

ANNUAL REPORT 2005

Dutch Research School of Theoretical Physics (DRSTP)
Landelijke Onderzoekschool voor Theoretische Natuurkunde (LOTN)

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Preface

This is the Annual Report 2005 of the Dutch Research School of Theoretical Physics (DRSTP). It provides an overview of the educational and research activities during 2005, intended for a broad spectrum of interested parties. The report also presents two research highlights written by staff members of the Research School. In addition, it offers a wealth of factual information, such as a list of the participating staff, of the PhD students, a comprehensive list of publications, as well as other relevant statistics.

The annual report is not the only information that we make available throughout the year. We also publish a monthly newsletter and a yearly guide of our educational activities. Up-to-date information on the DRSTP is also readily available on internet at: <http://www1.phys.uu.nl/drstp/>.

Finally, we should like to thank all of those who contributed to the Research School during this past year.

prof. dr. B. de Wit
Scientific director

prof. dr. K. Schoutens
Chair governing board

November 2006

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1 | The DRSTP in 2005

The Netherlands has a long tradition in theoretical physics which involves research performed at university institutes, industrial laboratories, and government institutions. The strength of this research area is, for a large part, based on the unity of methods employed in a wide range of applications. This reveals itself both in scientific research as well as in academic education.

In order to structure and coordinate the graduate education in theoretical physics, the Dutch Research School of Theoretical Physics (DRSTP) was accredited in 1994 by the Royal Netherlands Academy of Arts and Sciences (KNAW) and reaccredited in 1999 and 2004. The school is, at this moment, a cooperation between the theoretical physics groups of six Dutch universities: Universiteit van Amsterdam (UvA), Vrije Universiteit Amsterdam (VUA), University of Groningen (RUG), Leiden University (UL), Radboud University Nijmegen (RU) and Utrecht University (UU, commissioner). In addition, there are several associated groups and individual researchers.

The main objectives of the Dutch Research School of Theoretical Physics are to implement a joint programme of graduate education in theoretical physics and to maintain and strengthen research in theoretical physics from a broad unifying perspective that exploits the interrelationships between different fields of theory. The DRSTP is based on the conviction that a joint venture of all the moderately sized local theory groups, each with its own profile, offers added value for the achievement of these objectives. The current version of the mission statement and a short description of the DRSTP organization can be found in appendix A.

The DRSTP graduate programme in 2005

The DRSTP offers a joint programme of graduate education in theoretical physics leading to a PhD. As part of the research training, under supervision of a member-scientist of a participating university, the Research School guarantees a wide range of educational opportunities for its PhD students. These consist of postgraduate schools, advanced courses, seminars and topical courses in the Netherlands, and international experience in the form of workshops, summer schools or extended research visits abroad. As in previous years the educational board published the educational guide with an overview of the regular advanced courses taught at the universities.

In 2005 nineteen students obtained their PhD. The average time between the start of the research and the date of the PhD exam is 52,1 months. In reaction to comments in the reaccreditation report of the ECOS (KNAW) the rules for the admission of students to the DRSTP have become more strict. In this admission procedure, the so-called “agreement of education and guidance” (plan for training and supervision)

plays a crucial role. The selection and admission procedure is described in appendix B.

The DRSTP research programme

Theoretical physics is based on universal principles. New concepts often have a much wider validity than for the field where they were initially discovered, and methods of description developed in one field are often fruitful in another. Hence, theoretical physics is characterized by unity in diversity. The research programme of the DRSTP is organized according to two themes:

- Theme 1: Quantum field theory and elementary particle physics.
- Theme 2: Statistical physics, condensed-matter theory and quantum optics.

To give an impression of the variety of research topics, a highlight of each theme is presented in chapter 2. The specific content of the research programme depends on the responsible project leaders, on their creativity as well as their success in acquiring research funding from their home university, the Dutch research councils of NWO, or from international sources such as European Union programmes.

The 2005 research output of DRSTP members presented in this annual report is presented according to the two research themes.

Trends in Theory

Every two years the DRSTP symposium *Trends in Theory* takes place. In May 2005 the symposium was held for the sixth time. This symposium is also part of the educational programme of the PhD students, who are encouraged to present a poster at this occasion. The symposium is also an opportunity for permanent staff and postdoctoral fellows to meet and to get an overview of recent developments in theoretical physics. In appendix D more information about the symposium is given.

Staff mutations in 2005

Prof. dr. Y. Levin was appointed professor of theoretical astrophysics and prof. dr. H. Schiessel was appointed professor for the theoretical physics of life processes, both at the University of Leiden. Dr. G. Arutyunov was appointed as an associate professor at the Institute for Theoretical Physics (UU).

Dr. A.C.D. van Enter (RUG) was appointed adjunct professor of statistical physics at Groningen University and dr. R. Loll (UU) was appointed professor of theoretical physics at the Institute for Theoretical Physics (UU).

Prof. dr. G. Vertogen (RU), prof. dr. H. Knops (RU/UU) and dr. L.G. Suttorp (UvA) retired in the course of 2005.

Prof. dr. K.J.F. Gaemers (UvA) ended his affiliation with the DRSTP at the end of 2005 upon becoming the dean of the Faculty of Science at UvA.

Inaugural lecture

Dr. A. Achúcarro (UL) delivered her inaugural lecture *In praise of imperfection - a cosmological perspective* at Leiden University on 14 January 2005.

Guest chairs

Also in 2005 staff members and PhD students profited from the presence of world

renowned physicists appointed on the guests chairs.

Prof. dr. D. Weitz (Harvard) occupied the Van der Waals Chair at the Universiteit van Amsterdam. He taught a series of seminars on *Highlights in soft condensed matter*.

Prof. dr. P. Zoller (Innsbruck) occupied the Lorentz Chair at Leiden University. He taught a lecture course on *Quantum optics and quantum information*.

Prof. dr. P. Grassberger (Jülich) occupied the Kramers Chair at Utrecht University. He taught a lecture course on *Phase transitions and anomalous scaling in non-equilibrium systems*.

Visiting professorships held by DRSTP staff

F.A. Bais (UvA) was visiting research fellow at the Santa Fe Institute, USA (20 February - 20 May), a visiting professor at the Research School for Science and Engineering, Australian National University, Canberra, Australia (15 June - 28 August 28) and a visiting professor at the Yukawa Institute for Theoretical Physics, Kyoto University, Japan (20 September - 20 December).

B. de Wit (UU) was a visiting professor at the Yukawa Institute for Theoretical Physics, Kyoto University, Japan (1 January - 31 March).

F.C. MacKintosh (VUA) was a visiting professor of physics at the University of Edinburgh, UK (2004-2005).

J. Zaanen (UL) was a visiting professor at the Physics Department, Stanford University, Stanford, USA (September 2004 - August 2005).

Awards and distinctions

B. de Wit (UU) presented the Subashis Nag Memorial Lectures in Chennai, India, 9-13 December.

H. Sahlmann (UU) received the 2005 Physics Prize of the German Academy of Sciences in Göttingen, Germany.

F.S. Saueressig (UU) received the "Promotionspreis 2005" of the Friedrich-Schiller-Universität Jena (Germany) for his PhD thesis *Topological phase transition in Calabi-Yau compactifications of M-theory*.

G. 't Hooft (UU) became an honorary fellow of the Inter-University Centre for Astronomy and Astrophysics, Pune, India and a visiting fellow at STIAS (Stellenbosch Institute for Advanced Study), South Africa.

Visiting scientists (long term)

I.S. Burmistrov (Landau Institute, Moscow, Russia) was a guest at the Institute for Theoretical Physics (UvA) in 2005.

N. Mousseau (Montreal, Canada) was a guest at the Institute for Theoretical Physics (UU) from 10 June to 10 October.

Y. Yamamoto (Tsuru, Japan) was a guest at the Institute for Mathematics, Astrophysics and Particle Physics (RU) from 15 July to 25 August.

S. Panda (Harish-Chandra Research Institute, Allahabad, India) was a guest at the Centre for Theoretical Physics (RUG) during the month of September.

F.A.P. Aquiar de Moura (Portugal Science and Technology Foundation/Instituto Superior Técnico, Lisboa, Portugal) was a guest at the Institute for Theoretical Physics

Amsterdam (UvA) from 1 October to 30 December.

D. Rodriguez-Gómez (Spanish Ministry of Science/Universidad Orviedo, Spain) was a guest at the Institute for Theoretical Physics Amsterdam (UvA) from 1 October to 30 December.

This annual report is organized as follows. Chapter 2 contains two scientific highlights. Chapter 3 gives a description of the educational programme, short summaries of the PhD theses published in 2005, an overview of the scientific and educational activities of the PhD students affiliated to the DRSTP. An overview of the DRSTP scientific staff and associate members is given in chapter 4. The chapters 5, 6, 7 contain, respectively, the 2005 publications, talks and other presentations and science-related activities (public lectures, professional publications). Data on research funding are listed in chapter 8.

2 | Scientific highlights

This chapter presents two highlights of theoretical research carried out by members of the Research School. One concerns work on granular matter by the groups of Amsterdam and Leiden. This work belongs to statistical physics, one of the topics in theme 2 of the school. The contribution has been written by Bernard Nienhuis. The second highlight concerns a topic in quantum gravity and belongs to theme 1. It deals with the emergence of space and time. This work was carried out by the group in Utrecht in collaboration with researchers in Copenhagen and Krakow. The contribution has been written by Renate Loll.

Scale invariance and universality of force networks in static granular matter (Bernard Nienhuis, UvA)

Pebbles in a heap and grains of rice in a bag are kept in place by a network of contact forces which forms a fractal structure. The associated fractal dimensions and distribution function are universal, i.e. independent of the details of the grains considered. This is the surprising outcome of a study of force networks in so-called static granular matter, carried out by Srdjan Ostojic, Ellák Somfai and Bernard Nienhuis belonging to the groups of Amsterdam and Leiden. The discovery of these properties provides a new test for theoretical models, and promises a more elaborate mathematical description of force networks in granular matter, but also other systems such as foam and emulsions. These results were published in Nature [1].

Granular matter has been an extremely active field of research in the recent years. It concerns a form of matter, ubiquitous in both nature and industry: sand dunes, piles of apples at the grocer's, or pills in a conveyor belt are just a few examples. The behaviour of such assemblies of macroscopic particles is far from being understood satisfactorily and any insight gained on their properties is of direct consequence for civil engineering and industrial processing technology.

Static granular matter, formed by grains at rest, behaves in many aspects as a solid. If an external stress is applied, the assembly will resist it and remain at rest, as long as the stress is not too large. This rigidity is in first place due to inter-grain contact forces, which form a tenuous network (see Figure 2.1). These force networks determine fundamental physical properties of granular materials such as stability, elasticity and sound transmission.

A striking feature of the networks is the existence of irregular spatial patterns. As a large contact force on one side of a particle is typically balanced by another one on the other side, large forces tend to align in filamentary structures called “force chains”.

These disordered spatial structures are reminiscent of fractals, which characteristically have a similar appearance at various scales, yet a precise characterization has long remained elusive.

Identifying force chains

These fractal structures have been determined in granular packings created by computer simulations. The trick is to identify force chains by considering only forces larger than a given value, and ignoring others. Grains joined by forces larger than a given threshold form a cluster, whose size quantifies the extent of the corresponding force chain.

The size of the clusters of course depends on the value of the threshold. High thresholds isolate grains connected by the strongest forces in the packing. But as the threshold is decreased, more and more grains take part in force chains, and at a given critical value, a chain appears which spans the whole system. This point turns out to be analogous to a second order phase transition, so that close to it the clusters exhibit remarkable properties. In particular, the probability distribution of their sizes becomes scale-invariant, and can be characterized by a set of fractal dimensions, also called scaling exponents.

Both the values of these scaling exponents, and the distribution of cluster sizes close to the threshold turns out to be *universal*, i.e. independent of microscopic details in the system. It was shown that many physical parameters such as the rigidity of the grains, their roughness (mutual friction), their size distribution and the pressure applied on the packing, do not influence the values of the fractal dimensions.

Universal scaling behaviour

This universal scaling has been observed in granular packings for the first time and similar behaviour is expected in other “jammed” systems of macroscopic particles such as foams and emulsions. This universal behaviour can be used as a test for theoretical models of force chains. Some much-used models do not pass this test, but a recently formulated simple model shows exactly the same scaling properties as much more realistic packings. The mathematical formalism developed for the theory of second order phase transitions can now be applied in a novel context, and it will provide a more quantitative description of static granular systems.

[1] S. Ostojsic, E. Somfai and B. Nienhuis: *Nature*, 439, pp. 828-830, 16 February 2006.

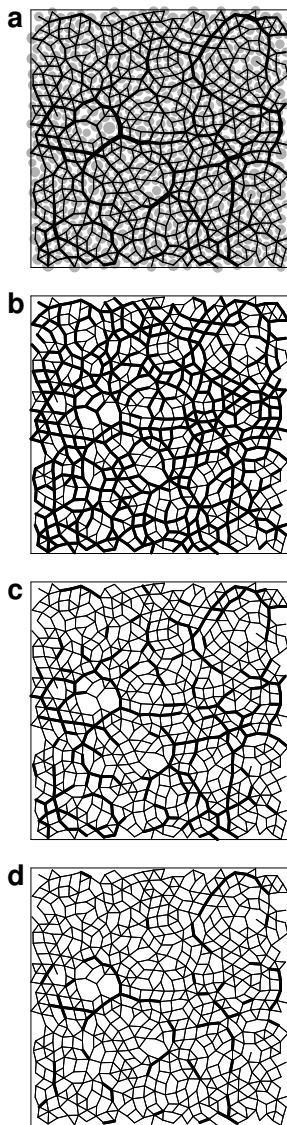


Figure 2.1: Force network and force chains: (a) Network of forces in a static packing of grains. The centers of grains in contact are joined by lines whose thickness is proportional to the associated force (b-d) clusters formed by forces larger than an increasing threshold; (a) for small values of the threshold almost all grains are connected; (c) for large values only the strongest force chains are isolated.

The surprising physics of “Nothing” (Renate Loll, UU)

One of the insights of 20th century physics was the recognition that the concept of *vacuum*, namely, what remains of space and time once all material objects are removed from it, is an interesting physical quantity in its own right. According to quantum theory and, more specifically, quantum field theory, which accurately describes three of the four known fundamental interactions (electro-magnetism, and the weak and strong nuclear forces), empty space is anything but empty. It is seething with vacuum fluctuations of fields and particles which appear and disappear out of nothing in rapid succession, within the limits set by the quantum uncertainty relations.

We do not yet have a good quantitative picture of this quantum vacuum. For example, the quantum fluctuations are purported to carry a so-called zero-point energy, and extracting this “energy from nothing” has spurred the imagination of researchers and science-fiction writers alike. However, when one tries to estimate the amount of energy contained in the vacuum fluctuations, it is clear that something must be wrong with this picture. If present, they would give such an enormous contribution to the energy of our universe that its cosmological history would be totally different from the one observed.

An obvious problem with such estimates is that they are made within a theoretical description which is still incomplete, because it accounts only for fluctuations in three of the fundamental interactions, and completely ignores the effects of the fourth one, namely, gravity. For a long time, researchers have speculated that the quantum fluctuations of the gravitational field will lead to a highly non-trivial structure of “empty” spacetime at very short distances, which in turn may result in a more fundamental understanding of notions like that of vacuum energy. Despite concerted efforts, discovering a *Theory of Quantum Gravity* to account for such phenomena remains one of the outstanding challenges of theoretical physics today.

A new approach to uncover quantum gravity is being pursued by Renate Loll and Jan Ambjørn from Utrecht (Ambjørn is also affiliated to the Niels-Bohr-Institute in Copenhagen) and Jerzy Jurkiewicz at the Jagellonian University in Krakow. Their main idea is to recreate empty spacetime from a set of minuscule building blocks, each representing a tiny piece of spacetime. One takes a very large number of such building blocks, and glues them together according to simple rules which incorporate the gravitational interactions (which determine how spacetime is curved), quantum theory and causality. There are very many ways in which the gluing can be done to obtain a macroscopic chunk of spacetime. All of them have to be taken into account and together form a concrete model of the quantum fluctuations of spacetime.

This approach of *quantum gravity through causal dynamical triangulations* [1] has several attractive features. Firstly, the nature of the effective quantum spacetime obtained from the superposition of all possible gluings is insensitive to the details of how the microscopic building blocks and gluing rules are chosen. This highly desirable property of *universality* – familiar from statistical mechanics and lattice formulations of QCD – guarantees that the physics does not depend on the fine details of the model which were chosen by hand. Secondly, although the strong interactions make

perturbative methods unsuitable, the system can be investigated numerically with Monte Carlo methods. Thirdly, and somewhat unusually in this area of research, the approach has produced some new and unexpected results.



Figure 2.2: In the described quantum gravity theory, the dimension of spacetime changes smoothly from 2 to 4 dimensions. Also the Dutch artist M.C. Escher was fascinated by such transitions in dimensionality.

Understanding the geometric and physical properties of the quantum spacetime generated by the method is a challenging task. Most recently, a surprising result was found by studying a diffusion process on the quantum-fluctuating spacetime: its *spectral dimension*, which characterizes how other fields will propagate in it, turns out to be scale-dependent, an effect not previously observed in quantum gravity. At large distances, this dimension is four, as one would expect from a quantum gravity theory with the correct classical limit. However, at short distances, where quantum effects dominate, it is found to be close to two, with further indications that spacetime at and below this so-called Planck scale has a fractal structure [2]. This is exciting

because it is the first concrete piece of evidence of what the microstructure of spacetime (usually dubbed “spacetime foam”) may be like, in a way that could not have been predicted from Einstein’s classical theory. The fact that its effective dimension is reduced to two as one approaches the Planck scale indicates furthermore that the gravitational degrees of freedom will generate dynamically a short-distance cutoff in spacetime, a mechanism much sought-after to eliminate unphysical infinities in quantum field-theoretic calculations. These are encouraging milestones in a research programme that is ongoing and aiming to shed further light on some longstanding mysteries concerning the “mother of all vacua”.

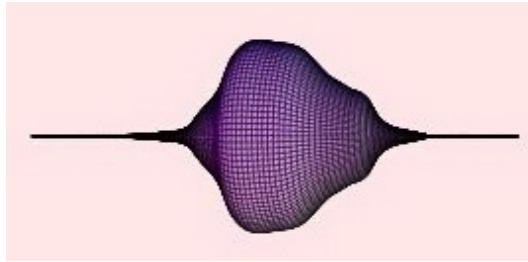


Figure 2.3: The shape of a macroscopic universe emerges dynamically from gluing together microscopic pieces of spacetime and letting them interact according to the rules of gravity and quantum theory.

- [1] J. Ambjørn, J. Jurkiewicz and R. Loll: *The Universe from Scratch*, Contemporary Physics 47 (2006) 103-117 [arXiv: hep-th/0509010] (an overview article for non-experts).
- [2] J. Ambjørn, J. Jurkiewicz and R. Loll: *The Spectral Dimension of the Universe is Scale-Dependent*, Physical Review Letters 95 (2005) 171301 [arXiv: hep-th/0505113].

3 | PhD programme

This chapter provides an overview of the educational programme and of the PhD degrees granted in 2005. Research projects of the current PhD students and data on their scientific and educational activities in 2005 are given.

The DRSTP offers a joint programme of graduate education leading to a PhD. The educational programme is based in part on the regular advanced courses, seminars and topical courses offered at the participating universities. The DRSTP organizes at least two postgraduate schools every year. Furthermore students can gain international experience by attending (international) workshops or summer schools and, in certain cases, by making extended research visits abroad. The governing board is advised on educational matters by the educational board. Regular advanced courses at the universities are published in a nationwide survey at the beginning of each academic year.

Seventy-one (71) PhD students were affiliated with the DRSTP on December 31, 2005. Nineteen (19) PhD students obtained their PhD in 2005. The governing board of the DRSTP decides on admission of individual PhD students and monitors their progress. The affiliation of students is based on the “agreement of education and guidance” (plan for training and supervision), drawn between each individual student and his/her advisor(s). This document is submitted to the governing board before a decision is taken about the formal affiliation. An extended description of the selection and supervision procedure is presented in appendix B of this annual report.

3.1 Educational programme

3.1.1 DRSTP postgraduate courses (AIO/OIO schools)

The following courses were held in 2005:

Theoretical High Energy Physics (THEP)

The DRSTP postgraduate course (AIO/OIO school) Theoretical High Energy Physics was held from 24 January to 4 February 2005 in Conference Center Jonkerbosch, Nijmegen. The programme was organized by E. Laenen (NIKHEF/ UU) and S. Vandoren (UU) and included the following lectures (7,5 hours each):

G. 't Hooft (UU): *Topics in advanced quantum field theory*

T. Prokopec (UU): *Inflation, baryogenesis and the CMB spectrum*

E.P. Verlinde (UvA): *String theory and black holes*

S. Weinzierl (MPI, Munich, Germany): *Higher-order perturbation theory*

In addition to these lecture courses, daily discussion/problem sessions were held in the afternoon (7,5 hours each week).

An evening seminar (3 February) was given by F.A. Bais (UvA) entitled: *To be or not to be: monopoles in gauge theories*. The other evening presentations (15 minutes) were given by the students.

Thirty-one (31) people participated. Twenty-three (23) of them were from the Netherlands, eight (8) participants came from Belgium (5 KU Leuven, 2 UL Brussels, 1 UC Louvain). Further information is given in appendix C.

Statistical Physics and Theory of Condensed Matter (SPTCM)

The DRSTP postgraduate course (AIO/OIO school) Statistical Physics and Theory of Condensed Matter was held from 25-29 April 2005 in Conference Centre Jonkerbosch, Nijmegen. The programme was organized by A. Fasolino (RU) and H. van Beijeren (UU) and included the following lectures (3 hours each):

H. Knops (RU): *From real space to dynamical renormalization*

C.W.J. Beenakker (UL): *Quantum information and quantum computers*

H. Schiessel (UL): *From DNA to chromatin: the physics of DNA compaction*

L.-F. Feiner (Philips/UU): *Orbital physics*

In addition to these lecture courses, daily discussion/problem sessions were held in the afternoon (2 hours for each lecture course). An evening seminar (27 April) was given by N.G. van Kampen (UU) entitled: *The changing face of physics*. The other evening presentations (15 minutes) were given by the students.

Seventeen (17) students participated. Sixteen (16) of them were from the Netherlands, one participant came from Belgium (Univ. Antwerpen). Further information is given in appendix C.

3.1.2 DRSTP symposium Trends in Theory

The 6th biennial symposium Trends in Theory was held from 19-20 May 2005 in Conference Center De Bron, Dalfsen, the Netherlands. One hundred (100) people participated. The programme included the following lectures (40 minutes each):

R.H. Dijkgraaf (UvA): *The quantum geometry of strings and black holes*

H. Schiessel (UL): *DNA folding: the physics of chromatin*

E. Pallante (RUG): *From lattice QCD to astrophysics: building the bridge with terascale computers*

C. Morais Smith (UU): *High- T_c superconductors: the status of research nearly 20 years after discovery*

M.I. Katsnelson (RU): *Nanoscale world between quantum and classical*

D. Frenkel (AMOLF): *Unconventional Monte-Carlo algorithms*

C. Timmermans (NIKHEF/RU): *Science and outreach: The HiSPARC project*

T. Prokopec (UU): *Baryogenesis: the quest for the origin of matter*

J. van den Brink (UL): *A limit to quantum coherence due to spontaneous symmetry breaking*

F. van Lunteren (UU): *Lorentz, Einstein, Ehrenfest and the rise of theoretical physics*

In addition to these lectures, poster presentations were held on both days. Forty-six (46) posters were presented. A panel discussion was held (19 May) with the topic: *Gigabits wiser or just a bit* by S. de Leeuw (TUD, chair), G. Barkema (UU), E. Pallante (RUG) and P.R. ten Wolde (AMOLF).

Further information is given in appendix D.

3.1.3 Guest lecturers

Prof. dr. D. Weitz (Harvard) occupied the Van der Waals Chair at the Universiteit van Amsterdam. He taught a series of seminars on *Highlights in soft condensed matter* in March 2005.

Prof. dr. P. Zoller (Innsbruck) occupied the Lorentz Chair at Leiden University from March to June 2005. He taught a lecture on *Quantum optics and quantum information*.

Prof. dr. P. Grassberger (Jülich) occupied the Kramers Chair at Utrecht University from September until the end of December 2005. He taught a lecture course on *Phase transitions and anomalous scaling in non-equilibrium systems*.

3.2 PhD degrees and subsequent employment

In 2005 nineteen (19) PhD students received their PhD degree.

Nine (9) of them received postdoctoral positions in theoretical physics (in Belgium, Germany, Switzerland and the UK), five (5) a position at a commercial company, two (2) a position as scientist at a non-physics public research institute, one (1) a position with the government and one (1) became high school teacher. Of one (1) student the subsequent employment is not known. More information on career moves of former PhD students during the last six years can be found in appendix E.

3.3 PhD degrees granted in the DRSTP in 2005

In this section a short summary of the PhD theses published in 2005 is given. The summaries are written by the students themselves.

Baggio, C. (UL)

thesis title: *Dynamics of vortex fronts in type II superconductors*

advisor: prof. dr. ir. W. van Saarloos

date: 22 November 2005

present position: pricing actuary assistant, PartnerRe, Zürich, Switzerland

In this thesis we have described and analysed some out-of-equilibrium patterns in type II superconductors. The main issue on which this work focused was the propaga-

tion of fronts separating two different coexisting phases. We explored in particular the dynamics of an interface between the intermediate and the superconducting state as a first example, and the dynamics of an interface between flux of opposite sign as a second case.

The central theme of this thesis is the collective behaviour of vortices and their final distribution into domains whose shape is not trivially dependent on the material inhomogeneities, but determined extrinsically by an instability. We have seen that flux penetration can occur through the development of vortex domains, which have a well defined shape and propagate very rapidly. A first question that arises towards the understanding of this pattern formation is which physical factors play a fundamental role in the development of these phenomena. Moreover, a second issue is the study of the pattern features, like the shape and the characteristic size.

An important characteristic of systems of vortices is that they are dissipative: the vortex motion is always accompanied by dissipation, due to the normal nature of the cores. The heat released because of the coupling between the induced electro-magnetic field and the currents certainly has dramatic effect on the stability of the material. A temperature increment continues to grow if the amount of heat that is generated in this process can not be transferred to the substrate with a fast enough rate. Since, especially in the creep regime, the dynamics of vortices is driven by a thermal activation over the pinning barriers, as a consequence of the over-heating, a large amount of flux penetrates, leading to avalanches. In this thesis we have underlined the importance of this interplay on the selection of the pattern shape and of the dynamics of the front. While in Chapter 2 we have strengthened these ideas by proposing a model with a self-organized finger-like domains dependent on the temperature distribution, in Chapter 3 we have pointed out the limitation of a model that does not include this dependence.

Beside the relevance of the temperature for the dynamics of vortices, a fundamental characteristic for their collective behaviour is that, contrary to the particles of other pattern-forming systems, they do not attract but repel each other. This has an immediate consequence for the properties of a finite-size domain of vortices, since the absence of a stabilizing factor like the surface tension e.g. at the interface between a solid and a liquid makes the study of the final pattern selection non-conventional.

On the other hand, in Chapter 3 we have considered a system of vortices of opposite sign that attract each other and annihilate by dissipating the core energy.

In both examples of vortex front dynamics that we have investigated, we have adopted a coarse-grained picture for the magnetic flux distribution, in which we have neglected the finite core size and the non-local relations ignored by the London approximation. A more accurate analysis beyond this cutoff scale, would be provided by the Ginzburg-Landau equations. For the first case of propagating front, this macroscopic continuum description implies a picture with a domain of constant density of magnetic flux and a sharp transition zone at the interface with the superconducting state. In the second case, instead, the continuity involves a singularly vanishing front at the boundaries with vortices and anti-vortices. This approach, however, is justified in both cases since it does not affect the relevant dynamics of the front. In the first case we are interested indeed in the contour dynamics of the domain of vortices, for which a one-dimensional description is quite appropriate, as we have seen, whereas in

the second one we concentrate on the long-wavelength behaviour of the front and the interface dynamics is not affected by the singularity.

In Chapter 2 we have studied finger-like domains of vortices in Nb thin films and investigated their characteristic shape and width. We have proposed and built a novel-type of model for the front dynamics based on a boundary-layer approximation. This approach, which has extensively been used for other pattern-forming systems to describe phenomena like dendrites at the solid-liquid interface or viscous fingering, had never been used for systems of vortices. Even if our formulation has some limitations, like e.g. the neglected non-locality of the current response or long-ranges forces, it captures, however, the essentiality of the phenomenon and provides a proof for the well-defined shape of finger-like patterns. In our model, by supporting the theory of a thermo-magnetic instability, we suggested the picture of propagating fingers with a self-organized shape, with a relatively higher mobility and velocity at the tip and a lower mobility and velocity on the side. A higher speed leads to an enhanced mobility and therefore more heat is generated. From our analysis we could estimate the fingers width and its dependence on the substrate temperature. In order to understand more complex structures than the flux filaments with finger-like shape, the long-range interactions between current ribbons at the edge of the domain should be included. Moreover, to study dendritic patterns one should take into account also inhomogeneities. As supported by previous numerical simulations, indeed, flux filaments can split and evolve into patterns with a branched-like morphology when they encounter a defect.

In Chapter 3 we have analyzed the stability of an interface between vortices of opposite sign. The aim of our investigation was to understand the mechanism that leads to the unstable “turbulent” behaviour observed at the boundaries of a $YBa_2Cu_3O_{7-\delta}$ crystal. In particular we examined whether such an instability originates from the in-plane anisotropy of the sample, in analogy with the Kelvin-Helmoltz effect between adjacent layers of fluids. An in-plane anisotropy, indeed, generates in fact a shear between the two regions of flux of opposite sign, due to a velocity component along the interface. From our analysis it has emerged that an instability is never observed for a moving vortex-front, if the coupling with the temperature is not taken into account. In the case with a symmetric stationary interface, instead, we have found an instability for extremely high coefficients of in-plane anisotropy, confirming previous analysis. However, the critical anisotropy coefficient, has a value much too high when compared with experimental measurements for an $YBa_2Cu_3O_{7-\delta}$ sample. We conclude therefore that only a model that takes in account the coupling of the temperature, including a dissipative term and a temperature-dependent viscosity in the flux flow regime, could capture the essence of the instability.

Boels, R.H. (UvA)

thesis title: *Integrable structure in low energy effective supersymmetric gauge theory*

advisor: prof. dr. J. de Boer

date: 14 October 2005

present position: postdoctoral fellow, Oxford University, UK

Over the last decades it has become increasingly clear that the standard model of

particle physics does a fantastically good job of describing the known basic forces in nature, apart of course from gravity which is described by the separate theory of general relativity. However, much of this understanding is based on a perturbation theory in the various coupling constants and a natural question is what happens when some or even all of these couplings become large. This is a problem in particular in understanding the strong nuclear force, which among other things should bind quarks into protons. The quantum field theory which describes this force, quantum chromodynamics (QCD) is weakly coupled on small distance scales and becomes strongly coupled when viewed on larger distance scales. The ‘large’ and ‘small’ in the previous sentence refer to a distance scale of about the radius of a proton. This phenomenon of weak coupling at short distance scales is called asymptotic freedom and is of fundamental importance in describing high energy phenomena. However, when one is interested in, for instance, how exactly quarks are bound into protons or then reason why never lone particles with color charge are seen, we need to know how the theory behaves at larger distance scales where perturbation techniques are not applicable.

An time-tested avenue of attack on physical problems is the study of simplified models which are as close as possible to the model we are interested in while being completely solvable. A spectacularly successful class of models for the standard model can be obtained by introducing supersymmetry, a symmetry which interchanges bosons and fermions. A surprise in the study of these models at the low energy scales we are interested in has been that they are related in a mathematically natural way to particular classical completely integrable systems known from classical mechanics and much-studied in mathematics. Integrable systems are multi-particle systems in classical mechanics which in a precise sense contain so much symmetry that they are actually in principle completely solvable, which is a very rare property for n -body systems. Although there is a natural mathematical relation, physically the connection between supersymmetry and gauge theory is unclear. My thesis is a part of the study of this connection.

Collinucci, G.A. (RUG)

thesis title: *Instantons and cosmologies in string theory*

advisor: prof. dr. E.A. Bergshoeff

date: 7 October 2005

present position: postdoctoral fellow, KU Leuven, Institute for Theoretical Physics, Belgium

This thesis deals with problems in two subdomains of string theory that are a priori unrelated, and in the last chapter, links are established between those two. The first topic of research is that of D-instantons. These are mathematical objects that allow one to compute physical effects that are missed by the standard perturbation theory approach to string theory, and quantum field theory in general. In this thesis, three families of D-instantons are studied, and are shown to be mathematically related to electrically charged black holes.

The second topic of this thesis is cosmology in string theory. In recent years, new hope has arisen that string theory might be able to explain two important cosmological events in our universe: inflation and present day acceleration. In this thesis, toy

models are studied with the goal of determining whether string theory is at all capable of providing viable scenarios for these. The results show that string theory can certainly generate present day acceleration, however, a realistic scenario for inflation is yet to be found.

In the final chapter of this thesis, two mathematical correspondences between D-instantons and cosmologies in string theory are shown. Although both correspondences are technical in nature and no physical consequences can be directly attributed to them, there is hope that the second of these two might help resolve the Big Bang singularity. The standard theory of general relativity does not describe what happened at the time of the Big Bang reliably, as it predicts a singularity in spacetime at that moment. The result in this thesis hypothetically might be hinting at a possible resolution of this, by painting a picture where the universe would have gone through a contraction, and then through a re-expansion that we now call Big Bang, as opposed to the current picture of a universe that “starts” at the Big Bang.

Dei Cont, D. (UvA)

thesis title: *Loops, colors and tiles*

advisor: prof. dr. B. Nienhuis

date: 1 November 2005

present position: unknown

The task of statistical mechanics is to derive the macroscopic behaviour of a many body system from the microscopic interactions between the elementary degrees of freedom. Usually this is done by means of a number of simplifications and approximations. When the macroscopic behaviour is dominated by collective aspects, the techniques have to be especially acute and subtle, as the standard approximation schemes generally fail to predict the truly collective behaviour. The saving grace for this class of behaviour is that it has many universal qualities. In other words many properties of collective behaviour depend only on very few parameters of the system. As a result there has been much attention for the development of solvable models for the description of collective behaviour. In these models the many parameters on which the universal aspects of the macroscopic behaviour do not depend are chosen to optimize the possibilities of exact analysis.

One of the methods used for this exact analysis is called the Bethe Ansatz. It is a proposal for the form of eigenvectors, first formulated by Hans Bethe in his solution of the quantum Heisenberg chain. The proposal turned out to be true and has been generalized to be valid for many many models in statistical mechanics and quantum mechanics. In this thesis the method is explained by applying it to the problem of tiling the plane with rhombi. In this case the result is particularly simple because it is equivalent to the behaviour in time of a gas of free fermions in one space dimension. Subsequently the method is applied to two other problems. The first is the double fully packed loop model (FPL²). In this model the edges of the square lattice are completely and singly covered by loops of two kinds so that each vertex is visited by both kinds. The weight of each permissible configuration is determined solely by the number of loops of each kind. This model has been studied before but not previously was it noted that it can be solved exactly. It has applications in the description of

polymers in the melt. Several specializations of the model are outstanding combinatorial problems. The bulk thermodynamic functions are calculated as well as the leading size dependence and the asymptotic behaviour of a variety of two-point correlations.

The thesis also discusses the problem of tiling the plane with squares and equilateral triangles. This is a model for twelve-fold symmetric quasi crystals, provided the number of squares and triangles are tuned to cover an equal area each. When more than half of the area is covered by squares, the model describes an incommensurable crystal of square symmetry. It is this phase which is studied in the thesis. The study focusses on the question of scale- and conformal invariance. The result of the study is that the model is equivalent to the spatio-temporal behaviour of a mixture of two fermionic gases. The fermions do not interact with others of the same kind but only with the other kind. On large scales this interaction results in an affine rescaling of the space time of the fermions, different for the two types. Apart from this rescaling the fermions are free.

Eenink, M.G.C. (RUG)

thesis title: *Dirichlet branes, effective actions and supersymmetry*

advisor: prof. dr. M. de Roo

date: 28 October 2005

present position: postdoctoral fellow, Netherlands Cancer Institute, Department of Radiation Oncology, Amsterdam

Theoretical high-energy physics searches for a mathematical description of the fundamental building blocks of nature. The established theories in this field are the Standard Model and General Relativity Theory (GRT); both are quantum field theories. The Standard Model describes all particles known to us, as well as the electromagnetic interactions and the weak and strong nuclear forces between them. GRT only describes the gravitational force.

At the relatively low energies that are used by particle physicists in their experiments these quantum field theories work quite well. However, it turns out that at very high energies these theories are no longer valid, and have to be replaced by something new. Situations where these extreme energies occur can be found in our universe: the period right after the Big Bang, or processes in a black hole are examples.

String theory is a very promising effort to find a unifying mathematical description of all matter and all four forces which will be valid at arbitrarily high energies. In quantum field theory the mathematical model for a particle is a zero-dimensional object, i.e., a point. However, in string theory particles correspond to the vibrational modes of a fundamental one-dimensional object, i.e., a string.

String theory is still under construction: the theory is far from finished. In the past ten years it has become clear that next to the one-dimensional strings also higher-dimensional objects, so-called branes, play an important role.

An important class of branes are the Dirichlet branes. They behave like black holes, but when they coincide their behaviour turns out to be quite exotic. The quantum-field theoretical description of their low-energy behaviour is an important tool to study their properties. In my research programme I have used several techniques,

described in more detail in my thesis, to obtain new contributions to these effective quantum field theories.

Falco, G.M. (UU)

thesis title: *Resonantly-interacting ultracold atomic Fermi gases*

advisor: prof. dr. ir. H.T.C. Stoof

date: 3 October 2005

present position: postdoctoral fellow, Faculty of Physics, University Duisburg-Essen, Germany

The thesis contains a detailed analysis of the two-channel atom-molecule effective Hamiltonian for an ultracold two-component homogeneous Fermi gas interacting near a Feshbach resonance. We focus in particular on the two-body and many-body properties of the dressed molecules in such a gas. First we give a brief description of the Feshbach multichannel scattering in ultracold atomic gases based on the eigenstates of the microscopic atomic physics Hamiltonian. Then we introduce a low-energy effective quantum field theory based on a two-channel atom-molecule Hamiltonian. The field theory is solved in the many-body T-matrix approximation. An exact result for the many-body T-matrix of the two-channel model is derived both by considering coupled vertex equations and by functional integral methods. The field theory incorporates exactly the two-body physics of the Feshbach scattering by means of simple analytical formulas without any fitting parameters. New interesting many-body effects are also discussed in connection with the possibility of having narrow resonances. The paper also contains a description of the BEC-BCS crossover above and below T_c . The effects of different approximations for the selfenergy of the dressed molecules are discussed. The single-channel results are derived as a special limit for broad resonances. Moreover, through the analysis of the BEC limit, where analytical calculations are possible, the relation between the composite boson of the single-channel model and the dressed-molecule of the two-channel model is clearly formulated and likewise at a mathematical level.

Fusco, C. (RU)

thesis title: *Friction and diffusion dynamics of adsorbates at surfaces*

advisors: prof. dr. A. Fasolino; prof. dr. T.W.J. Janssen

date: 5 July 2005

present position: postdoctoral fellow, Faculty of Physics, University Duisburg-Essen, Germany

A theoretical study of the motion of adsorbates (e.g. atoms, molecules or clusters) on solid surfaces is presented, with a focus on surface diffusion and atomic-scale friction. These two phenomena are inextricably linked, because when an atomic or molecular adsorbate diffuses, or is pulled, it unavoidably experiences friction, opposing its motion. Since the adsorbate typically extends over the length scale of nanometers, the simple, empirical laws of friction known for the macroscopic world do not hold in this context. The aim of this work is to investigate the microscopic dynamical mechanisms of surfaces diffusion and to find a “counterpart” of the macroscopic laws of friction

at the nanoscale. After a brief introduction about the experimental techniques and the computational methods to study surface diffusion and nanoscale friction, we consider the one-dimensional diffusion of a diatomic molecule on a periodic surface. At variance with the case of a single atom, complex dynamical features related to the interparticle interaction are observed, such as highly non-linear behaviour, anomalous diffusion, resonances and chaos. In the last part of the work, the velocity and load dependence of atomic-scale friction are presented. For a pair of macroscopic objects, friction is independent of their relative sliding velocity and is proportional to the applied load. At the nanoscale, we find an appreciable non-linear dependence of friction on sliding velocity in the framework of the Tomlinson model, whose specific form depends on the presence or not of thermal effects. The load dependence is studied for a model of friction on graphite, using molecular dynamics simulations. It turns out to be non-linear, with an exponent larger than one. We also report dynamical effects observed in the motion of extended flakes of graphite, where the role of surface registry is important to achieve very low friction.

Goorden, M.C. (UL)

thesis title: *Superconductivity in nanostructures: Andreev billiards and Josephson junction qubits*

advisor: prof. dr. C.W.J. Beenakker

date: 15 September 2005

present position: postdoctoral fellow, University of Geneva, Switzerland

Fundamental research on superconductivity can be broadly divided into two classes, each with its own motivation. The first class of research studies novel mechanisms of electron pairing, that might persist at higher temperatures than the conventional phonon-mediated pairing. The second class studies novel effects that occur when conventionally paired electrons are confined to structures of sub-micrometer dimensions (so-called nanostructures). The motivation here is not the search for higher transition temperatures, but the integration of superconducting elements in computer circuits. The research described in this thesis falls in the second class, the study of superconductivity in nanostructures.

Two types of nanostructures have been investigated, Andreev billiards and Josephson junction qubits. An Andreev billiard is an impurity-free region in a two-dimensional electron gas (a so-called quantum dot), coupled to a superconducting electrode via a point contact. The fundamental question that we have answered is how the excitation gap of the electron gas, caused by Andreev reflection at the superconductor, depends on the Ehrenfest time. This time scale governs the crossover from classical to quantum chaos in quantum dots.

A Josephson junction qubit is a superconducting ring in which the direction of the current is a quantum mechanical superposition of clockwise and counter-clockwise. Such a device is one of the possible building blocks of a quantum computer. To describe existing experiments we have developed a quantitative theory that takes into account both the time-dependent external magnetic field used to control the qubit and its coupling to a quantum measurement device.

Henneman, A.A. (VUA)

thesis title: *Scale dependence of correlation on the light-front*

advisor: prof. dr. P.J.G. Mulders

date: 2 February 2005

present position: research scientist, Department of Parasitology, Leiden University Medical Center, the Netherlands

Quark distribution and fragmentation functions describe the probability of finding a quark with a specific polarization and fraction of the parent hadron's momentum. These functions are being measured in highly energetic scattering experiments and are treated in a field theoretic description. The field theory that describes the behaviour of quarks and gluons, the mediators of the force between quarks, is called Quantum Chromodynamics (QCD). QCD possesses the property of asymptotic freedom, which means that at high energy, quarks behave as if they were free and their interactions can be described in perturbation theory. Consistent description of distribution and fragmentation functions within a QCD framework, requires to define these functions including perturbative corrections. This results in functions depending on the scale, which can be regarded as a resolution, at which they are measured. This scale dependence, known as evolution, connects the numerical values of these functions at the different scales at which they were measured. In this thesis we present the results for the scale dependence of a new type of distribution and fragmentation function, which appear when quark momentum in transverse directions with respect to the highly energetic scattering is incorporated in the description. The evolution of these distribution and fragmentation functions has a complicated structure. This is not surprising as inclusion of transverse quark momentum, leads to the presence of additional, quark-gluon interaction dependent functions in the evolution equations.

Kadar, Z. (UU)

thesis title: *The polygon representation of three dimensional gravitation and its global properties*

advisor: prof. dr. G. 't Hooft

co-advisor: dr. R. Loll

date: 18 April 2005

present position: postdoctoral fellow, Mathematics Department, Heriot-Watt University, Edinburgh, UK

Three dimensional Lorentzian general relativity with zero cosmological constant and spinless point particles is studied. The topology of spacetime is $M \times \mathbb{R}$, where M is a Riemann surface and global hyperbolicity is assumed. The system has only a finite number of degrees of freedom corresponding to non-trivial topology, since all solutions of the vacuum Einstein equations are locally flat spaces in three dimensions. After a generic introduction to phase space reduction, the polygon model of 't Hooft is introduced.

This finite dimensional Hamiltonian system is encoded in a number of Euclidean polygons. It arises as the foliation of the three dimensional universe with spacelike Euclidean polygons, whose edges are decorated by two real numbers, their lengths L

and the “so-called” boost parameters h of the corresponding transition functions of the geometric structure. Such an object is an element g of the Lorentz group $SO(2,1)$. Particles are easily added to this model by cutting out wedges from the polygons corresponding to a new pair of glued edges meeting at the “point particle”. The condition for the angle at the tip of the wedge is $\text{Tr } g = \cos(m)$ in suitable units, where m is interpreted as the mass of the particle, which determines the angle. The deficit from 2π in the rest frame of the particle is equal to its mass. These vertices carry three dimensional curvature singularities as opposed to the trivalent ones.

This thesis contains two main results. One concerns the case of a higher genus space-like slice without particles. It is shown that the h variables parametrize Teichmüller space, (which is the reduced configuration space of physically distinct universes) if they are interpreted as geodesic lengths in hyperbolic space. Then the dual graph of the skeleton yields an ideal triangulation of a uniformizing hyperbolic with the same topology as the physical equal time surface and with constant curvature -1 . Using this, one can show that the constraints corresponding to the closure of the Euclidean polygon (in case there is only one) can always be solved by a clever choice of the chart corresponding to basepoint of the geodesic loops on the uniformizing surface. It is very likely that each physically distinct universe admits a slicing in terms of only one polygon. The question of generalization for particles is more difficult, and explicit configurations are found where the construction does not work.

The second result is the derivation of the postulated symplectic structure from the first order action of general relativity by means of symplectic reduction. It is done in two steps: the first is a reduction from the (infinite dimensional) dynamical fields of the action to a finite set of variables describing a non-planar polygonal contour in a background Minkowski space. This covariant model is then gauge-fixed to obtain the 't Hooft polygon model. In the last subsection aspects of quantization procedures from these and related starting points are discussed.

Nogradi, D. (UL)

thesis title: *Multi-calorons and their moduli*

advisor: prof. dr. P.J. van Baal

date: 29 June 2005

present position: postdoctoral fellow, Wuppertal University, Germany

Pure Yang-Mills instantons are considered on $S^1 \times R^3$ – so-called calorons. The holonomy – or Polyakov loop around the thermal S^1 at spatial infinity – is assumed to be a non-centre element of the gauge group $SU(n)$ as most appropriate for QCD applications in the confined phase. It is shown that a charge k caloron can be seen as a collection of nk massive magnetic monopoles – coming in n types – each carrying fractional topological charge. This interpretation offers a physically appealing way of introducing monopole degrees of freedom into pure gluodynamics: as constituents of finite temperature instantons.

Using the Nahm transform an elaborate treatment is given for arbitrary topological charge and new exact and explicit solutions are found for $SU(2)$ and charge 2. The k zero-modes of the Dirac operator in the background of a charge k caloron are computed, and are shown to ‘hop’ between the n types of monopoles as a function of

the temporal boundary condition. The abelian limit – where it is assumed that the massive field components can be dropped – is analysed in great detail and is shown that the abelian charge distribution of each monopole type coincides with the corresponding fermion zero-mode density.

The $4nk$ dimensional hyperkahler moduli space is identified as an algebraic variety, defined by four matrices obeying a constraint, modulo a natural adjoint action. This moduli space is proved to be the same as the moduli space of stable holomorphic bundles over the complex projective plane which are trivial on two complex lines. A description is given for its twistor space which allows for the computation of the exact hyperkahler metric – at least in principle.

Finally, lattice gauge theoretic applications are mentioned and is explicitly demonstrated how to obtain calorons on the lattice using the method of cooling.

Papadimitriou, I. (UvA)

thesis title: *Aspects of the gauge/gravity duality and holography*

advisors: prof. dr. J. de Boer; dr. K. Skenderis

date: 6 September 2005

present position: postdoctoral fellow, DESY Theory Group, Hamburg, Germany

One of the most important developments in string theory in recent years has been the discovery of the correspondence or duality between certain string theories and certain gauge theories. Such ‘gauge/string dualities’ are ‘strong/weak coupling dualities’ since they relate the strongly coupled regime of one theory to the weakly coupled limit of the other and vice versa. As a result, the gauge/string dualities have allowed for a deeper understanding of both string theory and gauge theory in regimes that were inaccessible by other techniques.

In this thesis we focus on a subclass of ‘gauge/string dualities’ where the relevant string theory admits a supergravity description at low energies and hence the duality becomes a ‘gauge/gravity’ duality. The supergravity in question is usually Type IIB supergravity in ten dimensions or eleven dimensional supergravity, which can be consistently truncated to some gauged supergravity in lower dimensions. Such gauged supergravities typically admit asymptotically locally Anti de Sitter (AdS) solutions, which, via the gauge/gravity duality are dual to the gauge theory living on the conformal boundary of the AdS space.

In particular, correlation functions of BPS gauge-invariant operators of the (strongly coupled) gauge theory, in a particular vacuum of the theory, can be computed from the on-shell supergravity action, which is a functional of the arbitrary Dirichlet boundary conditions of the supergravity fluctuations around the solution corresponding to the gauge theory vacuum in question. Such computations, however, are obstructed by the divergences of the on-shell supergravity action, which arise due to the infinite volume of the AdS spaces.

In Chapter 3 of this thesis we review the method of Holographic Renormalization, which allows for a systematic removal of the infrared divergences of the supergravity action by constructing a set of covariant boundary counterterms, and we develop a more efficient Hamiltonian version of holographic renormalization. In Chapter 4 we apply this method to the computation of various correlation functions in $\mathcal{N} = 4$ super

Yang-Mills theory as well as in the field theory dual to the Janus solution of gauged supergravity in five dimensions. Finally, in Chapter 5 we apply the Hamiltonian version of holographic renormalization to study the thermodynamics of AlAdS black holes and we prove that such black holes satisfy the first law of thermodynamics, even if there is a non-vanishing conformal anomaly.

Reijnders, J.W. (UvA)

thesis title: *Quantum phases for rotating bosons*

advisor: prof. dr. K. Schoutens

date: 24 May 2005

present position: consultant, Benelux Unit A.T. Kearney, the Netherlands and Belgium

The thesis deals with Bose Einstein condensates enriched by 'extra ingredients' rotation and spin. First we study the influence of a co-rotating periodic potential (1- or 2-dimensional optical lattice) on the structure of a vortex lattice in a BEC. In the phase diagram we find structural transitions as function of the lattice strength and the vortex density. A calculation of the dispersion of the collective modes of the vortex lattice reveals that they acquire a gap in the presence of the periodic potential. Secondly, we consider a rotating condensate in which three spin components are included. We map out the phase diagram of a rotating spin-1 condensate by identifying the structure of the spin textures as a function of the interaction strengths and angular momentum. Third we focus on the implications of ultra fast rotation in a (single component) condensate. We discuss density features of atomic quantum Hall states in a multi-layer geometry, which are relevant for a specific experimental set-up.

Schaap, H.G. (RUG)

thesis title: *Ising models and neural networks*

advisors: prof. dr. A.C.D. van Enter; prof. dr. M. Winnink

date: 23 May 2005

present position: ICT-Trainee, Collis, Leiden, the Netherlands

The goal of the research area of my thesis is to bridge the gap between the behaviour of matter on the microscopic and on the macroscopic scale. Matter can in fact have quite different properties in these two regimes. On microscopical scales a statistical description is usually not very effective, while on large scales it often is. As an example, consider a pair of dice. It is hard to predict how many times one will throw two sixes in twelve throws, while after twelve hundred throws one expects with some confidence approximately two hundred sixes.

With increasing volume a system begins to exhibit global characteristics, which will in general not change with a further increase. These global characteristics are given by a statistical, thermal state on the system. There are however some systems for which this is not the case. In my thesis I discuss two such systems. One is a model for the working of the brain. It turns out that the way memory works in this model depends strongly on the number of neurons present, i.e. on the volume. A second model describes magnetism; in this case the magnetic behaviour depends strongly

on the properties of the external environment. In both cases, the statistics of this variable behaviour can be expressed in the so-called metastate formalism, which gives probability distributions on the different global characteristics.

Schouten, H.F. (VUA)

thesis title: *Light transmission through sub-wavelength apertures*

advisor: prof. dr. D. Lenstra

date: 22 November 2005 (cum laude)

present position: high school teacher, Sint-Nicolaas Lyceum, Amsterdam, the Netherlands

In this thesis, the light transmission through sub-wavelength apertures is studied. Contrary to most studies, we will take into account both the finite thickness and finite conductivity of the metal plate, by making use of a rigorous Green's tensor method. The influence of several parameters such as the slit width, the plate thickness, the material properties of the plate and the polarization of the incident field are discussed. For the explanation of the results the concepts of guided modes inside the slit and phase singularities of the Poynting vector are used. Another topic addressed in this thesis is the light transmission through two apertures, with the aim of clarifying the role of surface plasmons in the interaction between the two apertures. The results are explained by a heuristic model involving the local excitation of surface plasmons at the slits. The results are important for optical recording and near-field optical microscopy.

Tajic, A. (UL)

thesis title: *Study of a stroboscopic model of a quantum dot*

advisor: prof. dr. C.W.J. Beenakker

date: 12 May 2005

present position: senior scientist, NXP Semiconductors, Eindhoven, the Netherlands

Mesoscopic systems are intermediate between the macroscopic world of classical mechanics and the microscopic world of quantum mechanics. These two worlds come together in the study of quantum chaos, which is the search for quantum mechanical signatures of classically chaotic dynamics. In this thesis we investigate the quantum-to-classical crossover in a class of chaotic systems called "quantum dots", using a numerical method called "stroboscopic".

Temürhan, M. (UvA)

thesis title: *Random matrices in topological string theory*

advisor: prof. dr. R.H. Dijkgraaf

date: 28 October 2005

present position: postdoctoral fellow, VU Brussels, Belgium

In this thesis the theory of random matrices is studied together with topological string theory. It has been mostly motivated by the Dijkgraaf-Vafa conjecture, which makes a connection between topological string theory and large N random matrix models,

and provides a method to calculate the effective superpotential of $\mathcal{N} = 1$ supersymmetric gauge theories from topological strings.

In Chapter 1, topological strings are introduced, including the topological A- and the B-model, which are topologically twisted versions of the sigma model. Also a notion of superspace and supersymmetry is given to prepare the way towards an understanding of the Dijkgraaf-Vafa conjecture, together with some mathematical tools that will be needed later.

In Chapter 2, random matrices are introduced as simple gauge theories, with the stress on the $N \times N$ one-matrix model and its large N limit where the 't Hooft coupling is fixed. This is connected to topological string theory through the open/closed string duality. Also the process of how the matrix model potential and free energy arise from the topological theory is shown. Multicut matrix models, as opposed to one-cut matrix models, have also been treated. The Gaussian matrix model is given as an example.

In Chapter 3, a gauge theoretic description of the conjecture is stated. Here it is shown that the effective $\mathcal{N} = 1$ superpotential as a function of the glueball superfield can be calculated exactly by means of a sum over the planar diagrams arising in this gauge theory. It is also shown that the conjecture extends to the deformed $\mathcal{N} = 2$ super Yang-Mills theory, where the $\mathcal{N} = 2$ supersymmetry is broken to $\mathcal{N} = 1$ supersymmetry by the presence of the effective superpotential. This is also related to Seiberg-Witten theory for flat spaces and to the Donaldson-Witten theory for curved spaces. The cubic matrix model is given as an example. A geometric description is also treated.

In Chapter 4, the matrix model free energy at genus one is calculated directly from the matrix model loop equations using conformal field theory methods. This is then compared to the known results from topologically twisted $\mathcal{N} = 2$ super Yang-Mills theories and an agreement is found. This confirms the Dijkgraaf-Vafa conjecture at the nonplanar level.

In Chapter 5, the focus is shifted to a different description of matrix models from topological strings. In particular, instead of the 't Hooft limit, where a double scaling is taken, Kontsevich-like matrix models are treated for finite N . Here, a description of topological B-branes is given since they lead to these Kontsevich-like matrix models by inserting branes in the geometry. These B-branes are then treated as fermions.

In Chapter 6, the knowledge from the previous chapter of brane-insertions is used to calculate universal correlators in the matrix models. These correlators are shown to be related to universal correlators from Calabi-Yau crystals, which are treated as 3D random partitions.

van Velsen, J.L. (UL)

thesis title: *On the production and transfer of entangled electrons and photons*

advisor: prof. dr. C.W.J. Beenakker

date: 28 September 2005

present position: researcher, Ministry of Justice, Den Haag, the Netherlands

The nonclassical correlation known as entanglement is one of the most counterintuitive features of quantum mechanics and plays a central role in the emerging field of

quantum computing and quantum information processing. Two spatially separated particles are entangled if their joint state can not be prepared by operating on each particle separately – not even with the exchange of classical bits of information. Entanglement is called a “resource” because it is both precious and useful: It is precious, because if the quantum correlation is lost after the particles have been separated, it can not be restored without bringing them back together. It is useful, because entangled pairs of particles enable the disembodied transfer (= teleportation) of quantum bits of information(= qubits), which is a basic step in quantum algorithms.

The two separate aspects of entanglement production and transfer studied in this thesis were motivated by two separate lines of experimental research. For the entanglement transfer, we were motivated by an experiment in Leiden on the transmission of entangled photons through strongly scattering metal plates. We have developed a general scattering theory of entanglement transfer that accounts for the highly entangled transmitted photons in the experiment.

For the entanglement production, our motivation came from experiments in progress in Delft to produce and detect entangled electrons trapped in quantum dots. These experiments require control over the electron-electron interactions on short distances, first to entangle the electrons and then to spatially separate them. As described in this thesis, we came up with an alternative scheme for entanglement production and detection with free electrons, that does not rely onelectron-electron interactions.

Wijnhout, J.S. (UvA)

thesis title: *Gauge theories in 3&1 dimensions*

advisor: prof. dr. J. de Boer

date: 20 April 2005

present position: scientific programmer, software company medical imaging MEDIS, cardiac MRI section, Leiden, the Netherlands

In the first part of this thesis a method was proposed to calculate the exact quantum vacua of four-dimensional $N = 2$ supersymmetric gauge theories deformed to $N = 1$ by a superpotential. The effective superpotential could be calculated in the theory compactified on $R^{1+2} \times S^1$. In the three-dimensional limit the superpotential was easy to calculate, no quantum correction had to be calculated. It was only a matter of finding the right variables such that the minima of the superpotential give the correct quantum vacua. Those variables were conjectured to be given by a classical mechanical system: the Toda system. This system is an integrable system with a Lax matrix description. The adjoint scalar field should be substituted with the Lax matrix of the Toda system. Ample evidence for various gauge groups was found for this conjecture. Much of the evidence came from comparing the results with field theory calculations, Seiberg-Witten curve factorizations to be more specific. Using a special technique, “integrating in”, it was also possible to obtain the superpotential in terms of the glueball field S . This made it possible to compare the results with the recent progress known as the Dijkgraaf-Vafa method. Because the use of the integrable system involves no integrals, some results were very easy to obtain. Exact agreement was found with known results. The conjecture was also extended

to the gauge group G_2 . A proposal for the resolvent, an effective way to summarize vacuum expectation values of chiral operators, was put forward and tested, finding a hyperelliptic Seiberg-Witten curve for G_2 along the way.

The second part of this thesis is about finding the action for multiple D-branes in a gravitational background. A new symmetry principle is used to implement a kind of diffeomorphism invariance in the D-geometry formulation. In short this symmetry principle entails the expansion of the action around some base-point and the independence of the expansion of the choice of base-point. The base-point independence can be successfully applied to the action of D0-branes in a curved background. Results obtained using other methods are found to be consistent with base-point independence. A common claim, that the symmetrized trace prescription is a general solution to the ordering problem in the action for D0-branes, is not consistent with base-point independence. The inconsistencies are found when trying to extend the action to be valid for higher velocities (expansion in \dot{X}) or higher curvatures (expansion in R). Non-symmetrized trace corrections, rendering the action base-point independent, can be found. However those corrections terms are not uniquely determined by this new symmetry principle.

Since there are strings stretching between the branes one would think that it is always energetically favourable to put the D0-branes on top of each other. However in a special background (a Ramond-Ramond four form flux) the D0-branes tend to blow up into a spherical configuration. This is usually referred to as the Myers effect. One can wonder if gravitational couplings can also show such collective behavior. Evidence for this is found in the sense that D0-branes moving along geodesics on a negatively curved space experience an instability (tachyon) in the modes that represent the strings stretching between the D0-branes, just like in the original Myers effect. Of course it may happen that the instability does not lead to a nearby stable vacuum. To decide about the fate of the instability one would have to extend the validity of the action for D0-branes in a curved background. Hopefully it is clear by now that this is not an easy thing to do.

3.4 Other PhDs advised by DRSTP staff

de Lang, D. (UvA)

thesis title: *Magneto-transport studies on critical behaviour in the quantum Hall regime*

advisors: prof. dr. A.M.M. Pruisken; dr. A. de Visser

date: 30 June 2005

Ponomarenko, L. (UvA)

thesis title: *Experimental aspects of quantum criticality in the quantum Hall regime*

advisors: prof. dr. A.M.M. Pruisken; dr. A. de Visser

date: 22 September 2005

Visser J. (UL)

thesis title: *Operator description of the dynamics of optical modes*

advisor: prof. dr. G. Nienhuis

date: 29 September, 2005

3.5 DRSTP PhD students (31 December 2005)

This section gives an overview of the PhD students affiliated to the DRSTP on 31 December 2005. The projects are chronologically ordered according to starting date. The research themes mentioned refer to quantum field theory and elementary particle physics (theme 1) and statistical physics, condensed-matter theory and quantum optics (theme 2).

Universiteit van Amsterdam (UvA)

- Mitra, S. (oio) as of 15 December 1999 with B. Nienhuis.
project: The description of bulk and boundary correlations for two-dimensional percolation and related models, as far as these can be obtained exactly from the extrapolation of finite size data (theme 2).
- Voropaev, M. (oio) as of 28 January 2000 with A.M.M. Pruisken.
project: electron tunneling and shot noise in the quantum Hall effect (theme 2).
- Kager, W. (oio) as of 15 November 2001 with B. Nienhuis.
project: generalization of stochastic Löwner evolutions to interacting polymers (theme 2). PhD exam: 21 March 2006.
- Ostojic, S. (oio) as of 1 September 2002 with B. Nienhuis.
project: development of simplified models for granular phenomena; study of granular velocity distribution from Boltzmann equations (theme 2).
- Hagemans, R.L. (aio) as of 1 April 2003 with K. Schoutens and J.-S. Caux.
project: correlations in strongly coupled spin systems (theme 2).
- Cheng, M.C.-N. (oio) as of 1 September 2003 with J. de Boer and K. Skenderis.
project: various aspects of quantum gravity, holography and the physics of black holes (theme 1).
- van der Meulen, M.P. (oio) as of 1 October 2003 with J. Smit.
project: applications of field-theoretic methods to the physics of the early universe (theme 1).
- Kampmeijer, L. (oio) as of 1 November 2003 with F.A. Bais.
project: monopoles with non-Abelian charges, hidden symmetry and confinement (theme 1).
- Galistu, G. (oio) as of 1 December 2003 with A.M.M. Pruisken.
project: experimental determination of electronic structure of low-dimensional electron systems, with emphasis on quantum critical phenomena of a two-dimensional electron gas in the quantum Hall regime (theme 2).
- Manschot, J. (oio) as of 1 March 2004 with E.P. Verlinde.
project: the study of the connection between gravity and gauge theory using string theory, in particular with applications to cosmology (theme 1).
- Koers, H.B.J. (aio) as of 1 April 2004 with K.J.F. Gaemers and J.-W. van Holten.
project: modelling sources and properties of neutrinos in the universe, in particular high-energy neutrinos detectable by neutrino telescopes as presently being developed world-wide (theme 1).
- Arsiwalla, X.D. (oio) as of 1 November 2004 with E.P. Verlinde.
project: development of non-perturbative methods in string-theory, in particular topological strings and black holes (theme 1).

- Hollands, L. (aio) as of 1 November 2004 with R.H. Dijkgraaf.
project: the study of mathematical aspects of string theory, in particular topological strings (theme 1).
- Messamah, I. (oio) as of 1 November 2004 with J. de Boer.
project: issues in quantum gravity using non-perturbative string theory, in particular the quantum physics of black holes, their formation and Hawking radiation, cosmological models and the nature of quantum space-time geometry (theme 1).
- Hoogeveen, J. (oio) as of 1 September 2005 with R.H. Dijkgraaf and K. Skenderis.
project: string theory, in particular the Berkovits formulation of superstrings (theme 1).
- Kanitscheider, I.R.G. (oio) as of 1 September 2005 with J. de Boer and M. Taylor.
project: quantum gravity, in particular holography (theme 1).
- El-Showk, S.N. (oio) as of 10 September 2005 with J. de Boer.
project: quantum gravity with perturbative and non-perturbative string theory (theme 1).
- Zozulya, O.S. (oio) as of 1 October 2005 with K. Schoutens.
project: collective behavior vs. entanglement in atomic matter (theme 2).
- Mehmani, B. (aio) as of 1 December 2005 with B. Nienhuis and Th.M. Nieuwenhuizen.
project: fundamental aspects of quantum physics (theme 2).

Vrije Universiteit Amsterdam (VUA)

- Pijlman, F. (aio) as of 1 November 2001 with P.J.G. Mulders.
project: transverse momentum of partons in high-energy scattering processes (theme 1). PhD exam: 12 January 2006.
- Warringa, H.J. (aio) as of 1 December 2001 with D. Boer and P.J.G. Mulders.
project: phase transitions in QCD (theme 1). PhD exam: 28 February 2006.
- van Zon, J.S. (aio) as of 1 February 2002 with F.C. MacKintosh.
project: granular materials (theme 2).
- Erzgräber, H. (aio) as of 15 August 2003 with D. Lenstra en B. Krauskopf.
project: non-linear dynamics and chaos in laser systems (theme 2).
- Bomhof, C. (oio) as of 1 September 2003 with P.J.G. Mulders.
project: quark-gluon structure of hadrons in high-energy scattering processes (theme 1).
- Wang, W. (aio) as of 1 October 2003 with D. Lenstra.
project: TUC-towards ultrafast (theme 2).

- Conti, E. (aio) as of 1 October 2004 with F.C. MacKintosh
project: theory of dilute granular gases (theme 2).
- Wessels, E. (oio) as of 1 December 2004 with P.J.G. Mulders and D. Boer.
project: investigating observable consequences of the colour glass condensate (theme 1).

University of Groningen (RUG)

- Westra, D.B. (oio) as of 1 September 2002 with M. de Roo.
project: string theory and quantum gravity (theme 1).
- van Riet, T. (oio) as of 1 September 2003 with E.A. Bergshoeff.
project: braneworlds (theme 1).
- Hartong, J. (aio) as of 1 September 2004 with E.A. Bergshoeff.
project: the quest for quantum gravity (theme 1).
- Ploegh, A.R. (oio) as of 1 September 2004 with E.A. Bergshoeff.
project: towards a formulation of coinciding M5-branes (theme 1).
- Chemissany, W. (aio) as of 1 October 2004 with M. de Roo.
project: light from string theory (theme 1).

Leiden University (UL)

- Cvetkovic, V. (oio) as of 1 November 2001 with J. Zaanen.
project: quantum liquid crystals (theme 2). PhD exam: 29 March 2006.
- Qian, X. (aio) as of 1 September 2002 with H.W.J. Blöte.
project: percolation and tricriticality in $O(n)$ models (theme 2).
- Mboyo Esole, J. (aio) as of 1 December 2002 with A. Achúcarro.
project: extended objects in particle physics and cosmology (theme 1).
- Leurs, B.W.A. (oio) as of 1 November 2002 with J. Zaanen.
project: the theoretical investigation of quantum liquid crystalline phases as of relevance to various strongly interacting electron systems (theme 2).
- van Wezel, J. (aio) as of 1 March 2003 with J. Zaanen.
project: decoherence due to spontaneous symmetry breaking (theme 2).
- Ellenbroek, W.G. (oio) as of 1 November 2003 with W. van Saarloos.
project: theory of granular matter (theme 2).
- Becherer, P. (aio) as of 1 January 2004 with W. van Saarloos.
project: dynamics of friction and polymer flow (theme 2).
- de Kok, M.O. (oio) as of 1 January 2004 with P. van Baal.
project: non-perturbative aspects of gauge theories (theme 1).

- Zacheddu, M. (oio) as of 1 January 2004 with C. Filippi (W. van Saarloos).
project: Why is green fluorescent protein green? A quantum Monte Carlo study (theme 2).
- Michaelis, B. (oio) as of 1 April 2004 with C.J.W. Beenakker.
project: solid state quantum information processing (theme 2).
- Salmi, P. (oio) as of 1 July 2004 with A. Achúcarro.
project: semilocal string networks in the early universe (theme 1).
- Bardarson, J. (oio) as of 1 September 2004 with C.J.W. Beenakker.
project: theory of phase-coherent dynamics of entangled electronic states in nanostructures (theme 2).
- Sousa, K.S. (aio) as of 1 September 2004 with A. Achúcarro.
project: extended objects in cosmological models with supersymmetry (theme 1).
- Snyman, I. (oio) as of 15 January 2005 with C.J.W. Beenakker.
project: developing theory for nanostructures that are strongly coupled to radiation, with the goal of studying ways to produce entangled microwave photons out of entangled electron-hole pairs (theme 2).
- Giovanetti, G. (oio) as of 1 August 2005 with J. van den Brink.
project: electronic structure and electron correlations in organic molecular crystals (theme 2).
- Idema, T. (oio) as of 1 September 2005 with H. Schiessel and C. Storm.
project: theoretical biophysics of membranes and proteins (theme 2).
- Emanuel, M.O. (aio) as of 1 December 2005 with H. Schiessel.
project: theoretical biophysics of DNA and its complexation with proteins (theme 2).

Radboud University Nijmegen (RU)

- Dams, C.J.F. (oio) as of 1 October 2000 with R.H.P. Kleiss.
project: scattering of unstable particles (theme 1). PhD exam: 13 June 2006.
- Lazopoulos, A. (aio) as of 15 April 2002 with R.H.P. Kleiss.
project: numerical investigation of multi-patron processes (theme 1).
- van Kessel, M.T.M. (oio) as of 1 April 2004 with R.H.P. Kleiss.
project: path integral aspects of spontaneous symmetry breaking (theme 1).
- Wagenaar, J.W. (aio) as of 1 December 2004 with R.H.P. Kleiss.
project: Kaon-nucleon interactions (theme 1).

Utrecht University (UU)

- Brendel, K. (aio) as of 1 September 2001 with G.T. Barkema (H. van Beijeren, formal advisor).
project: nucleation theory (theme 2). PhD exam: 9 January 2006.
- Nobbenhuis, S.J.B. (aio) as of 1 December 2001 with G. 't Hooft.
project: quantum gravity: categorizing different approaches to the cosmological constant problem (theme 1). PhD exam: 15 June 2006.
- Davidse, M. (aio) as of 1 January 2002 with S. Vandoren (B. de Wit, formal advisor).
project: research on supersymmetric gauge theories and string theory (theme 1).
- Dickerscheid, D.B.M. (oio) as of 15 January 2002 with H.T.C. Stoof (UU) and P. Denteneer (UL).
project: phase transitions and properties of phases of quantum many particle systems and the application to optical lattices of cold atoms (theme 2).
- Snoek, M. (oio) as of 1 August 2002 with H.T.C. Stoof.
project: to understand strongly correlated spin one atoms (theme 2).
- Zoetekouw, B. (oio) as of 1 September 2002 with R. van Roij (H. van Beijeren, formal advisor).
project: the fundamental understanding of thermodynamics, structure and phase behaviour of suspensions of charged colloids, in particular in low salt concentrations (theme 2).
- Romans, M.W.J. (aio) as of 1 February 2003 with H.T.C. Stoof.
project: effects of phase fluctuations in the Bose-Einstein condensate (theme 2).
- Benedetti, D. (oio) as of 1 April 2003 with R. Loll.
project: to construct and investigate a gravitational path for black-hole geometries, using nonperturbative methods (theme 1).
- de Vroome, M. (oio) as of 1 June 2003 with S. Vandoren and B. de Wit (advisor).
project: to investigate non-perturbative aspects of superstring compactifications, using instanton techniques and supergravity tools (theme 1).
- Westra, W. (aio) as of 15 September 2003 with R. Loll.
project: constructing models of quantum gravity by means of non-perturbative Lorentzian methods (theme 1).
- Vocks, H. (aio) as of 1 June 2004 with G.T. Barkema (H. van Beijeren, formal advisor).
project: polymers and polymeric systems by means of computer simulation (theme 2).
- Juricic, V. (aio) as of 1 September 2004 with C. Morais Smith.
project: the application of field theoretical methods to the description of transport properties in low-dimensional systems (theme 2).

- Torres Valderrama, A. (oio) as of 1 September 2004 with R. van Roij (H. van Beijeren, formal advisor).
project: gaining theoretical understanding of suspensions of charged colloids, in particular in external fields (theme 2).
- Stavenga, G.C. (aio) as of 1 May 2005 with E. Laenen and B. de Wit.
project: perturbative and non-perturbative QCD in high-energy scattering (theme 1).
- Koetsier, A.O. (aio) as of 1 August 2005 with H.T.C. Stoof.
project: thermodynamical and dynamical properties of degenerate gases (theme 2).
- Janssen, T.M. (aio) as of 1 September 2005 with T. Prokopec (G. 't Hooft, formal advisor).
project: novel observational consequences from cosmic inflation and observational consequences of interacting quantum fields during inflation (theme 1).
- Kuipers, J. (aio) as of 1 September 2005 with H. van Beijeren and G.T. Barkema.
project: comparison between classical nucleation theory (CNT) and computer simulation results of nucleation in lattice gases (theme 2).
- Zwanikken, J.W. (aio) as of 1 September 2005 with R. van Roij (H. van Beijeren, formal advisor).
project: theoretical study of suspensions of colloidal molecules, such as dumbbells and (semi-) flexible chains, both in bulk and in external fields (electric, shear, gravity) (theme 2).

3.6 Scientific and educational activities of PhD students in Quantum Field Theory and Elementary Particle Physics (theme 1)

Arsiwalla, X.D. (UvA)

- DRSTP postgraduate course ‘Theoretical High Energy Physics’, Nijmegen, the Netherlands, 24 January-4 February 2005 (attended)
- Mathematics lectures ‘Knot Theory, Quantum Groups and Topological Field Theories’, February-May 2005 (attended)
- Spring school ‘Superstring Theory and Related Topics’, ICTP, Trieste, Italy, 14-22 March 2005 (attended)
- *Non-perturbative aspects of 4D theories via 2D gauge dualities*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (poster)
- Workshop ‘Random Partitions and Calabi-Yau Crystals’, Amsterdam, the Netherlands, 1-3 June 2005 (attended)
- Amsterdam workshop ‘String Theory 2005’, Amsterdam, the Netherlands, 15-22 June 2005 (attended)

- Thematic school ‘Algebraic Geometry and Topological Strings’, IST, Lisbon, Portugal, 15-22 October 2005 and 6-12 November 2005 (attended)

Benedetti, D. (UU)

- DRSTP postgraduate course ‘Theoretical High Energy Physics’, Nijmegen, the Netherlands, 24 January-4 February 2005 (attended)
- *3D quantum gravity, heaps of dimers and products of random matrices*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (poster)
- Conference ‘Loops ‘05’, Albert-Einstein-Institute, Potsdam, Germany, 10-14 October 2005 (attended)
- ENRAGE workshop ‘Quantum Gravity’, Utrecht, the Netherlands, 1-2 December 2005 (attended)

Boels, R.H. (UvA)

- Amsterdam workshop ‘String Theory 2005’, Amsterdam, the Netherlands, 15-22 June 2005 (attended)

Bomhof, C. (VUA)

- DRSTP postgraduate course ‘Theoretical High Energy Physics’, Nijmegen, the Netherlands, 24 January-4 February 2005 (attended)
- *T-odd effects in hadronic scattering processes*, ‘Single Spin Asymmetries Workshop’, Brookhaven National Laboratory, Upton, New York, USA, 1-3 June 2005 (talk)
- *T-odd effects in hadronic scattering processes*, NNV meeting, Lunteren, the Netherlands, 28 October 2005 (talk).

Chemissany, W. (RUG)

- *Non-abelian Born-Infeld theory*, DRSTP postgraduate course ‘Theoretical High Energy Physics’, Nijmegen, the Netherlands, 24 January-4 February 2005 (talk)
- *Born-Infeld theory*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (poster)
- Conference ‘From Strings to Cosmic Web’, Groningen, the Netherlands, 30 November-2 December 2005 (attended)
- *Born-Infeld theory and derivative corrections*, 23 December 2005 (talk)

Cheng, M.C.-N. (UvA)

- *AdS/CFT and Witten’s proof of the positive energy theorem*, DRSTP postgraduate course ‘Theoretical High Energy Physics’, Nijmegen, the Netherlands, 24 January-4 February 2005 (talk)
- Spring school ‘Superstring Theory and Related Topics’, ICTP, Trieste, Italy, 14-22 March 2005 (attended)
- International spring school ‘String Theory’, Hangzhou, China, 21 April-20 May 2005 (attended)
- Thematic school ‘Algebraic Geometry and Topological Strings’, IST, Lisbon, Portugal, 15-22 October 2005 and 6-12 November 2005 (attended)

Collinucci, G.A. (RUG)

- *Instantons and cosmologies in string theory*, Groningen, the Netherlands, 3 October 2005 (talk)

Davidse, M. (UU)

- RTN Winter School ‘Strings, Supergravity and Gauge Theories’, SISSA/ISAS, Trieste, Italy, 31 January-4 February 2005 (attended)

- *Non-perturbative effects in supergravity*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (poster)

de Kok, M.O. (UL)

- *Remarks on SUSY lattice gauge theory*, DRSTP postgraduate course ‘Theoretical High Energy Physics’, Nijmegen, the Netherlands, 24 January-4 February 2005 (talk)
- *On SUSY and the lattice*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (poster)

de Vroome, M. (UU)

- *T-duality in 4D $N=2$ supergravity*, DRSTP postgraduate course ‘Theoretical High Energy Physics’, Nijmegen, the Netherlands, 24 January-4 February 2005 (talk)
- *String theory*, student seminar mathematics, Utrecht, the Netherlands, 20 April 2005 (talk)
- *Generating instantons from black holes*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (poster)
- RTN Network workshop ‘Constituents, Fundamental Forces and Symmetries of the Universe’, Corfu, Greece, 20-26 September 2005 (attended)

Eenink, M.G.C. (RUG)

- *Group manifold reduction of dual $N=1$ $d=10$ supergravity*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (poster)
- *Dirichlet branes, effective actions and supersymmetry*, Groningen, the Netherlands, 24 October 2005 (talk)

Hartong, J. (RUG)

- *Black holes in de Sitter space*, DRSTP postgraduate course ‘Theoretical High Energy Physics’, Nijmegen, the Netherlands, 24 January-4 February 2005 (talk)
- Workshop ‘String Cosmology’, Uppsala, Sweden, 25-28 April 2005 (attended)
- *Time-dependent brane solutions in supergravity*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19 May 2005 (poster)
- Conference ‘From Strings to Cosmic Web’, Groningen, the Netherlands, 30 November-2 December 2005 (attended)
- Universidad Autonoma de Madrid (Prof. T. Ortín), Spain, 12-22 December 2005 (work visit)

Hollands, L. (UvA)

- *Building blocks of topological strings*, DRSTP postgraduate course ‘Theoretical High Energy Physics’, Nijmegen, the Netherlands, 1 February 2005 (talk)
- Spring school ‘Superstring Theory and Related Topics’, ICTP, Trieste, Italy, 14-22 March 2005 (attended)
- *Topological strings*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (poster)
- Graduate student workshop, University of Washington, Seattle, USA, 18-22 July 2005 (attended)
- *Topological strings and the quintic*, Seattle, USA, 22 July 2005 (talk)
- Summer institute ‘Algebraic Geometry’, University of Washington, Seattle, USA, 25 July-5 August 2005 (attended)
- Thematic school ‘Algebraic Geometry and Topological Strings’, IST, Lisbon, Portugal, 15-22 October 2005 and 6-12 November 2005 (attended)

Hoogeveen, J. (UvA)

- International School of High Energy Physics and Cosmology (ISHEPAC), University of Crete, Heraklion, Greece, 25 September-28 October 2005 (attended)

Janssen, T.M. (UU)

- Conference ‘From Strings to Cosmic Web’, Groningen, the Netherlands, 30 November-2 December 2005 (attended)

Kampmeijer, L. (UvA)

- *Non-abelian monopoles in Seiberg-Witten theory*, String Seminar, Amsterdam, the Netherlands, 19 January 2005 (talk)
- *Monopoles in non-abelian gauge theories*, DRSTP postgraduate course ‘Theoretical High Energy Physics’, Nijmegen, the Netherlands, 24 January-4 February 2005 (talk)
- Spring school ‘Superstring Theory and Related Topics’, ICTP, Trieste, Italy, 14-22 March 2005 (attended)
- *Monopoles in phases with non-abelian gauge symmetry*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (poster)
- FOM workshop ‘Effectieve Gespreksvaardigheden’ [Effective Conversation Skills], Naarden, the Netherlands, 1-2 and 22 December 2005 (attended)

Kanitscheider, I. (UvA)

- International school of High Energy Physics and Cosmology (ISHEPAC), University of Crete, Heraklion, Greece, 25 September-28 October 2005 (attended)

Koers, H.B.J. (UvA)

- *Neutrinos from hot GRB fireballs*, DRSTP postgraduate course ‘Theoretical High Energy Physics’, Nijmegen, the Netherlands, 24 January-4 February 2005 (talk)
- *Neutrino emission from hot GRB fireballs*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (poster)
- *The effect of neutrinos on the initial fireballs in gamma-ray bursts*, NNV meeting, Lunteren, the Netherlands, 28 October 2005 (talk)

Manschot, J. (UvA)

- *Black hole entropy from strings and branes*, DRSTP postgraduate course ‘Theoretical High Energy Physics’, Nijmegen, the Netherlands, 24 January-4 February 2005 (talk)
- Spring school ‘Superstring Theory and Related Topics’, ICTP, Trieste, Italy, 14-22 March 2005 (attended)
- *Multi-center black hole solutions*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (poster)
- Thematic school ‘Algebraic Geometry and Topological Strings’, IST, Lisbon, Portugal, 15-22 October 2005 and 6-12 November 2005 (attended)

Mboyo Esole, J. (UL)

- University of the Witwatersrand, Johannesburg, South Africa, 10-14 January 2005 (work visit)
- *$N = 2$ supergravity*, University of the Witwatersrand, Johannesburg, South Africa, 11 January 2005 (talk)
- Workshop ‘String Cosmology’, Uppsala, Sweden, 25-28 April 2005 (attended)
- DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (attended)

- Bernard-fest Utrecht, the Netherlands, 27-28 May 2005 (attended)
- Francqui meeting in honour of Joaquim Gomis, ‘Gravity, Strings and Branes’, Leuven, Belgium, 30-31 May 2005 (attended)
- Summer school ‘Strings, Gravity and Cosmology’, Perimeter Institute, Waterloo, Ontario, Canada, June-July 2005 (attended)
- Conference ‘Strings 2005’, Toronto University, Canada, July 2005 (attended)
- Workshop ‘Arithmetic Geometry and High Energy Physics’, Lorentz Center, Leiden, the Netherlands, 29 August-2 September 2005 (attended)
- Conference ‘Cosmic Strings and Fundamental Strings’, Institute Henri Poincaré, Paris, France, 22-27 September 2005 (attended)
- Conference ‘From Strings to Cosmic Web’, Groningen, the Netherlands, 30 November-2 December 2005 (attended)
- *Constant Fayet Iliopoulos terms from $N=2$ supergravity*, ULB-VUB-KUL seminars, Leuven, Belgium, 22 December 2005 (talk)

Messamah, I. (UvA)

- DRSTP postgraduate course ‘Theoretical High Energy Physics’, Nijmegen, the Netherlands, 24 January-4 February 2005 (attended)
- Spring school ‘Superstring Theory and Related Topics’, ICTP, Trieste, Italy, 14-22 March 2005 (attended)
- *Black rings*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (poster)
- Workshop ‘Random Partitions and Calabi-Yau Crystals’, Amsterdam, the Netherlands, 1-3 June 2005 (attended)
- Amsterdam workshop ‘String Theory 2005’, Amsterdam, the Netherlands, 15-22 June 2005 (attended)

Nobbenhuis, S.J.B. (UU)

- *Categorizing approaches to the cosmological constant problem*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (poster)
- *Categorizing approaches to the cosmological constant problem*, University of Heidelberg, Germany, 1-5 June 2005 (talk)
- *Categorizing approaches to the cosmological constant problem*, Workshop ‘COSMO ’05’, Bonn, Germany, 28 August-1 September 2005 (talk and poster)

Nogradi, D. (UL)

- *Moduli and twistor spaces for calorons*, ‘Non-perturbative Gauge Dynamics’, SISSA, Trieste, Italy, 10-12 March 2005 (poster)
- *Moduli space metric of calorons*, INFN - Roma II, Tor Vergata, Rome, Italy, 3 June 2005 (poster)

Papadimitriou, I. (UvA)

- *Thermodynamics of asymptotically locally AdS spacetimes*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (poster)
- Amsterdam workshop ‘String Theory 2005’, Amsterdam, the Netherlands, 15-22 June 2005 (attended)
- ‘Théories des cordes et théories de jauge supersymétriques’, XXXV^eme Institut d’Été, Paris, France, 8-19 August 2005 (attended)

Pijlman, F. (VUA)

- *Single spin asymmetries in hard scattering processes*, Partonic Structure of Hadrons', ECT*, Trento, Italy, 9-14 May 2005 (talk)
- *Single spin asymmetries in semi-inclusive DIS*, SIR-workshop, Jefferson Lab, Newport News, Virginia, USA, 18-20 May 2005 (talk)

Ploegh, A.R. (RUG)

- *Non-extremal D-instantons and the AdS/CFT correspondence*, DRSTP postgraduate course 'Theoretical High Energy Physics', Nijmegen, the Netherlands, 25 January 2005 (talk)
- Workshop 'String Cosmology of the Nordic Network', Uppsala, Sweden, 25-28 April 2005 (attended)
- *Non-extremal D-instantons and the AdS/CFT duality*, DRSTP symposium 'Trends in Theory', Dalfsen, the Netherlands, 19-20 May 2005 (poster)
- RTN network meeting, Corfu, Greece, 20-26 September 2005 (attended)
- Conference 'From Strings to Cosmic Web', Groningen, the Netherlands, 30 November-2 December 2005 (attended)

Salmi, P. (UL)

- University of Sussex, UK, January-September 2005, work visit under the supervision of dr. M. Hindmarsh and co-financed by the Marie Curie Fellowship of the European Community Programme Human Potential under contract HPMT-CT-2000-00096 (work visit)
- *Scaling of the length of domain walls*, DRSTP postgraduate course ‘Theoretical High Energy Physics’, Nijmegen, the Netherlands, 24 January-4 February 2005 (talk)
- *Can embedded defects be stabilised due to the plasma effects*, ‘Revisited UK Classical Lattice Field Theory Network Meeting’, Manchester, UK, 21-22 March 2005 (talk)
- Workshop ‘The Origin of Primordial Density Perturbation’, University of Lancaster, UK, 22-24 March 2005 (attended)
- *Networks of semilocal strings*, Workshop ‘COSMO ’05’, Bonn, Germany, 28 August-1 September 2005 (talk)
- University of Sussex, UK, 5 January 2005 Imperial College, London, UK, 23 April 2005 University of Durham, UK, 19-20 September 2005 (work visit)
- Conference ‘Cosmic Strings and Fundamental Strings’, Paris, France, 22-27 September 2005 (attended)
- Course ‘Object Oriented Analysis and Design’, Rutherford Appleton Laboratory, UK, 25-28 October 2005 (attended)
- Course ‘Introduction to OO Programming Using C++’, Rutherford Appleton Laboratory, UK, 29 November-1 December 2005 (attended)

Sousa, K.S. (UL)

- DRSTP postgraduate course ‘Theoretical High Energy Physics’, Nijmegen, the Netherlands, 24 January-4 February 2005 (attended)
- DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (attended)
- Bernard-fest, Utrecht, the Netherlands, 27-28 May 2005 (attended)
- Francqui meeting in honour of Joaquim Gomis, ‘Gravity, Strings and Branes’, Leuven, Belgium, 30-31 May 2005 (attended)
- 8th Hellenic School in Elementary Particle Physics, Corfu, Greece, 4-26 September 2005 (attended)

Stavenga, G. (UU)

- *Renormalons in the non-linear Σ -model*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (poster)

Temürhan, M. (UvA)

- Management course, Nijenrode Business University, Breukelen, the Netherlands, 13-18 March 2005 (attended)
- *Universal correlators from geometry*, Brunel University, West London, UK, 22 March 2005 (talk)
- Workshop ‘Cosmology, Dark Matters’, Brussels, Belgium, 18-20 May 2005 (attended)

van der Meulen, M.P. (UvA)

- *Topological defects in cold electroweak baryogenesis*, DRSTP postgraduate course ‘Theoretical High Energy Physics’, Nijmegen, the Netherlands, 24 January-4 February 2005 (talk)

- Spring school ‘Superstring Theory and Related Topics’, ICTP, Trieste, Italy, 14-22 March 2005 (attended)
- *Defects in a tachyonic electroweak transition*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (poster)
- Workshop ‘COSMO ’05’, Particle Physics and the Early Universe’, Bonn, Germany, 28 August-1 September 2005 (attended)
- Aegean summer school ‘The Invisible Universe’, Chios, Greece, 26 September-1 October 2005 (attended)
- Conference ‘From Strings to Cosmic Web’, Groningen, the Netherlands, 30 November-2 December 2005 (attended)

van Kessel, M.T.M. (RU)

- DRSTP postgraduate course ‘Theoretical High Energy Physics’, Nijmegen, the Netherlands, 24 January-4 February 2005 (attended)
- *The concavity of the effective potential*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (poster)

van Riet, T. (RUG)

- *Scalar cosmology with multiple exponential potentials*, DRSTP postgraduate course ‘Theoretical High Energy Physics’, Nijmegen, the Netherlands, 24 January 2005 (talk)
- Workshop ‘String Cosmology of the Nordic Network’, Uppsala, Sweden, 25-28 April 2005 (attended)
- *Non-extremal D-instantons and the AdS/CFT duality*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (poster)
- RTN Network meeting, Corfu, Greece, 20-26 September 2005 (attended)
- Conference ‘From Strings to Cosmic Web’, Groningen, the Netherlands, 30 November-2 December 2005 (attended)

Wagenaar, J.W. (RU)

- DRSTP postgraduate course ‘Theoretical High Energy Physics’, Nijmegen, the Netherlands, 24 January-4 February 2005 (attended)
- *Strong meson-baryon interactions*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (poster)

Warringa, H.J. (VUA)

- *Color superconductivity vs. pseudoscalar condensation in a three-flavor NJL model*, Workshop ‘Extreme QCD’, Swansea, UK, 2 August 2005 (talk)

Wessels, E. (VUA)

- DRSTP postgraduate course ‘Theoretical High Energy Physics’, Nijmegen, the Netherlands, 24 January-4 February 2005 (attended)
- *Gauging the constancy of constants*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (poster)

Westra, D.B. (RUG)

- *Group manifold reduction of dual $N = 1$ $d = 10$ supergravity*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (poster)
- Conference ‘From Strings to Cosmic Web’, Groningen, the Netherlands, 30 November-2 December 2005 (attended)

Westra, W. (UU)

- *Quantum geometry dynamical triangulations and all that*, DRSTP postgraduate course ‘Theoretical High Energy Physics’, Nijmegen, the Netherlands, 24 January-4 February 2005 (talk)
- *Non-perturbative sum over topologies in 2D Lorentzian quantum gravity*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (poster)
- Conference ‘Loops ‘05’, Albert-Einstein-Institute, Potsdam, Germany, 10-14 October 2005 (attended)
- *Topology change in 2D causal dynamical triangulations*, ENRAGE workshop ‘Quantum Gravity’, Utrecht University, Utrecht, the Netherlands, 2 December 2005 (talk)

3.7 Scientific and educational activities of PhD students in Statistical Physics, Condensed-Matter Theory and Quantum Optics (theme 2)

Baggio, C. (UL)

- *Theoretical model for finger-like patterns in type II superconductors*, Workshop ‘Physics of Superconducting Phase Shift Devices’, Ischia, Italy, 4 April 2005 (talk)
- *Finger-like patterns in type II superconductors*, ‘This Week’s Discovery’, Leiden, the Netherlands, 15 November 2005 (talk)

Bardarson, J. (UL)

- Casimir research school workshop ‘EGMOND II’, Egmond aan Zee, the Netherlands, 21-24 May 2005 (attended)
- Boulder School for Condensed Matter and Material Physics, ‘Physics of Mesoscopic Systems Boulder’, Colorado, USA, 4-29 July 2005 (attended)
- *Stroboscopic model of transport through a quantum dot with spin-orbit scattering*, ‘Nanoscale Dynamics and Quantum Coherence’, Catania, Italy, 2-5 October 2005 (poster)
- *Stroboscopic model of transport through a quantum dot with spin-orbit scattering*, Scientific meeting FOM ‘Condensed Matter’, Veldhoven, the Netherlands, 13-14 December 2005 (poster)
- Warsaw University from 13-28 April 2005 (work visit)

Becherer, P. (UL)

- *Amplitude expansion for subcritical instabilities*, scientific meeting FOM ‘Statistical Physics’, Lunteren, the Netherlands, 20-21 January 2005 (poster)
- National Seminar ‘Statistical Physics’, Leiden, the Netherlands, 25 February 2005 (attended)
- DRSTP postgraduate course ‘Statistical Physics and Theory of Condensed Matter’, Nijmegen, the Netherlands, 25-29 April 2005 (attended)
- *Amplitude expansion for subcritical instabilities*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (poster)
- ‘XXV Dynamics Days Europe 2005’, Berlin, Germany, 25-28 July 2005 (attended)

- *Amplitude expansion for subcritical instabilities*, Summer school ‘Fundamental Problems in Statistical Physics XI’, Leuven, Belgium, 4-17 September 2005 (poster)
- *Amplitude expansions for subcritical instabilities, an application to viscoelastic shear flows*, Workshop ‘Dynamics of Patterns’, Leiden, the Netherlands, 10 November 2005 (talk)
- Scientific meeting FOM ‘Condensed Matter’, Veldhoven, the Netherlands, 13-14 December 2005 (attended)

Brendel, K. (UU)

- *Nucleation times in the 2D Ising model*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (poster)

Conti, E. (VUA)

- DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (attended)

Cvetkovic, V. (UL)

- Department of Physics, Stanford University, Stanford, USA, 16 February-9 April 2005 (work visit)
- *Ordered limit of superconductivity*, Department of Physics, University of California, Berkeley, USA, 6 April 2005 (talk).
- *Ordered limit of superconductivity*, Department of Physics, Stanford University, Stanford, USA, April 2005 (talk).
- *Ordered limit of superconductivity*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (poster)
- *Quantum liquid crystals*, Workshop ‘Complex behaviour in correlated electron systems’, Lorentz Center, Leiden, the Netherlands, 5 August 2005 (talk)
- *Ordered limit of superconductivity*, ICAM workshop, ‘Strongly correlated electrons: diverse examples and unifying themes’, Cargèse, France, 8-20 August 2005 (talk)
- Workshop ‘Electronic Crystals’, ECRYS-2005, Cargèse, France, 21-27 August 2005 (attended)

Dickerscheid, D.B.M. (UU)

- *Feshbach resonances in an optical lattice*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (poster)
- ICTP school ‘Quantum Phase Transitions and Non-Equilibrium Phenomena in Cold Atomic Gases’, Trieste, Italy, 11-22 July 2005 (attended)
- *Feshbach resonances in optical lattices*, ESF research conference ‘Bose-Einstein Condensation’, San Feliu de Guixols, Spain, 7-15 September 2005 (poster)
- Scientific meeting FOM ‘Condensed Matter’, Veldhoven, the Netherlands, 14-15 December 2005 (attended)

Ellenbroek, W.G. (UL)

- *Force response as a probe of the jamming transition*, scientific meeting FOM ‘Statistical Physics’, Lunteren, the Netherlands, 20-21 January 2005 (poster)
- *Force response as a probe of the jamming transition*, Master course ‘Soft Condensed Matter’, Utrecht, the Netherlands, 28 February-4 March 2005 (poster)
- ‘Fysica 2005’, Delft, the Netherlands, 8 April 2005 (attended)
- *Force response as a probe of the jamming transition*, DRSTP postgraduate course ‘Statistical Physics and Theory of Condensed Matter’, Nijmegen, the Netherlands, 25-29 April 2005 (talk)

- *Ensemble theory for force networks in hyperstatic granular matter*, National seminar ‘Statistical Physics’, Nijmegen, the Netherlands, 13 May 2005 (talk)
- *Probing the jamming transition in granular matter*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (poster)
- *Force response as a probe of the jamming transition*, Conference ‘Powders & Grains 2005’, Stuttgart, Germany, 18-22 July 2005 (talk)
- *Force response as a probe of the jamming transition*, Summer school ‘Fundamental Problems in Statistical Physics XI’, Leuven, Belgium, 4-17 September 2005 (poster)
- J.M. Burgers Course ‘Physics of Granular Matter’, Enschede, the Netherlands, 3-6 October 2005 (attended)
- Symposium ‘Hubert’s Parting Party’, Nijmegen, the Netherlands, 7 October 2005 (attended)
- National seminars ‘Statistical Physics’, Leiden, 25 February 2005 Nijmegen, 13 May 2005 Amsterdam, 23 September 2005 Utrecht, the Netherlands, 4 November 2005 (attended)
- *Emergence of a critical scale in jamming of frictional grains*, scientific meeting FOM ‘Condensed Matter’, Veldhoven, the Netherlands, 13-14 December 2005 (talk)

Falco, G. (UU)

- *Atom-molecule theory for cold Fermi-gas at Feshbach resonances*, DRSTP post-graduate course ‘Statistical Physics and Theory of Condensed Matter’, Nijmegen, the Netherlands, 25-29 April 2005 (talk)
- *Atom-molecule theory for ultracold Fermi gases at the Feshbach resonance*, Conference ‘Path Integrals’, Prague, Czech Republic, 6-11 June 2005 (talk)

Hagemans, R.L. (UvA)

- *Correlation functions of integrable Heisenberg chains*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (poster)
- Amsterdam workshop ‘Low-D Quantum Condensed Matter’, 25-30 July 2005 (attended)
- *Correlation functions of integrable Heisenberg chains*, Summer school ‘Fundamental Problems in Statistical Physics XI’, Leuven, Belgium, 4-17 September 2005 (poster)
- *Correlation functions of anisotropic Heisenberg chains*, ‘X Training Course in the Physics of Correlated Electron Systems and High- T_c Superconductors’, University of Salerno, Vietri sul Mare, Salerno, Italy, 7 October 2005 (talk)
- *Dynamical correlations in spin chains*, FNWI/ITFA, Amsterdam, the Netherlands, 6 December 2005 (talk)
- *Correlation functions of integrable Heisenberg chains*, scientific meeting FOM ‘Condensed Matter’, Veldhoven, the Netherlands, 13 - 14 December 2005 (poster)

Idema, T. (UL)

- Scientific meeting FOM ‘Statistical Physics’, Lunteren, the Netherlands, 20-21 January 2005 (attended)
- Stieltjes Onderwijsweek, ‘Global and Variational Methods for ODEs and PDEs’, Lorentz Center, Leiden, the Netherlands, 14-17 February, 2005 (attended)
- Summer school ‘Fundamental Problems in Statistical Physics XI’, Leuven, Belgium, 4-17 September 2005 (attended)
- Annual meeting ‘Molecular and Cellular Biophysics’, Lunteren, the Netherlands, 10 October 2005 (attended)

- Workshop ‘Biology for Physicists’, Lorentz Center, Leiden, the Netherlands, 24-28 October 2005 (attended)
- Workshop ‘Dynamics of Patterns’, Lorentz Center, Leiden, the Netherlands, 7-11 November 2005 (attended)
- ‘Dag van de Biofysica’, Leiden, the Netherlands, 18 November 2005 (attended)
- Scientific meeting FOM ‘Condensed Matter’, Veldhoven, the Netherlands, 13-14 December 2005 (attended)

Juricic, V. (UU)

- *Dissipative dynamics of vortices in a spiral state and transport in the spin-glass phase of cuprates*, ‘Workshop Nanoscale Fluctuations in Magnetic and Superconducting Systems’, Dresden, Germany, 10-14 May 2005 (poster)
- *Dissipative dynamics of vortices in a spiral state and transport in the spin-glass phase of cuprates*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (poster)
- Workshop ‘Complex Behaviour in Correlated Electron Systems’, Leiden University, the Netherlands, 1-19 August 2005 (attended)
- *Magnetism and transport in lightly doped $La_{2-x}Sr_xCuO_4$* , Material Science Center, University of Groningen, the Netherlands, 6 December 2005 (talk)
- *Magnetism and transport in lightly doped $La_{2-x}Sr_xCuO_4$* , Lorentz Institute for Theoretical Physics, Leiden University, the Netherlands, 29 December 2005 (talk)

Kager, W. (UvA)

- *The excursion of a particle in a random environment*, scientific meeting FOM ‘Statistical Physics’, Lunteren, the Netherlands, 20 January 2005 (talk)
- *Reflected Brownian motions in generic triangles with uniform exit distributions*, AIO-lectures of the section Mathematical Statistics (SMS) of the Dutch Society for Statistics and Operations Research (VVS), Amsterdam, the Netherlands, 3 February 2005 (talk)
- *Reflected Brownian motion in generic triangles and wedges*, Center for Mathematics and Computer Science, Amsterdam, the Netherlands, 15 February 2005 (talk)
- *Reflected brownian motion in generic triangles and wedges*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (poster)
- *SLE: understanding the scaling limit of critical models*, ITFA, Amsterdam, the Netherlands, 29 June 2005 (talk)
- 1st Magnet meeting ‘Probability’, Chateau du Magnet, Mers sur Indre, France, 5-10 September 2005 (attended)
- *Conformal mapping theory and Löwner’s method, Schramm-Löwner Evolution: the scaling limit of the Ising model*, Mini-course SLE organised by EURANDOM, Eindhoven, the Netherlands, 25 November 2005 (talk)
- Mini-course SLE organised by EURANDOM, Eindhoven, the Netherlands, 13 December 2005 (attended)

Leurs, B.W.A. (UL)

- Physics Department of Stanford University, Stanford, USA, 25 April-7 June 2005 (work visit)
- Workshop ‘Complex Behaviour in Correlated Electron Systems’, Lorentz Center, Leiden, the Netherlands, 1-19 August 2005 (attended)
- *Charge order, quantum phases and nodal fermions*, Scientific meeting FOM ‘Con-

densed Matter', Veldhoven, the Netherlands, 13-14 December 2005 (poster)

Michaelis, B. (UL)

- FOM training course 'Goal Oriented Working', Utrecht, the Netherlands, 11 January and 8 February 2005 (attended)
- Course 'Non-Linear Dynamics and Chaos', VUA, Amsterdam, the Netherlands, January/February 2005 (attended)
- *Quantum gases with strong interactions*, DRSTP postgraduate course 'Statistical Physics and Theory of Condensed Matter', Nijmegen, the Netherlands, 25-29 April 2005 (talk)
- Casimir research school workshop 'EGMOND II Workshop', Egmond aan Zee, the Netherlands, 21-24 May 2005 (attended)
- International School of Physics 'Quantum Computers, Algorithms and Chaos', Varenna, Italy, 5-15 July 2005 (attended)
- *All-electronic coherent population trapping in quantum dots*, Workshop 'Nanoscale Dynamics and Quantum Coherence', Catania, Italy, 2-5 October 2005 (talk)

Ostojic, S. (UvA)

- *Fractal nature of force networks in jammed matter*, DRSTP symposium 'Trends in Theory', Dalfsen, the Netherlands, 19-20 May 2005 (poster)
- *Universality classes for force networks in granular matter*, Conference 'Traffic and Granular Flow 2005', Berlin, Germany, 10-12 October 2005 (talk)
- *Scale-invariance and universality of force networks in granular matter*, Instituut-Lorentz, Leiden, the Netherlands, 25 October 2005 (talk)
- *Scale-invariance and universality of force networks in granular matter*, scientific meeting FOM, Veldhoven, the Netherlands, 13 December 2005 (talk)

Qian, X. (UL)

- *Three-state Potts model with long-range interaction*, DRSTP postgraduate course 'Statistical Physics and Theory of Condensed Matter', Nijmegen, the Netherlands, 25-29 April 2005 (talk)

Reijnders, J.W. (UvA)

- *Pinning of vortices in rotating BEC's*, APS March meeting, Los Angeles, USA, March 2005 (talk)
- *Density profiles for atomic quantum Hall states*, Conference BEC2005, San Feliu, Spain, 10-15 September 2005 (poster)

Romans, M.W.J. (UU)

- *BEC-BCS crossover near a Feshbach resonance*, scientific meeting FOM 'Statistical Physics', Lunteren, the Netherlands, 20-21 January 2005 (poster)
- *BEC-BCS crossover near a Feshbach resonance*, DRSTP symposium 'Trends in Theory', Dalfsen, the Netherlands, 19-20 May 2005 (poster)
- *BEC-BCS crossover near a Feshbach resonance*, ICTP school 'Quantum Phase Transitions and Non-Equilibrium Phenomena in Cold Atomic Gases', Trieste, Italy, 11-22 July 2005 (poster)
- *Dressed molecules in the BEC-BCS crossover*, PhD workshop 'Ultracold Bose-Fermi Mixtures', University of Potsdam, Germany, 26-28 September 2005 (talk)
- *Dressed molecules in the BEC-BCS crossover*, scientific meeting FOM 'Condensed Matter', Veldhoven, the Netherlands, 13-14 December 2005 (poster)

Schaap, H.G. (RUG)

- Mark Kac seminars, Utrecht, the Netherlands, 2005 (attended)
- *Ising models and neural networks*, CWI, Amsterdam, the Netherlands, 12 April 2005 (talk)
- *Ising models and neural networks*, CTN, Groningen, the Netherlands, 18 May 2005 (talk)

Snoek, M. (UU)

- *Nematic order in spin-one bosons in optical lattices*, DRSTP postgraduate course ‘Statistical Physics and Theory of Condensed Matter’, Nijmegen, the Netherlands, 25-29 April 2005 (talk)
- *Ultracold superstrings*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (poster)
- *Ultracold superstrings*, ICTP school ‘Quantum Phase Transitions and Non-Equilibrium Phenomena in Cold Atomic Gases’, Trieste, Italy, 11-22 July 2005 (poster)
- *Ultracold superstrings*, ESF research conference ‘Bose-Einstein Condensation’, San Feliu de Guixols, Spain, 7-15 September 2005 (poster)

Snyman, I. (UL)

- *How neighbouring mesoscopic circuits affect each other*, DRSTP postgraduate course ‘Statistical Physics and Theory of Condensed Matter’, Nijmegen, the Netherlands, 25-29 April 2005 (talk)
- *Quantum tunneling detection of two-photon and two-electron processes*, Workshop ‘Nanoscale Dynamics and Quantum Coherence’, Catania, Italy, 2-5 October 2005 (talk)

Torres Valderrama, A. (UU)

- *Sedimentation of charged colloids*, DRSTP postgraduate course ‘Statistical Physics and Theory of Condensed Matter’, Nijmegen, the Netherlands, 25-29 April 2005 (talk)
- *Sedimentation profiles of charged colloids at low ionic strength. An effective one component model*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (poster)
- *Sedimentation profiles of charged colloids at low ionic strength. An effective one component model*, ‘Liquid Matter Conference’, Utrecht, the Netherlands, 2-6 July 2005 (poster)
- Summer school ‘Fundamental Problems in Statistical Physics XI’, Leuven, Belgium, 4-17 September 2005 (attended)
- *Sedimentation profiles of charged colloids at low ionic strength. An effective one component model*, Jülich Soft Matter Days, Bonn, Germany, 1-4 November 2005 (poster)

van Wezel, J. (UL)

- *Does spontaneous symmetry breaking limit quantum coherence?*, Scientific meeting FOM ‘Statistical Physics’, Lunteren, the Netherlands, 20-21 January 2005 (talk)
- *Orbital driven spin ordering in 1-d chains*, DRSTP postgraduate course ‘Statistical Physics and Theory of Condensed Matter’, Nijmegen, the Netherlands, 25-29 April 2005 (talk)
- *A limit to quantum coherence due to spontaneous symmetric breaking*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (poster)

- *Quantum coherence in a classical condensate*, Department of Natural Sciences, Leiden University, the Netherlands, 10 May 2005 (talk)
- *An intrinsic limit to quantum coherence due to the classical nature of measuring machines*, CWI Amsterdam, the Netherlands, 12 July 2005 (talk)
- *Orbital driven spin ordering in the 1D chains of NaTiSi₂O₆*, ‘X Training Course in the Physics of Correlated Electron Systems and High-T_c Superconductors’, University of Salerno, Vietri sul Mare, Salerno, Italy, 3-14 October 2005 (talk)
- *Larger qubits are different*, scientific meeting FOM, ‘Condensed Matter’, Veldhoven, the Netherlands, 13-14 December 2005 (talk)

van Zon, J.S. (UvA)

- *Biochemical networks*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (poster)

Vocks, H. (UU)

- DRSTP postgraduate course ‘Statistical Physics and Theory of Condensed Matter’, Nijmegen, the Netherlands, 25-29 April 2005 (attended)
- *The thermodynamically-weighted activation-relaxation technique*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (poster)

Zaccheddu, M. (UL)

- DRSTP postgraduate course ‘Statistical Physics and Theory of Condensed Matter’, Nijmegen, the Netherlands, 25-29 April 2005 (attended)

Zoetekouw, B. (UU)

- *Phase diagrams of charged colloids from linear and non-linear Poisson-Boltzmann theory*, DRSTP symposium ‘Trends in Theory’, Dalfsen, the Netherlands, 19-20 May 2005 (poster)
- *The fate of the gas-liquid spinodal in low-salt suspensions of highly charged colloids*, Meeting European Network of Excellence ‘SoftComp’, Bonn, Germany, 31 October-1 November 2005 (talk)
- Jülich Soft Matter Days, Bonn, Germany, 1-4 November 2005 (attended)
- *The fate of the gas-liquid spinodal in low-salt suspensions of highly charged colloids*, scientific meeting FOM ‘Condensed Matter’, Veldhoven, the Netherlands, 13-14 December 2005 (talk)

Zozulya, O.S. (UvA)

- Scientific meeting FOM ‘Condensed Matter’, Veldhoven, the Netherlands, 13-14 December 2005 (attended)

Zwanikken, J.W. (UU)

- *Polydisperse mixtures of charged colloids*, scientific meeting FOM ‘Statistical Physics’, Lunteren, the Netherlands, 20-21 January 2005 (poster)
- Workshop ‘Introduction to Soft Condensed Matter & Advanced Colloid Science’, Utrecht University, Utrecht, the Netherlands, 28 February-11 March 2005 (attended)
- *The sediment of polydisperse mixtures of charged colloids*, ‘SFB-TR6: Physics of Colloidal Dispersions in External Fields’, Heinrich Heine University, Düsseldorf, Germany, 26-27 September 2005 (talk)
- *Polydisperse mixtures of charged colloids, sedimentation equilibrium in a gravity field*, Jülich Soft Matter Days, Bonn, Germany, 1-4 November 2005 (poster)

4 | Scientific staff (31 December 2005)

Below an overview is given of the permanent and temporary staff of the DRSTP on 31 December 2005. Also the associate groups and members are listed. PhD students are given in chapter 3 (sect. 5).

Theme 1 refers to the research area quantum field theory and elementary particle physics and theme 2 to statistical physics, condensed-matter theory and quantum optics. The fte commitment of the permanent staff is given in the last column.

4.1 Permanent staff

<u>Universiteit van Amsterdam (UvA)</u>	theme	fte
prof. dr. ir. F.A. Bais	1	0.50
dr. J.-S. Caux	2	0.50
prof. dr. J. de Boer	1	0.50
prof. dr. R.H. Dijkgraaf	1	0.50
prof. dr. J.H. Koch	1	0.10
prof. dr. B. Nienhuis	2	0.50
dr. Th.M. Nieuwenhuizen	2	0.50
prof. dr. A.M.M. Pruisken	2	0.50
prof. dr. K. Schoutens	2	0.50
dr. K. Skenderis	1	0.50
prof. dr. J. Smit	1	0.50
dr. L.J. van den Horn	1	0.25
dr. W.A. van Leeuwen	2	0.50
prof. dr. E.P. Verlinde	1	0.50

<u>Vrije Universiteit Amsterdam (VUA)</u>	theme	fte
dr. K. Allaart	2	0.10
dr. B.L.G. Bakker	1	0.20
dr. D. Boer	1	0.25
prof. dr. B. Krauskopf	1	0
prof. dr. D. Lenstra	2	0.25
prof. dr. F.C. Mackintosh	2	0.50
prof. dr. P.J.G. Mulders	1	0.25
prof. dr. J.W. van Holten	1	0
prof. dr. W.L.G.A.M. van Neerven	1	0
dr. T.D. Visser	2	0.25

<u>University of Groningen (RUG)</u>	theme	fte
prof. dr. E.A. Bergshoeff	1	0.50
prof. dr. M. de Roo	1	0.50
prof. dr. A.C.D. van Enter	2	0.50

<u>Leiden University (UL)</u>	theme	fte
prof. dr. A. Achúcarro	1	0.80
prof. dr. C.W.J. Beenakker	2	0.40
prof. dr. H.W.J. Blöte	2	0.10
dr. P.J.H. Denteneer	2	0.80
prof. dr. Y. Levin	1	0.20
prof. dr. G. Nienhuis	2	0.40
prof. dr. H. Schiessel	2	0.40
prof. dr. P.J. van Baal	1	0.80
prof. dr. J. van den Brink	2	0.40
prof. dr. W.L.G.A.M. van Neerven	1	0.80
prof. dr. ir. W. van Saarloos	2	0.40
prof. dr. J. Zaanen	2	0.80

<u>Radboud University Nijmegen (RU)</u>	theme	fte
dr. W.J.P. Beenakker	1	0.30
prof. dr. A. Fasolino	2	0.20
prof. dr. M.I. Katsnelson	2	0.40
prof. dr. R.H.P. Kleiss	1	0.30
dr. T.A. Rijken	1	0.50
prof. dr. A.N.J.J. Schellekens	1	0.10
prof. dr. J. van den Brink	2	0

<u>Utrecht University (UU)</u>	theme	fte
prof. dr. J. Ambjørn	1	0.18
dr. G. Arutyunov	1	0.60
dr. G.T. Barkema	2	0.60
prof. dr. B. de Wit	1	0.60
prof. dr. L.F. Feiner	2	0.10
prof. dr. E. Laenen	1	0
prof. dr. R. Loll	1	0.60
prof. dr. C. Morais Smith	2	0.60
dr. T. Prokopec	1	0.60
prof. dr. J. Smit	1	0
prof. dr. ir. H.T.C. Stoof	2	0.60
prof. dr. G. 't Hooft	1	0.60
prof. dr. H. van Beijeren	2	0.60
prof. dr. J.E.J.M. van Humbergen	2	0
dr. R. van Rooij	2	0.60
dr. S. Vandoren	1	0.60

4.2 Temporary staff (31 December 2005)

<u>Universiteit van Amsterdam (UvA)</u>	theme
dr. G. Aquino	2
dr. J. Bouttier	2
dr. R.A.P. Britto	1
dr. P. Calabrese	2
dr. B.E.L. Craps	1
dr. B. Fiol	1
dr. N.T. Jones	1
dr. A.J. Kashani-Poor	1
dr. K.E. Schalm	1
dr. M. Taylor	1
dr. B.P. Williams	1

<u>Vrije Universiteit Amsterdam (VUA)</u>	theme
dr. D. Danova	2
dr. K. Green	2
dr. D. Lubensky	2
dr. A. Utermann	1
dr. M. van Iersel	1

<u>University of Groningen (RUG)</u>	theme
dr. S. Kerstan	1
dr. V.A. Malyshev	2
dr. E. Pallante	1

<u>Leiden University (UL)</u>	theme
dr. B. Ashok	2
dr. J. Betouras	2
dr. F. Bruckmann	1
dr. S.C. Davis	2
dr. C. Filippi	2
dr. F. Freire	1
dr. R. Jeannerot	1
dr. F. Krüger	2
dr. A. Morozov	2
dr. A. Ossipov	2
dr. A. Rycerz	2
dr. K. Shundyak	2
dr. C. Storm	2
dr. B. Trauzettel	2

<u>Radboud University Nijmegen (RU)</u>	theme
dr. A. Grechnev	2

Utrecht University (UU)	theme
dr. L.F. Alday	1
dr. M. Barbosa da Silva Neto	2
dr. R.L. Doretto	2
dr. J. Engquist	1
dr. M. Haque	2
dr. J. Henson	1
dr. J. Klein-Wolterink	2
dr. G.S. Krishnaswami	1
dr. G. Rigopoulos	1
dr. D. Robles Llana	1
dr. H. Sahlmann	1
dr. F.S. Saueressig	1
dr. A. Starodubtsev	1
dr. C. Tanase	2

4.3 Associate members

	theme
prof. dr. ir. H. Dekker (TNO/UvA/TU/e)	2
prof. dr. H.A. de Raedt (RUG)	2
dr. B.J. Hoenders (RUG)	2
dr. ir. L.P.J. Kamp (TU/e)	2
prof. dr. J. Knoester (RUG)	2
prof. dr. D. Lohse (UT)	2
NIKHEF theory group (Amsterdam)	1
Theoretical and Polymer Physics Group (TU/e)	2
prof. dr. R. Timmermans (KVI)	1

5 | Academic publications

This chapter presents an overview of publications in refereed journals published in 2005. The publications belonging to theme 1 and theme 2 are given separately. Within each theme the publications are ordered according to university. Note that publications by associate members are not included. Professional publications are listed in chapter 7.

5.1 Theme 1: Quantum field theory and elementary particle physics

Universiteit van Amsterdam

- Anguelova, L., de Medeiros, P. and Sinkovics, A., *On topological F-theory*, JHEP 0505 (2005) 021.
- Arrizabalaga, A.X., Smit, J. and Tranberg, A., *Equilibration in ϕ^4 theory in 3+1 dimensions*, Phys. Rev. D72 (2005) 025014.
- Balasubramanian, V., de Boer, J., Jejjala, V. and Simon, J., *The library of Babel: on the origin of gravitational thermodynamics*, JHEP 512 (2005) 006.
- Boels, R.H. and de Boer, J., *Classical spin chains and exact three-dimensional superpotentials*, Nucl. Phys. B715 (2005) 234-274.
- de Boer, J., Jejjala, V. and Minic, D., *Alpha-states in de Sitter space*, Phys. Rev. B71 (2005) 044013.
- de Boer, J., Maoz, L. and Naqvi, A., *Some aspects of the AdS/CFT correspondence*, in: AdS/CFT correspondence: Einstein metrics and their conformal boundaries, proc. of the 73rd meeting between physicists and mathematicians, Strassbourg, 11-13 September, 2003, O. Biquard (ed.), IRMA Lectures in Mathematics and Theoretical Physics 8, European Mathematical Society, (2005) 33-58 [ISBN 3-03719-013-2].
- de Boer, J., Naqvi, A. and Shomer, A., *Towards a topological G(2) string*, in: ‘String theory: from gauge interactions to cosmology,’ proceedings of the Nato Advanced Study Institute, Cargese, France, 7-19 June 2004, L. Baulieu et al (eds.), Nato Science Series II: Mathematics, Physics and Chemistry vol. 208, Springer (2005) 117-128.
- Cheng, M.C.-N. and Skenderis, K., *Positivity of energy for asymptotically locally AdS space-times*, JHEP 0508 (2005) 107.
- Craps, B.E.L., Sethi, S. and Verlinde, E., *A matrix big bang*, JHEP 10 (2005) 005.

- Craps, B.E.L. and Skenderis, K., *Comments on BRST quantization of strings*, JHEP 5 (2005) 001.
- Drukker, N. and Fiol, B., *All-genus calculation of Wilson loops using D-branes*, JHEP 0502 (2005) 010.
- Flournoy, A., Wecht, B. and Williams, B., *Constructing non-geometric vacua in string theory*, Nucl. Phys. B706 (2005) 127-149.
- Grant, L., Maoz, L., Marsano, J., Papadodimas, K. and Rychkov, V.S., *Minisuperspace quantization of ‘Bubbling AdS’ and free fermion droplets*, JHEP 08, (2005) 025, 22 pp.
- Maoz, L. and Rychkov, V.S., *Geometry quantization from supergravity: the case of ‘Bubbling AdS’*, JHEP 08 (2005) 096.
- Ooguri, H., Vafa, C. and Verlinde, E., *Hartle-Hawking wave-function for flux compactifications: the entropic principle*, Lett. in Math. Phys. 74 (3) (2005) 311-342.
- Papadimitriou, I. and Skenderis, K., *Thermodynamics of asymptotically locally AdS spacetimes*, JHEP 0508 (2005) 004 [hep-th/0505190].
- Parikh, M. and Verlinde, E., *De Sitter holography with a finite number of states*, JHEP 1 (2005) 054.
- Sinkovics, A., and Verlinde, E., *A six-dimensional view on twistors*, Phys. Lett. B 608 (2005) 142-150.
- Smit, J., *Simulations in early universe theory*, PoS LAT2005 022 (2005).
- Tranberg, A. and Smit, J., *Simulations of cold electroweak baryogenesis*, PoS LAT2005 246 (2005).
- van der Heide, J., Koch, J.H. and Laermann, E., *The pion form factor on the lattice at zero and finite temperature*, Few Body Syst. 36 (2005) 119-124.
- van der Heide, J., Koch, J.H. and Laermann, E., *The pion form factor at zero and finite temperature*, proceedings of Light-Cone 2004 (2005) [hep-lat/0410006].
- Yoshino, H. and Rychkov, V.S., *Improved analysis of black hole formation in high-energy particle collisions*, Phys. Rev. D71, 104028 (2005).

Vrije Universiteit Amsterdam

- Bacchetta, A., Bomhof, C.J., Mulders, P.J. and Pijlman, F., *Single spin asymmetries in hadron-hadron collisions*, Phys. Rev. D72 (2005) 034030 [hep-ph/0505268].
- Badalian, A.M., Veselov, A.I. and Bakker, B.L.G., *Leptonic widths of high excitations in heavy quarkonia*, J. Phys. G31 (2005) 417-426 [hep-ph/0411291].
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- Diehl, M. and Hägler, P., *Spin densities in the transverse plane and generalized transversity distributions*, Eur. Phys. J. C44 (2005) 87.
 - Edwards, R.G., Taminga Fleming, G., Hägler, P., Negele, J.W., Orginos, K., Pochinsky, A.V., Renner, D.G., Richards, D.G and Schroers, W., LHPC Collaboration, *Hadron structure with light dynamical quarks*, proceedings Sci. LAT2005 (2005) 056.
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 - Ji, C.R. and Bakker, B.L.G., *Vector anomaly and practicality of light-front dynamics*, Few Body Syst. 36 (2005) 137-144.
 - Mulders, P.J., *Polarized structure functions*, Prog. Part. Nucl. Phys. 55 (2005) 243-269.
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 - Warringa, H.J., *Phase diagrams of the three-flavor NJL model with color superconductivity and pseudoscalar condensation*, to appear in proceedings of the workshop Extreme QCD, Swansea, 2-5 August 2005 [hep-ph/0512226].
 - Warringa, H.J., *Thermodynamics of the 1+1-dimensional non-linear sigma model through next-to-leading order in 1/N*, in: Proceedings of the 6th conference on Strong and Electroweak Matter 2004, World Scientific Singapore (2005).
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- Chakrabarti, D. and Mukherjee, A., *Impact parameter dependent parton distributions for a relativistic composite system*, Phys. Rev. D71 (1) (2005) 014038.
- Chakrabarti, D. and Mukherjee, A., *Impact parameter-dependent parton distributions for a relativistic composite system*, Few-Body Systems 36 (1-4) (2005) 205-208.
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- Freire, F., Antunes, N.D., Salmi, P. and Achúcarro, A., *Role of dissipation in biasing the vacuum selection in quantum field theory at finite temperature*, Phys. Rev. D72 (4) (2005) 045017.
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 - Davidse, M., Saueressig, F., Theis, U. and Vandoren, S., *Membrane instantons and de Sitter Vacua*, JHEP 0509 (2005) 065 [hep-th/0506097].
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 - Mohaupt, T. and Saueressig, F., *Dynamical conifold transitions and moduli trapping in M-theory cosmology*, JCAP 0501 (2005) 006 [hep-th/0410273].
 - Mohaupt, T. and Saueressig, F., *Conifold cosmologies in IIA string theory*, Fortsch. Phys. 53 (2005) 522-527 [hep-th/0501164].
 - Reuter, M. and Saueressig, F., *From big bang to asymptotic de Sitter: complete cosmologies in a quantum gravity framework*, JCAP 0509 (2005) 012 [hep-th/0507167].
 - Snoek, M., Haque, M., Vandoren, S. and Stoof, H., *Ultracold superstrings in atomic boson-fermion mixtures*, Phys. Rev. Lett. 95 (2005) 250401 [cond-mat/0505055].
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5.2 Theme 2: Statistical physics, condensed-matter theory and quantum optics

Universiteit van Amsterdam

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- van Kampen, N.G., *How good is Langevin?* in: ‘Unsolved problems of noise’, AIP conference proceedings, vol. 800 (proceedings of UPoN 2005: fourth international conference on Unsolved Problems of Noise and Fluctuations in Physics, Biology, and High Technology), Gallipoli, Lecce (Italy), 6-10 June 2005, 10-14.
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6 | Scientific activities

This chapter contains an overview of conference talks, seminars, lecture courses and poster presentations of staff members and postdoctoral fellows. An overview of the presentations of PhD students is given in chapter 3 (sects. 6 and 7). A list of public lectures can be found in chapter 7 (sect. 3)

6.1 Theme 1: Quantum field theory and elementary particle physics

Universiteit van Amsterdam

- Bais, F.A., *Non-abelian monopoles*, ITFA, Amsterdam, the Netherlands, 19 January 2005.
- Bais, F.A., *Magnetic monopoles revisited*, DRSTP postgraduate course (AIO/ OIO school) Theoretical High Energy Physics, Nijmegen, the Netherlands, 3 February 2005.
- Bais, F.A., *The physics of information*, Santa Fe Institute, Santa Fe, USA, 9 March 2005.
- Bais, F.A., *Topological interactions*, Santa Fe Institute, Santa Fe, USA, 30 March 2005.
- Bais, F.A., *Turning points in science*, Australian National University, Canberra, Australia, 5 August 2005.
- Bais, F.A., *Topological interactions*, Research School of the Physical Sciences and Engineering, Australian National University, Canberra, Australia, 24 August 2005.
- Bais, F.A., *Topological interactions*, Yukawa Institute for Theoretical Physics, Kyoto University, Japan, October 2005.
- Bais, F.A., *Quantum symmetries and their breaking*, Yukawa Institute, Kyoto, Japan, 18 November 2005.
- Bais, F.A., *On gauging charge conjugation*, KEK Tsukuba, Japan, 29 November 2005.
- Bais, F.A., *Applications of quantum symmetry*, Institute for Theoretical Physics, Tokyo University, Japan, 1 December 2005.
- Bais, F.A., *Quantum symmetries and their breaking*, workshop on Fundamental Problems in Field Theory, Yukawa Institute, Kyoto, Japan, 19 December 2005.
- de Boer, J., *The topological G2 string*, Physics Department, University of Munich, Germany, 10 February 2005.

- de Boer, J., *String theory: an update*, Santiago de Compostela, Spain, 29 March 2005.
- de Boer, J., *The topological $G2$ string*, Santiago de Compostela, Spain, 30 March 2005.
- de Boer, J., *The topological $G2$ string*, Trinity College, Dublin, Ireland, 4 April 2005.
- de Boer, J., *Issues in supersymmetric gauge theories*, conference Beyond the Standard Model, Bad Honnef, Germany, 14-17 April 2005.
- de Boer, J., *The topological $G2$ string*, string-cosmology workshop, Uppsala, Sweden, 25-28 April 2005.
- de Boer, J., *The topological $G2$ string*, The Bernard-fest, Driebergen, the Netherlands, 27-28 May 2005.
- de Boer, J., *Black holes and random partitions*, workshop on random partitions and Calabi-Yau crystals, Institute for Theoretical Physics, Universiteit van Amsterdam, the Netherlands, 2 June 2005.
- de Boer, J., *Quantum gravity as an emergent phenomenon*, University of Berkeley, USA, 27 September 2005.
- de Boer, J., *Quantum gravity as an emergent phenomenon*, University of Barcelona, Barcelona, Spain, 20 October 2005.
- de Boer, J., *Quantum gravity as an emergent phenomenon*, DESY, Hamburg, Germany, 9 November 2005.
- de Boer, J., *The topological $G2$ string*, Queen Mary, London, UK, 17 November 2005.
- de Boer, J., *Quantum gravity as an emergent phenomenon*, University Tor Vergata, Rome, Italy, 18 November 2005.
- de Boer, J., *What is the dual of a dipole*, University of Pennsylvania, Philadelphia, USA, 15 December 2005.
- Britto, R., *$N=1$ Super-Yang-Mills amplitudes at one loop*, workshop From Twistors to Amplitudes, Queen Mary University of London, London, UK, 5 November 2005.
- Craps, B., *Strings and spacetime singularities*, DESY Hamburg, Germany, January 2005.
- Craps, B., *Strings and spacetime singularities*, ITF, KU Leuven, Leuven, Belgium, January 2005.
- Craps, B., *Comments on BRST quantization of (topological) strings*, joint seminar KU Leuven - UL Bruxelles - VU Brussels, Belgium, January 2005.
- Craps, B., *Strings and spacetime singularities*, King's College London, London, UK, February 2005.
- Craps, B., *Comments on BRST quantization of strings*, University of Pennsylvania Philadelphia, USA, April 2005.
- Craps, B., *Comments on BRST quantization of strings*, University of Chicago Chicago, USA, April 2005.
- Craps, B., *A matrix big bang*, Benasque workshop on String Theory, Benasque Center for Science Benasque, Spain, 25 July 2005.
- Craps, B., *D-branes*, String Steilkurs, Albert-Einstein-Institut, Golm, Germany, 26-30 September 2005, lecture series.
- Craps, B., *The big bang: a string theory perspective*, Universiteit van Amsterdam,

- Amsterdam, the Netherlands, 26 October 2005.
- Craps, B., *The big bang: a string theory perspective*, Niels Bohr Institute Copenhagen, Denmark, 8 November 2005.
 - Craps, B., *The big bang: a string theory perspective*, ETH-Zurich, Zurich, Switzerland, 23 November 2005.
 - Dijkgraaf, R.H., *The mathematics of string theory*, Topological string theory I and II, Fields Institute, University of Toronto, Canada, 17, 18 and 20 January 2005, Coxeter lectures.
 - Dijkgraaf, R.H., *Topological strings and black holes*, Harvard Mathematics colloquium, USA, 9 February 2005.
 - Dijkgraaf, R.H., *Topological strings and baby universes*, EU network kick-off meeting, Max Planck Institute, Golm, Germany, 25 April 2005.
 - Dijkgraaf, R.H., *The quantum geometry of strings and black holes*, DRSTP symposium Trends in Theory, Dalfsen, the Netherlands, 19 May 2005.
 - Dijkgraaf, R.H., *Random partitions and Calabi-Yau crystals*, workshop ITF, Amsterdam, the Netherlands, 3 June 2005.
 - Dijkgraaf, R.H., *The quantum geometry of string theory*, Einstein symposium, ETH Zürich, Switzerland, 8 June 2005.
 - Dijkgraaf, R.H., *Baby universes in topological string theory*, 10th Claude Itzykson meeting, Saclay, France, 16 June 2005.
 - Dijkgraaf, R.H., *Strings, black holes, and the end of space and time*, Strings 2005, Toronto, Canada, 16 July 2005.
 - Dijkgraaf, R.H., *The quantum geometry of string theory*, 75th anniversary symposium, School of Natural Science, Institute for Advanced Study, Princeton, New Jersey, USA, 23 September 2005.
 - Dijkgraaf, R.H., *String theory and quantum gravity*, international symposium on Mathematical Sciences, Max Planck Institute for Mathematics in the Sciences, Leipzig, Germany, 5 October 2005.
 - Dijkgraaf, R.H., *Quantum geometry and topological strings*, Loops '05, Berlin, Germany, 11 October 2005.
 - Dijkgraaf, R.H., *String theory and quantum gravity*, Siemens Lecture, Munich, Germany, 20 October 2005.
 - Dijkgraaf, R.H., *Topological strings and black holes*, opening symposium, Centre for Mathematical Physics, Hamburg, Germany, 21 October 2005.
 - Dijkgraaf, R.H., *Mathematical structures*, XXIII Solvay conference, The Quantum Structure of Space and Time, European Union, Brussels, Belgium, 2 December 2005.
 - Dijkgraaf, R.H., *Strings, black holes, and the end of space and time*, XXIII Solvay congress, European Union, Brussels, Belgium, 4 December 2005.
 - Dijkgraaf, R.H., *String theory and quantum gravity*, CEN-Saclay, France, 15 December 2005.
 - Fiol, B., *All-genus calculation of Wilson loops using D-branes*, Niels Bohr Institute, Copenhagen, Denmark, 7 February 2005.
 - Fiol, B., *All-genus calculation of Wilson loops using D-branes*, Weizmann Institute, Rehovot, Israel, 1 March 2005.
 - Fiol, B., *All-genus calculation of Wilson loops using D-branes*, CERN, Geneva,

- Switzerland, 12 April 2005.
- Fiol, B., *On the critical points of the entropic principle*, Madrid Christmas workshop, Madrid, Spain, 16 December 2005.
 - Fiol, B., *On the critical points of the entropic principle*, Barcelona Christmas workshop, Barcelona, Spain, 22 December 2005.
 - Jones, N., *Collisions of cosmic f - and d - strings*, Strings 2004, Paris, France, 30 June 2005.
 - Kashani-Poor, A., *Superpotentials generated by brane instantons*, Spinoza Institute, University of Utrecht, the Netherlands, 25 November 2005.
 - Kashani-Poor, A., *A stringy test of flux-induced isometry gauging*, DAMTP Cambridge, UK, 8 December 2005.
 - Koch, J., *The pion form factor on the lattice*, theory colloquium, University of Utrecht, the Netherlands, 16 February 2005.
 - Maoz, L., *Free fermions from minisuperspace quantization of bubbling AdS* , Joint Seminar at Neve Shalom, Israel, 12 April 2005.
 - Maoz, L., *Basic concepts in minisuperspace quantization*, Tel Aviv University, Tel Aviv, Israel, 19 April 2005.
 - Maoz, L., *Minisuperspace quantization of ‘Bubbling AdS ’ and free fermions*, Niels Bohr Institute, Copenhagen, Denmark, 10 May 2005.
 - Maoz, L., *Minisuperspace quantization of ‘Bubbling AdS ’ and free fermions*, CERN, Geneva, Switzerland, 17 May 2005.
 - Rychkov, V., *Theory of black hole production*, SISSA, Italy, 26 January 2005.
 - Rychkov, V., *Free fermion droplets and half-BPS sector of AdS/CFT* , international conference on Theoretical Physics, Lebedev Institute, Moscow, Russia, 11-16 April 2005.
 - Rychkov, V., *Black holes in future colliders and cosmic rays?*, International University Bremen, Germany, 31 May 2005.
 - Rychkov, V., *Geometry quantization from supergravity*, Strings 2005, Toronto, Canada, 11-16 July 2005.
 - Schalm, K., *Can cosmological data contain signatures of quantum gravity, string theory?*, COSMO ‘05, 8 August-1 September 2005, Bonn, Germany, 30 August 2005.
 - Schalm, K., *Searching for signatures of strings*, national seminar Theoretical High Energy Physics, ITF, Amsterdam, the Netherlands, 9 December 2005.
 - Sinkovics, A., *Topological M -theory, F -theory and S -duality*, Cambridge University, UK, 17 February 2005.
 - Sinkovics, A., *On topological F -theory*, Institute for Theoretical Physics, Utrecht University, Utrecht, the Netherlands, 25 February 2005.
 - Sinkovics, A., *On topological F -theory*, ICTP, Trieste, Italy, 2 March 2005.
 - Sinkovics, A., *Topological membranes*, conference Mathematical Structures in String Theory, Santa Barbara, USA, 10 August 2005.
 - Skenderis, K., *Conserved charges and thermodynamics for asymptotically locally AdS spacetimes*, String Theory-2005, 17-29 July 2005, Benasque, Spain, 19 July 2005.
 - Skenderis, K., *Conserved charges and positivity of energy for asymptotically locally AdS spacetimes*, Riemannian Geometry and GR, 26 September-9 October, Isaac

- Newton Institute for Mathematical Science, Cambridge, UK, 3 October 2005.
- Skenderis, K., *Positivity of energy for asymptotically AdS spacetimes*, Hamburg, Germany, 2 February 2005.
 - Skenderis, K., *Comments on the BRST quantization of strings*, ENS, Paris, France, 17 March 2005.
 - Skenderis, K., *Positivity of energy for asymptotically AdS spacetimes*, Les Rencontres thoriennes, Institut Henri Poincaré, Paris, France, 23 March 2005.
 - Smit, J., *Simulations in early universe theory*, Lattice 05, The XXIII International Symposium on Lattice Field Theory, 24-30 July 2005, Dublin, Ireland, 30 July 2005.
 - Smit, J., *Winding knots and Chern-Simons number in a tachyonic electroweak transition*, COSMO '05, 9th international workshop on Particle Physics and the Early Universe, 28 August-1 September 2005, Bonn, Germany, 28 August 2005.
 - Smit, J., *Sterile neutrino dark matter*, Theoretical Cosmology seminars, Amsterdam, the Netherlands, 18 November 2005.
 - Verlinde, E., *String theory and black holes*, DRSTP postgraduate course theoretical high-energy physics, Nijmegen, the Netherlands, 31 January - 4 February 2005, lecture series.
 - Verlinde, E., *Topological strings and the Hartle-Hawking wave function*, TH-division, Cern, Geneva, Switzerland, 8 March 2005.
 - Verlinde, E., *Topological strings and the Hartle-Hawking wave function*, Institute Henry Poincaré, Paris, France, 25 March 2005 .
 - Verlinde, E., *Topological strings and the Hartle-Hawking wave function*, Physics 2005 IOP-conference, Warwick, UK, 12 April 2005.
 - Verlinde, E., *A matrix Big Bang*, Strings 2005, Toronto, Canada, 16 July 2005.
 - Verlinde, E., *The topological string partition function as a wave function*, RTN-meeting, Corfu, 21 September 2005.

Vrije Universiteit Amsterdam

- Bakker, B.L.G., *Light-front singularities in the Yukawa model*, Light-Cone QCD and Non-Perturbative Hadron Physics 2005 (LC2005), workshop, Cairns, Australia, 7-15 July 2005.
- Bakker, B.L.G., *Light-front singularities in the Yukawa model*, Relativistic Dynamics in Hadronic Physics: Light-Front Dynamics and Lattice Gauge Calculations, workshop, Clermont-Ferrand, France, 19-21 October 2005.
- Boer, D., *Azimuthal asymmetries from hadronic versus QCD vacuum effects*, Brookhaven National Laboratory, Upton, New York, USA, 18 February 2005.
- Boer, D., *Lambda polarization in pp, pA and AA collisions*, Amsterdam-Münster-Utrecht workshop, University of Twente, the Netherlands, 5 April 2005.
- Boer, D., *Azimuthal asymmetries from hadronic versus QCD vacuum effects*, Semi-Inclusive Reactions (SIR) workshop 2005, Jefferson Lab, Virginia, USA, 18-20 May 2005.
- Boer, D., *Summary on transverse spin asymmetries*, Semi-Inclusive Reactions (SIR) workshop 2005, Jefferson Lab, Virginia, USA, 18-20 May 2005.
- Boer, D., *Sudakov suppression of asymmetries involving TMDs*, Single Spin Asymmetries workshop, Brookhaven National Laboratory, Upton, New York, USA, 1-3

June 2005.

- Boer, D., *Anomalous Drell-Yan asymmetry from hadronic or QCD vacuum effects*, international workshop on Transverse Polarisation Phenomena in Hard Processes, Transversity 2005, Como, Italy, 7-10 September 2005.
- Boer, D., *Spin physics at GSI/FAIR*, KVI, Groningen, the Netherlands, 2005.
- Hägler, P., *The structure of the nucleon from lattice QCD*, Technical university Munich, Germany, 10 January 2005.
- Hägler, P., *The structure of the nucleon from lattice QCD*, DESY Hamburg, Germany, 24 February 2005.
- Hägler, P., *The structure of the nucleon from lattice QCD*, Swansea University, UK, 10 March 2005.
- Hägler, P., *Generalized parton distributions in lattice QCD*, NIKHEF, Amsterdam, the Netherlands, 15 April 2005.
- Hägler, P., *Lattice quantum chromodynamics and the structure of the nucleon*, VUB, Brussels, Belgium, 22 April 2005.
- Hägler, P., *Generalized parton distributions in lattice QCD*, Liege University, Belgium, 25 May 2005.
- Hägler, P., *Hadron structure from lattice QCD*, Technical University Munich, Germany, 27 July 2005.
- Hägler, P., *Transverse nucleon structure from tensor GPDs in lattice QCD*, workshop, Como, Italy, 8 September 2005.
- Hägler, P., *Hadron structure from GPDs in lattice QCD*, workshop, Cyprus, Greece, 15 September 2005.
- Mulders, P.J., *The standard model of particle physics*, Vrije Universiteit Amsterdam, Amsterdam, the Netherlands, 10 February 2005.
- Mulders, P.J., *Non-collinear parton structure in hard processes, the partonic structure of hadrons*, workshop, Trento, Italy, 9-14 May 2005.
- Mulders, P.J., *Spin structure functions*, ECT School Hadron Physics, Trento, Italy, May-August 2005, lecture series.
- Mulders, P.J., *The standard model of particle physics*, Graduate School Subatomic Physics, Texel, the Netherlands, September 2005.
- Utermann, A., *Effective-Lagrangian approach to WW production*, ECFA International Linear Collider Workshop, Vienna, Austria, 14 November 2005.

University of Groningen

- Bergshoeff, E., *Branes as geodesic motion*, national seminar, Amsterdam, the Netherlands, February 2005.
- Bergshoeff, E., *Branes as geodesic motion*, Madrid, Spain, March 2005.
- Bergshoeff, E., *Branes as geodesic motion*, Valencia, Spain, March 2005.
- Bergshoeff, E., *Branes as geodesic motion*, Stanford, USA, April 2005.
- Bergshoeff, E., *Surprises with string theory*, Groningen, the Netherlands, June 2005.
- Bergshoeff, E., *Ten-dimensional supergravity revisited*, SQS'05 conference Super-symmetries and Quantum Symmetries, Dubna, Russia, July 2005.
- Bergshoeff, E., *Ten-dimensional supergravity revisited*, XVIII Spanish relativity meeting ERE 2005 A Century of Relativity Physics, Oviedo, Spain, September

- 2005.
- Bergshoeff, E., *An index for the Dirac operator on D3 branes with background fluxes*, network meeting Constituents, Fundamental Forces and Symmetries of the Universe, Corfu, Greece, September 2005.
 - Bergshoeff, E., *Ten-dimensional supergravity revisited*, München, Germany, November 2005.
 - Bergshoeff, E., *Ten-dimensional supergravity revisited*, topical conference on elementary particle physics and cosmology, Coral Gables and Key Biscayne, USA, December 2005.
 - Bergshoeff, E., *Ten-dimensional supergravity revisited*, Columbia University, New York, USA, December 2005.
 - de Roo, M., *Scalar potentials in supergravity: gaugings versus fluxes*, Freiburg, Germany, 3 June 2005.
 - de Roo, M., *IIB and IIA supergravity revisited*, Institute for Theoretical Physics, Utrecht University, Utrecht, the Netherlands, 7 December 2005.
 - Kerstan, S., *The IIB supergravity algebra*, Albert Einstein Institute, Golm, Germany, 25 June 2005.
 - Kerstan, S., *Type IIB, IIA and N=1 supersymmetry algebras in ten dimensions*, Centre for Theoretical Physics, University of Groningen, the Netherlands, 8 December 2005.
 - Pallante, E., *From lattice QCD to astrophysics: building the bridge with terascale computers*, DRSTP symposium Trends in Theory, Dalfsen, the Netherlands, 19 May 2005.

Leiden University

- Achúcarro, A., *Inflation and strings - the next generation*, KU Leuven, Belgium, 2 March 2005.
- Achúcarro, A., *Cosmic strings, yet again*, DAD (Dutch Astrophysics Days V), ASTRON/JIVE colloquium, Dwingeloo, the Netherlands, 18 March 2005.
- Achúcarro, A., *Dissipation and the stabilization of topological defects*, Paris workshop on Topological Defects, LPT Orsay, Paris, France, 1 July 2005.
- Achúcarro, A., *Semilocal string networks*, COSLAB 2005, Smolenice, Slovakia, 1 September 2005.
- Achúcarro, A., *Role of dissipation in the formation of embedded defects*, McGill workshop on Defect Stabilization, Montreal, Canada, 1 October 2005.
- Achúcarro, A., *Models of inflation with BPS and non-topological cosmic strings*, Conference From Strings to Cosmic Web, Groningen, the Netherlands, 30 November - 2 December 2005.
- Bruckmann, F., *Calorons - a showcase for topological objects in gauge theories*, University of Tübingen, Germany, 18 January 2005.
- Bruckmann, F., *Calorons - a showcase for topological objects in gauge theories*, University of Karlsruhe, Germany, 20 January 2005.
- Bruckmann, F., *Calorons - a showcase for topological objects in gauge theories*, Max Planck Institute of Physics (Werner Heisenberg Institute), Munich, Germany, 24 January 2005.
- Bruckmann, F., *Calorons - a showcase for topological objects in gauge theories*,

- Humboldt University, Berlin, Germany, 19 April 2005.
- Bruckmann, F., *Calorons - a showcase for topological objects in gauge theories*, DELTA meeting, University of Heidelberg, Germany, 22-23 April 2005.
 - Bruckmann, F., *Laplacian modes for calorons and as a filter*, 23rd international symposium on Lattice Field: Lattice 2005, Trinity College, Dublin, Ireland, 25-30 July 2005.
 - Bruckmann, F., *Laplacian modes as a filter*, workshop on Computational Hadron Physics (Hadron Physics 13), Nicosia, Cyprus, 14-17 September 2005.
 - Bruckmann, F., *Hopping of Laplacian modes*, workshop Confinement and Localization Properties of Low-Lying Modes, Humboldt University, Berlin, Germany, 9 December 2005.
 - Freire, F., *Dissipation and vacuum selection*, 29th Johns Hopkins workshop on current problems in particle physics: strong matter in the heavens, Budapest, Hungary, 1-3 August 2005.
 - Freire, F., *Mass terms and BRST cohomology*, Department of Physics, University of Sussex, Brighton, UK, 19 October 2005.
 - Jeannerot, R., *Inflation and topological defects*, national seminar High Energy, NIKHEF, Amsterdam, the Netherlands, 18 February 2005.
 - Jeannerot, R., *Inflation hybride en supergravite: confrontation entre la theorie et l'experience* (in French), CPT Marseille, France, 23 March 2005 and IPNL, Lyon, France, 13 May 2005.
 - Jeannerot, R., *Confronting hybrid inflation in SUGRA with CMB data and leptogenesis constraints*, PLANCK '05, Miramare - Trieste, Italy 23-28 May 2005.
 - Jeannerot, R., *Confronting SUGRA F-inflation with CMB data and leptogenesis constraints*, SUSY, IPPP, Durham, UK, 18-23 July 2005.
 - Jeannerot, R., *WMAP constraints on F-term inflation and leptogenesis*, COSMO '05, Bonn, Germany, 28 August-1 September 2005.
 - Jeannerot, R., *GUT hybrid inflation and cosmic strings*, Cosmic Strings and Fundamental Strings, Paris, France, 22-27 September 2005.
 - Jeannerot, R., *GUT hybrid inflation and cosmic strings*, Univ. Libre de Bruxelles, ULB Brussels, Belgium, 3 November 2005.
 - van Baal, P., *The Witten index in a finite volume revisited*, University of Washington, Seattle, USA, 4 February 2005.
 - van Baal, P., *Composite structures of instantons*, University of British Columbia, Vancouver, Canada, 14 February 2005.
 - van Baal, P., *Instanton quarks I*, KITP programme on Modern Challenges for Lattice Field Theory, Santa Barbara, USA, 22 February 2005.
 - van Baal, P., *Composite structures of instantons*, University of Utah, Salt Lake City, USA, 4 March 2005.
 - van Baal, P., *Composite structures of instantons*, SMU, Dallas, USA, 7 March 2005.
 - van Baal, P., *Composite structures of instantons*, SUNY, Stony Brook, USA, 17 March 2005.
 - van Baal, P., *Confinement and instanton quarks - some thoughts*, Ringberg workshop Understanding Confinement, Ringberg Castle, Tegernsee, Germany, 18 May 2005.
 - van Baal, P., *Cosmic rays: a bridge between high schools and real research*, Gribov

- 75 Memorial Workshop on Quarks, Hadrons and Strong Interactions, Budapest, Hungary, 23 May 2005.
- van Baal, P., *Instanton quarks and confinement*, Lattice conference, Dublin, Ireland, 26 July 2005.

Utrecht University

- Alday, F., *Structure constants of planar $N=4$ Yang-Mills at one loop*, Albert Einstein Institute, Potsdam, the Netherlands, 6 June 2005.
- Alexandrov, S., *Non-perturbative effects in the $c=1$ matrix model*, SPhT, CEA - Saclay, France, 17 January 2005.
- Alexandrov, S., *Non-perturbative effects in the $c=1$ matrix model*, King's College, London, UK, 23 February 2005.
- Alexandrov, S., *Introduction to loop quantum gravity*, King's College, London, UK, 25 February 2005.
- Alexandrov, S., *D-branes in $c=1$ string theory*, Jeussieu, Paris, France, 13 June 2005.
- Alexandrov, S., *D-branes in $c=1$ string theory*, 10th Claude Itzykson Meeting Quantum Field Theory: Then and Now, SPhT, Saclay, France, 17 June 2005.
- Alexandrov, S., *Holomorphic anomaly in string theory*, International V.A. Fock School for Advances of Physics 2005, St. Petersburg, Russia, 23 November 2005, lecture series.
- Ambjørn, J., *A semiclassical universe from first principles*, String Cosmology, Uppsala University, Uppsala, Sweden, 25-28 April 2005.
- Ambjørn, J., *A non-perturbative definition of quantum gravity*, Cambridge, UK, 25 May 2005.
- Ambjørn, J., *Construction of a universe without time-machines*, Igor Novikov Fest, Niels Bohr Institute, Copenhagen, Denmark, 15 November 2005.
- Ambjørn, J., *Quantum gravity via causal dynamical triangulations*, ENRAGE workshop, Utrecht University, Utrecht, the Netherlands, 1-2 December 2005.
- Arutyunov, G., *Integrability and gauge/string correspondence*, Institute for Theoretical Physics, Utrecht University, Utrecht, the Netherlands, 19 January 2005.
- Arutyunov, G., *On integrable structures of the gauge/string correspondence*, Institute for Theoretical Physics, Universiteit van Amsterdam, the Netherlands, 2 February 2005, lecture series.
- Arutyunov, G., *On integrability of classical superstrings in $AdS_5 \times S^5$* , Institute for Theoretical Physics, Utrecht University, Utrecht, the Netherlands, 27 April and May 10 2005, lecture series.
- Arutyunov, G., *Bethe ansatz for quantum strings*, Department of Pure and Applied Mathematics, University of Cambridge, UK, 7 July 2005.
- Arutyunov, G., *New integrable system of 2dim fermions from strings on $AdS_5 \times S^5$* , Ecole Normale Superior Summer Institute, 10 August 2005.
- Arutyunov, G., *Integrable Hamiltonian for superstrings on $AdS_5 \times S^5$* , The RTN meeting Constituents, Fundamental Forces and Symmetries of the Universe, Corfu, Greece, 21 September 2005.
- Arutyunov, G., *Integrable structures of the gauge/string correspondence*, String Steilkurs, Part II Advanced Topics in String Theory, Albert Einstein Institute,

- Golm, Germany, 26-30 September 2005, lecture series.
- Arutyunov, G., *Quantum dynamical R-matrices*, Institute for Theoretical Physics, Utrecht University, Utrecht, the Netherlands, 12 October 2005.
 - Arutyunov, G., *New integrable system of 2dim fermions from strings on $\text{AdS}_5 \times \text{S}^5$* , Part I, Laboratoire d'Annecy-Le-Vieux de Physique Théorique, 20 October 2005.
 - Arutyunov, G., *New integrable system of 2dim fermions from strings on $\text{AdS}_5 \times \text{S}^5$* , Part II, Laboratoire d'Annecy-Le-Vieux de Physique Théorique, 21 October 2005.
 - Arutyunov, G., *Large N gauge theories: spins or strings?* Institute for Theoretical Physics, Groningen University, the Netherlands, 7 November 2005.
 - de Wit, B., *Supersymmetric black holes*, symposium in honour of the 70th birthday of Julius Wess, München, Germany, 11 January 2005.
 - de Wit, B., *Maximal $D = 5$ supergravities and beyond*, Yukawa Institute, Kyoto, Japan, 4 February 2005.
 - de Wit, B., *Supersymmetric black holes*, Yukawa Institute, Kyoto, Japan, 28 February 2005.
 - de Wit, B., *Black hole entropy from M-theory and supergravity*, Tokyo University, Japan, 17 March 2005.
 - de Wit, B., *Supersymmetric black holes*, Saitama Institute of Technology, Japan, 18 March 2005.
 - de Wit, B., *Black hole entropy from string theory and supergravity*, CERN Theory division, 21 April 2005.
 - de Wit, B., *Variational principles for BPS black hole entropy workshop on gravitational aspects of string theory*, Fields Institute, Toronto, Canada, 3 May 2005.
 - de Wit, B., *Magnetic charges in local field theory – Lessons learnt from gauging maximal supergravity*, workshop in honour of Joaquim Gomis, Francqui Chair KU Leuven, Belgium, 30 May 2005.
 - de Wit, B., *Introduction to general relativity*, a programme of topical lectures, organized by the Research School Subatomic Physics, NIKHEF, Amsterdam, the Netherlands, 22-23 June 2005, lecture series.
 - de Wit, B., *Supersymmetric black hole partition functions*, Strings '05, Toronto, Canada, 11 July 2005.
 - de Wit, B., *Supersymmetric black hole partition functions*, Benasque 2005 String Theory Workshop, Spain, 18 July 2005.
 - de Wit, B., *Black hole entropy from M-theory and supergravity*, Subashis Nag Memorial Lectures, Colloquium, Chennai, India, 9 December 2005.
 - de Wit, B., *Magnetic charges in local field theory - Lessons learnt from gauging supergravity*, Subashis Nag Memorial Lectures, Chennai, India, 12 December 2005.
 - de Wit, B., *Black hole partition functions and duality*, Subashis Nag Memorial Lectures, Chennai, India, 13 December 2005.
 - de Wit, B., *Black hole partition functions and duality*, Einstein's Legacy in the New Millennium, Toshali Sands, Puri, India, 15-22 December 2005.
 - Engquist, J., *Singletons, higher spin algebras and strings*, Institute for Theoretical Physics, Utrecht University, Utrecht, the Netherlands, 7 November 2005.
 - Henson, J., *Lorentz violation in spin-foam models*, Loops '05 conference, Max Plank

- Institute, Golm, Germany, 11 October 2005.
- Henson, J., *Causal sets: discrete gravity*, Institute for Theoretical Physics, Utrecht University, Utrecht, the Netherlands, 24 October 2005.
 - Imeroni, E., $c = 1$ from $c < 1$, University of Wales, Swansea, Wales, UK, 3 May 2005.
 - Imeroni, E., $c = 1$ from $c < 1$, Institute for Theoretical Physics, Utrecht University, Utrecht, the Netherlands, 30 May 2005.
 - Imeroni, E., *An example of non-supersymmetric gauge/string correspondence*, Institute for Theoretical Physics, Utrecht University, Utrecht, the Netherlands, 30 May 2005.
 - Krishnaswami, G.S., *A classical theory of abelian gauge fields in two spatial dimensions motivated by incompressible flow*, Institute for Theoretical Physics, Utrecht University, Utrecht, the Netherlands, 23 June 2005.
 - Krishnaswami, G.S., *Co-adjoint orbits: from rigid body through hydrodynamics to Yang-Mills theory*, Institute for Theoretical Physics, Utrecht University, Utrecht, the Netherlands, 30 June 2005.
 - Krishnaswami, G.S., *An abelian ‘gauge’ theory of hydrodynamics*, workshop on Strings and Gauge Theories, University of Rochester, USA, 11 November 2005.
 - Laenen, E., *Monte Carlo event generation at NLO*, Topical Lectures, NIKHEF, Amsterdam, the Netherlands, 30 March-1 April 2005, lecture series.
 - Laenen, E., *Gluon saturation*, workshop, NL-Münster on RHIC/Alice Physics, University Twente, Enschede, the Netherlands, 5 April 2005.
 - Laenen, E., *Twistors and (non)-MHV amplitudes*, NIKHEF, Amsterdam, the Netherlands, 15 November 2005.
 - Laenen, E., *Top quarks at the LHC*, national seminar Theoretical Physics, Amsterdam, the Netherlands, 9 December 2005.
 - Loll, R., *Causality and emergence of a four-dimensional universe*, Technical University Aachen, Germany, 10 January 2005.
 - Loll, R., *Taking a close look at spacetime*, Physics 2005, A Century after Einstein, Warwick University, UK, 12 April 2005.
 - Loll, R., *Reconstructing the universe*, Institute for Theoretical Physics, Utrecht University, Utrecht, the Netherlands, 6 June 2005.
 - Loll, R., *Causal dynamical triangulations: introduction and new results*, 10eme Rencontre de Cosmologie de Peyresq, France, (two talks) 20-21 June 2005.
 - Loll, R., *What you always wanted to know about the quantum structure of spacetime*, Summer School 2005 in Theoretical Physics, Utrecht University, Utrecht, the Netherlands, 17 August 2005.
 - Loll, R., *The emergence of quantum spacetime from causal dynamical triangulations*, Quantum Gravity Conference Loops ‘05, Albert Einstein Institute, Golm, Germany, 12 October 2005.
 - Loll, R., *The emergence of quantum spacetime*, Perimeter Institute, Waterloo, Canada, 18 November 2005.
 - Loll, R., *Emergence of (quantum) spacetime from causal dynamical triangulations*, Göttingen University, Germany, 13 December 2005.
 - Loll, R., *Emergence of (quantum) spacetime from causal dynamical triangulations*, Autónoma University, Madrid, Spain, 20 December 2005.

- Noldus, J., *Geometry ‘curvature’*, Institute for Theoretical Physics, Utrecht University, Utrecht, the Netherlands, 13 January 2005.
- Prokopec, T., *Inflation, baryogenesis and the CMB spectrum*, DRSTP postgraduate course theoretical high-energy physics, Nijmegen, the Netherlands, 24-28 January 2005, lecture series.
- Prokopec, T., *La masse du photon et des champs magnétiques cosmologiques (The photon mass and cosmological magnetic fields)*, University of Paris VI, Paris, France, 3 May 2005.
- Prokopec, T., *Baryogenesis: the quest for the origin of matter*, DRSTP symposium Trends in Theory, Dalfsen, the Netherlands, 20 May 2005.
- Prokopec, T., *The cosmology of the nosymmetric theory of gravitation*, Oxford University, UK, 9 May 2005.
- Prokopec, T., *The cosmology of the nosymmetric theory of gravitation*, COSMO ‘05, 9th international workshop on Particle Physics and the Early Universe, Bonn, Germany, 28 August-1 September 2005.
- Prokopec, T., *The cosmology of the nosymmetric theory of gravitation*, University of Crete, Heraklion, Greece, 23 October 2005.
- Prokopec, T., *Primordial cosmological magnetic fields*, ICRA-CBPF (Centro Brasileiro de Pesquisas Físicas), Brasil, 13 November 2005.
- Prokopec, T., *The photon mass in inflation and cosmological magnetic fields*, University of Juiz de For, Brasil, 17 November 2005.
- Prokopec, T., *The photon mass in inflation and cosmological magnetic fields*, University of Rio de Janeiro, Brasil, 20 November 2005.
- Prokopec, T., *The photon mass in inflation and cosmological magnetic fields*, ICRA-CBPF (Centro Brasileiro de Pesquisas Físicas), Brasil, 27 November 2005.
- Prokopec, T., *The cosmology of the nosymmetric theory of gravitation*, From Strings to cosmic web, Groningen, the Netherlands, 30 November-2 December 2005.
- Rigopoulos, G., *Non-linear inflationary perturbations on long wavelengths*, COSMO ‘05, Bonn, Germany, 31 August 2005.
- Rigopoulos, G., *Is inflation generically gaussian?*, Institute for Theoretical Physics, Utrecht University, the Netherlands, 31 October 2005.
- Robles Llana, D., *Topological strings and generalized complex geometry*, Institute for Theoretical Physics, Utrecht University, the Netherlands, 3 and 10 October 2005.
- Sahlmann, H., *Loop quantum gravity, an (un-)conventional QFT*, Institute for Theoretical Physics, Utrecht University, the Netherlands, 19 and 26 September 2005.
- Sahlmann, H., *On the quantum origin of the seeds of cosmic structure*, workshop Quantum Fields, Gravity and Non-Commutative Geometry’, Leipzig, Germany, 3 October 2005.
- Sahlman, H., *On the quantum origin of the seeds of cosmic structure*, conference Loops ‘05, Golm, Germany, 13 October 2005.
- Sahlman, H., *Uniqueness of the kinematical representation of loop quantum gravity*, INI Programme Global Problems in Mathematical Relativity, Cambridge, UK, 25 October 2005.
- Sahlman, H., *Loop quantum gravity - a status report*, Institute for Theoretical

- Physics, Göttingen, Germany, 17 November 2005.
- Sahlman, H., *Quantum theory on a causal set*, ENRAGE mini workshop, Utrecht University, the Netherlands, 1 December 2005.
 - Saueressig, F.S., *Dynamical conifold transitions in Calabi-Yau compactifications of M-Theory*, national seminar Theoretical Physics, NIKHEF, Amsterdam, the Netherlands, 15 April 2005.
 - Saueressig, F.S., *Renormalization group improved cosmologies - no strings attached*, Institute for Theoretical Physics, Utrecht University, the Netherlands, 12 September 2005.
 - Starodubtsev, A., *Dynamics of point particles coupled to 2+1 gravity*, Institute for Theoretical Physics, Utrecht University, the Netherlands, 14 November 2005.
 - 't Hooft, *Topics in advanced quantum field theory*, DRSTP postgraduate course theoretical high-energy physics, Nijmegen, the Netherlands, 24-28 January 2005, lecture series.
 - 't Hooft, G., *Black holes and information: the holographic nature of our universe*, University of Tokyo, Japan, 31 January 2005.
 - 't Hooft, G., *Topological and non-topological causes of the absolute confinement of quarks in the theory of quantum chromodynamics*, University of Tokyo, Japan, 1 February 2005.
 - 't Hooft, G., *Renormalization without infinities*, University of Tokyo, Japan, 2 February 2005.
 - 't Hooft, G., *The biggest mystery of our physical world: why is there quantum mechanics, and why is the vacuum stable?*, Keio University, Japan, 3 February 2005.
 - 't Hooft, G., *Topological and non-topological causes of the absolute confinement of quarks in the theory of quantum chromodynamics*, Nagoya University, Japan, 7 February 2005.
 - 't Hooft, G., *Topological and non-topological causes of the absolute confinement of quarks in the theory of quantum chromodynamics*, Kyoto University, Japan, 9 February 2005.
 - 't Hooft, G., *Forces and dynamics in the sub-atomic universe*, NUS, Singapore, 3 March 2005.
 - 't Hooft, G., *Different mechanisms for the absolute confinement of quarks inside a hadron*, Technische Universität München, Germany, 9 March 2005.
 - 't Hooft, G., *Symmetry and Sidney*, conference QFT & QCD, Past, Present, and Future, lecture in honor of Sidney Coleman, Boston, USA, 18-19 March 2005.
 - 't Hooft, G., *The holographic mapping of the standard model onto the black hole horizon*, Institute for Theoretical Physics, Utrecht University, Utrecht, the Netherlands, 14 April 2005.
 - 't Hooft, G., *Sizes and scales in the sub-atomic world*, Clay lecture, Institute Mathematical research, Cambridge, Mass., USA, 27 April 2005.
 - 't Hooft, G., *On the holographic mapping of the standard model onto the horizon of a black hole*, SUNY, Stony Brook, USA, 2 May 2005.
 - 't Hooft, G., *Is there classical beneath quantum physics*, Seven Pines conference on The Classical-Quantum Borderlands, Stillwater, Minnesota, USA, 5 May 2005.
 - 't Hooft, G., *Holographic mapping of the standard model onto a black hole horizon*

- showcase*, Vancouver Conference, Vancouver, Canada, 12 May 2005.
- 't Hooft, G., *A holographic mapping of the standard model on the black hole horizon*, workshop in honour of Joaquim Gomis' Francqui Chair KU Leuven, Belgium, 31 May 2005.
 - 't Hooft, G., *A holographic mapping of the standard model on the black hole horizon*, scientific meeting and discussion session Causality in Quantum Gravity, Bibliotheca Alexandrina, Alexandria, Egypt, 5 June 2005.
 - 't Hooft, G., *Black holes and quantum mechanics*, University of Alexandria, Egypt, 7 June 2005.
 - 't Hooft, G., *The physics of quantum black holes*, Erice School of Sub Nuclear Physics, Erice, Italy, 6 September 2005.
 - 't Hooft, G., *General relativity as an emergent symmetry*, special symposium in honour of Alexander Polyakov, Princeton, USA, 6 November 2005.
 - 't Hooft, G., *Black holes in elementary particle physics*, Plücker-Vorlesung, Bonner Internationale Graduiertenschule Mathematik, Physik, Astronomie, Bonn, Germany, 25 November 2005.
 - 't Hooft, G., prepared comments for the 23rd Solvay conference The Quantum Structure of Space and Time, Brussels, Belgium, 1 December 2005.
 - 't Hooft, G., *Black holes in particle physics*, University of Rajasthan, Jaipur, India, 10 December 2005.
 - 't Hooft, G., *Quantum mechanics at the Planck scale*, Einstein's Legacy in the New Millennium, Toshali Sands, Puri, India, 17 December 2005.
 - 't Hooft, G., *The black hole horizon as a dynamical system*, lecture inclusive panel discussion on String Theory, at the meeting on Einstein's Legacy in the New Millennium, Toshali Sands, Puri, India, 20 December 2005.
 - 't Hooft, G., *Black holes in elementary particle physics*, Institute of Physics, Bhubaneswar, India, 22 December 2005.
 - Vandoren, S., *Non-extremal D-instantons*, University of Wales, Swansea, Wales, UK, 17 March 2005.
 - Vandoren, S., *Membrane instantons and de Sitter vacua*, Institute for Theoretical Physics, Utrecht University, Utrecht, the Netherlands, 23 May 2005.
 - Vandoren, S., *Ultracold superstrings*, Department of Physics and Astronomy (together with H. Stoof), Utrecht University, Utrecht, the Netherlands, 24 June 2005.
 - Vandoren, S., *Ultracold superstrings*, University of Jena, Germany, 6 July 2005.
 - Vandoren, S., *Instantons and vacua of string theories*, AEI, Potsdam, Germany, 25 July 2005.
 - Vandoren, S., *Ultracold superstrings*, AEI, Potsdam, Germany, 27 July 2005.
 - Vandoren, S., *Applications of quaternionic geometry in string theory*, Conference Rencontres entre Physiciens Théoriciens et Mathématiciens, Strasbourg, France, 24 September 2005.
 - Vandoren, S., *On de Sitter vacua in type IIA orientifold compactifications*, Sommerfeld Institute Munich, Munich, Germany, 24 November 2005.
 - Vandoren, S., *Non-extremal D-instantons and the AdS/CFT correspondence*, Institute Henri Poincaré, Paris, France, 8 December 2005.

6.2 Theme 2: Statistical physics, condensed-matter theory and quantum optics

Universiteit van Amsterdam

- Aquino, G., *Kovacs effect in a fragile glass model*, 100 Years of Brownian Motion, Erice, Sicily, Italy, 26 July-1 August 2005, poster.
- Aquino, G., *Kovacs effect in a fragile glass model*, summer school Ageing and the Glass Transition, University of Luxembourg, Luxembourg, 18-24 September 2005.
- Bouttier, J., *Statistical physics of random surfaces and bijective combinatorics of planar maps*, Saclay, France, 10 June 2005.
- Bouttier, J., *Random 2D planar lattices and trees*, Les Houches, France, 27 July 2005.
- Bouttier, J., *On the groundstate of an inhomogeneous $O(n)$ loop model*, Saclay, France, 14 November 2005.
- Bouttier, J., *On the groundstate of an inhomogeneous $O(n)$ loop model*, ITF Amsterdam, the Netherlands, 23 November 2005.
- Bouttier, J., *On self-avoiding walks and site percolation on a semi-infinite cylinder*, FOM Decemberdagen, Veldhoven, the Netherlands, 13 December 2005.
- Calabrese, P., *Entanglement entropy and quantum field theory*, Pisa University, Italy, 16 October 2005.
- Calabrese, P., *Entanglement entropy and quantum field theory*, Durham University, UK, 4 November 2005.
- Calabrese, P., *Entanglement entropy and quantum field theory*, ITF, Amsterdam, the Netherlands, 10 November 2005.
- Calabrese, P., *Entanglement entropy and quantum field theory*, Spth-CEA, Saclay, Paris, France, 28 November 2005.
- Caux, J.-S., *Matiere condensee et fortes correlations: quelques exemples contemporains*, ENS, Lyon, France, 10 January 2005.
- Caux, J.-S., *Dynamical correlation functions of one-dimensional spin chains*, St-Andrew's, UK, 28 February 2005.
- Caux, J.-S., *Computation of dynamical correlation functions of Heisenberg spin chains*, Utrecht University, the Netherlands, 2 June 2005.
- Caux, J.-S., *Computation of dynamical correlation functions of Heisenberg chains*, PSI, Villigen, Switzerland, 15 June 2005.
- Caux, J.-S., *Dynamical correlation functions of Heisenberg chains*, Amsterdam summer workshop on Low-Dimensional Quantum Condensed Matter, Amsterdam, the Netherlands, July 26 2005.
- Caux, J.-S., *Dynamics of quantum spin chains*, international summer school on Fundamental Problems in Statistical Physics XI, Leuven, Belgium, 14 September 2005.
- Caux, J.-S., *Dynamics of quantum spin chains*, Sherbrooke, Canada, 20 September 2005.
- Caux, J.-S., *Computing the dynamics of quantum spin chains*, FOM Decemberdagen, Veldhoven, the Netherlands, 13 December 2005.

- Nienhuis, B., *Finite size statistical mechanics*, colloquium, Bergische Universität Wuppertal, Germany, 3 February 2005.
- Nienhuis, B., *Critical models with $c=0$* , Counting Complexity, international conference at Dunk Island, Australia, 13 July 2005.
- Nienhuis, B., *Static sand heaps: spatial structure of the forces*, colloquium, University of Melbourne, Australia, 22 July 2005.
- Nienhuis, B., *Forces in sand castles*, Nijmegen, the Netherlands, 7 October 2005.
- Nieuwenhuizen, Th.M., *Solution for the quantum measurement problem and its implication for the interpretation of quantum mechanics*, colloquium Radboud University Nijmegen, Nijmegen, the Netherlands, 17 May 2005.
- Nieuwenhuizen, Th.M., *Classical phase space density for the relativistic hydrogen atom*, conference Quantum Theory: reconsideration of foundations-3, Vaxjo, Sweden, 7 June 2005.
- Nieuwenhuizen, Th.M., *Brownian motion and quantum mechanics: two sides of the same coin?*, 100 Years of Brownian Motion, Erice, Sicily, 26 July-1 August 2005.
- Pruisken, A.M.M., *Quantum criticality and super universality in the quantum Hall regime*, conference on Theoretical Physics, 70-year anniversary of the Tamm Theory Department, Lebedev Physical Institute, Moscow, 11-16 April 2005.
- Pruisken, A.M.M., *Super universality in spin liquids and quantum Hall liquids*, Landau Days-2005, 19-22 June 2005, Chernogolovka, Russia.
- Pruisken, A.M.M., *Non-fermi liquid criticality and super universality in the quantum Hall regime*, Low-D Quantum Condensed Matter Amsterdam summer workshop, Amsterdam, the Netherlands, 25-30 July 2005.
- Schoutens, K., *Phases of rotating bosons*, Utrecht University, the Netherlands, 5 January 2005.
- Schoutens, K., *Rotating bosons: from spin-textures to quantum Hall states*, symposium Back to the Future, Amsterdam, the Netherlands, 17 January 2005.
- Schoutens, K., *Phases of rotating bosons*, University of Virginia, USA, 24 January 2005.
- Schoutens, K., *Supersymmetric lattice models*, Leiden University, the Netherlands, 24 February 2005.
- Schoutens, K., *Supersymmetry at work: exact results for lattice fermions in dimensions $D \geq 1$* , Oxford University, UK, 10 June 2005.
- Schoutens, K., *Density profiles for atomic quantum Hall states*, workshop Low-Dimensional Quantum Condensed Matter, Amsterdam, the Netherlands, 29 July 2005.
- Surendran, N., *Super universality in quantum Hall and spin liquids*, seminar Condensed Matter, ITF, Amsterdam, the Netherlands, 8 March 2005.

Vrije Universiteit Amsterdam

- Barbarin, Y., Heck, M., Bente, E., Nötzel, R., Oei, S., Lenstra, D. and Smit, M.K., *15, 20 and 40 GHz passively modelocked bulk InGaAsP/InP lasers*, Cost 288 Action Nanoscale and Ultrafast Photonics, St Andrews, UK, 3-4 August 2005.
- Beri, S., Yousefi, M., Lenstra, D. and Smit, M.K., *Rate equations model for the coupling of longitudinal modes in semiconductor lasers*, European Semiconductor

- Laser Workshop, Glasgow, UK, 23-24 September 2005.
- Erzgräber, H., Yousefi, M., Lenstra, D. and Krauskopf, B., *Frequency oscillations of a semiconductor laser subject to a filtered optical feedback*, PHASE international workshop, Metz, France, 29-30 March 2005, 21.
 - Erzgräber, H., Krauskopf, B. and Lenstra, D., *Pure frequency oscillations of semiconductor lasers with filtered optical feedback*, IEEE/LEOS symposium Benelux Chapter, Mons, Belgium, 1-2 December 2005, 47-50.
 - Heck, M.J.R., Bente, E.A.J.M., Barbarin, Y., Lenstra, D. and Smit, M.K., *Simulation of modelocked ring lasers including integrated pulse shaping components*, PHASE international workshop, Metz, France, 29-30 March 2005.
 - Krauskopf, B., Erzgräber, H. and Lenstra, D., *A geometric picture of compound laser modes of mutually delay-coupled semiconductor lasers*, PHASE international workshop, Metz, France, 29 March 2005, poster.
 - Lenstra, D., Erzgräber, H. and Krauskopf, B., *Coherent optical feedback with time delay in semiconductor lasers*, XXV Dynamics Days Europe 2005, Berlin, Germany, 25-28 July 2005.
 - Lenstra, D., Li, Z., Liu, Y., Zhang, S., Ju, H., Tangdiongga, E., Waardt, H. de, Khoe, G.D. and Dorren, H., *(Ultra)fast all-optical functionalities using a SOA and a filter*, Cost 288 Action Nanoscale and Ultrafast Photonics, St. Andrews, UK, 3-4 August 2005.
 - Lenstra, D., Wang, W. and Allaart, K., *On the ultrafast gain polarization anisotropy in a bulk semiconductor optical amplifier*, European Semiconductor Laser Workshop, Glasgow, UK, 23-24 September 2005.
 - Lenstra, D., Wang, W. and Allaart, K., *Ultrafast birefringence in a semiconductor, optical amplifier due to the dipole orientation relaxation*, ESLW, Glasgow, 2005.
 - Li, Z.; Yang, X; Tangdiongga, E.; Ju, H.; Khoe, G.D.; Dorren, H.J.S. and Lenstra, D., *Mode-locking by non-linear polarization rotation in a semiconductor optical amplifier*, CLEO/Europe 2005, Munich, Germany, 12-17 June 2005.
 - Li, Z.; Liu, Y.; Zhang, S.; Ju, H.; Waardt, H. de; Khoe, G.D. and Lenstra, D., *All-optical logic gates based on a SOA and an optical filter*, ECOC 2005, Glasgow, Scotland, 25-29 September 2005.
 - Li, Z.; Liu, Y.; Zhang, S.; Molina Vazquez, J.; Khoe, G.D.; Dorren, H.J.S. and Lenstra, D., *Towards Tbps wavelength conversion with a bulk semiconductor optical amplifier*, IEEE/LEOS symposium Benelux Chapter, Mons, Belgium, 1-2 December 2005, poster.
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- MacKintosh, F.C., *Cytoskeletal networks: polymer physics meets cell mechanics*, Leeds-Sheffield Doctoral Training Centre, Doncaster, UK, 21 September 2005.
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University of Groningen

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- van Enter, A.C.D., *First-order transitions in non-linear vector and lattice gauge models*, seminar on Applications of Renormalization Group Methods in the Mathematical Sciences, Kyoto, Japan, 9 September 2005.
- van Enter, A.C.D., *States, metastates and chaotic size dependence in 2d Ising models*, workshop on Interacting Stochastic Systems, Eurandom Eindhoven, the Netherlands, 22 September 2005.
- van Enter, A.C.D., *Phase transitions in non-linear vector and lattice gauge models*, Tokyo Institute of Technology, Tokyo, Japan, 13 September 2005.
- van Enter, A.C.D., *Ising models with random boundary conditions: chaotic size dependence and metastates*, Gakushuin University, Tokyo, Japan, 14 September 2005.

Leiden University

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- Beenakker, C.W.J., *Quantum shot noise*, Vienna Physics Colloquium, Vienna, Austria, 17 January 2005.
- Beenakker, C.W.J., *Exponential sensitivity to dephasing of chaotic scattering*, international workshop on Aspects of Quantum Chaotic Scattering, Dresden, Germany, 7-12 March 2005.
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- Beenakker, C.W.J., *Optimal quantum entanglement pump*, Advanced Research workshop on Fundamentals of Electronic Nanosystems, St. Petersburg, Russia, 25 June-1 July 2005.
- Beenakker, C.W.J., *Entanglement in the Fermi sea*, International School of Physics Enrico Fermi on Quantum Computers, Algorithms and Chaos, Varenna, Italy, 5-15 July 2005, lecture series.
- Beenakker, C.W.J., *Optimal quantum entanglement pump*, ESF research conference on Fundamental Problems of Mesoscopic Physics, Acquafredda di Maratea, Italy, 3-8 September 2005.
- Beenakker, C.W.J., *Quantum entanglement in the solid state*, 11th International Summer School on Fundamental Problems in Statistical Physics, Leuven, Belgium, 4-17 September 2005.
- Beenakker, C.W.J., *Quantum shot noise*, 18th International Conference on Noise and Fluctuations, Salamanca, Spain, 19-23 September 2005.
- Beenakker, C.W.J., *Critical temperature for electron-hole entanglement*, International Workshop on Nanoscale Dynamics and Quantum Coherence, Catania, Italy, 2-5 October 2005.
- Blöte, H.W.J., *Percolation in one of q colors near criticality*, Mark Kac seminar Utrecht University, Utrecht, the Netherlands, 29 April 2005.
- Blöte, H.W.J., *Applications of geometric cluster algorithms*, International Conference of Differential Geometric Methods in Theoretical Physics, Tianjin, P.R. China, 21 August 2005.
- Blöte, H.W.J., *Renormalization, finite-size scaling and constraints*, Academy of Sciences of China, P.R. China, 23 September 2005.
- Blöte, H.W.J., *Finite-size scaling in the canonical ensemble*, symposium in honor of prof. H.J.F. Knops, Radboud University, Nijmegen, the Netherlands, 7 October 2005.
- Davis, S.C., *Constraining Gauss-Bonnet dark energy*, Sheffield University, UK, 28 September 2005.
- Depken, M. and Stinchcombe, R., *Exact joint density-current probability function for the asymmetric simple exclusion process*, APS March meeting, Los Angeles, USA, 24 March 2005.
- Depken, M. van Hecke, M. and van Saarloos, W., *Theoretical description of smooth, dense and slow granular flows*, JMBC-cursus dagen, Twente, the Netherlands, 5 October 2005.
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- Filippi, C., *Quantum Monte Carlo for electronic structure: achievements and obstacles*, symposium of the Deutsche Forschungsgemeinschaft Programme Modern and Universal First-Principles Methods for Many-Electron Systems in Chemistry and Physics, Bonn, Germany, 4-6 July 2005.
- Filippi, C., *Excited states in quantum Monte Carlo: a self-consistent scheme for wave function optimization*, Psi-k 2005, conference Toward Atomistic Materials Design, Schwäbisch Gmünd, Germany, 17-21 September 2005.
- Filippi, C., *Excited states in quantum Monte Carlo: a self-consistent scheme for wave function optimization*, Vrije Universiteit Amsterdam, Theoretical Chemistry, Amsterdam, the Netherlands, 18 October 2005.
- Krüger, F., *Frustrated quantum magnetism: fluctuation induced first order versus deconfined quantum criticality*, FOM Decemberdagen, Veldhoven, the Netherlands, December 2005.
- Leurs, B.W.A., Luna, K. and Zaanen, J., *Charge order, quantum phases and nodal fermions*, FOM Decemberdagen, Veldhoven, the Netherlands, December 2005, poster.
- Morozov, A., *Non-linear instabilities in parallel shear flows of viscoelastic fluids*, APS Division of Fluid Dynamics 58th Annual Meeting, Chicago, USA, 20-22 November 2005.
- Morozov, A., *Non-linear instabilities in parallel shear flows of visco-elastic fluids*, workshop, Polymers, Worms and Bilayers, University of Twente, the Netherlands, 22 September 2005.
- Nienhuis, G. and Visser, J., *Vortices and angular momentum in astigmatic modes*, Photonics West, San Jose, CA, January 22-27, 2005.
- Nienhuis, G., *Glauber Nobel laureate in physics*, Algemeen Fysisch Colloquium, Utrecht University, 9 December 2005.
- Schiessel, H., *The screws and gears of DNA: from sliding nucleosomes to self-propelling DNA motors*, scientific FOM Decemberdagen, Lunteren, the Netherlands, 20-21 January 2005.
- Schiessel, H., *The screws and gears of DNA: from sliding nucleosomes to self-propelling DNA motors*, BSI colloquium, Leiden, the Netherlands, 27 January 2005.
- Schiessel, H., *Mechanikbaukasten DNS: Von gleitenden Nukleosomen und wirbelnden DNS-Motoren*, physics colloquium, Mainz, Germany, 1 February 2005.
- Schiessel, H., *Theory of single DNA micromanipulation*, colloquium, Institute for

- Theoretical Physics, Utrecht University, the Netherlands, 30 March 2005.
- Schiessel, H., *From DNA to chromatin*, DRSTP postgraduate course (AIO/ OIO school) Statistical Physics and Theory of Condensed Matter, Nijmegen, the Netherlands, 25-29 April 2005, lecture series.
 - Schiessel, H., *The nucleosome: a transparent, slippery, sticky and yet stable DNA-protein complex*, DRSTP symposium Trends in Theory, Dalfsen, the Netherlands, 19-20 May 2005.
 - Schiessel, H., *The screws and gears of DNA: from sliding nucleosomes to self-propelling DNA motors*, Darmstadt, Germany, 11 July 2005.
 - Schiessel, H., *The nucleosome: a transparent, slippery, sticky and yet stable DNA-protein complex*, workshop Soft Matters in Biological Physics, Leipzig (Germany), 20-21 September 2005.
 - Schiessel, H., *Salts, electrostatics, proteins*, fall school on Biology for Physicists, Leiden, the Netherlands, 24-28 October 2005, lecture series.
 - Schiessel, H., *The nucleosome: a transparent, slippery, sticky and yet stable DNA-protein complex*, Lund, Sweden, 3 October 2005.
 - Schiessel, H., *Collective dynamics of DNA micromachines*, Lorentz workshop Dynamics of Patterns', Leiden, the Netherlands, 7-11 November 2005.
 - Schiessel, H., *Physics of chromatin organisation*, Dag van de Biofysica, Leiden, the Netherlands, 18 November 2005.
 - Schiessel, H., *From DNA to chromatin* and one seminar on *A DNA ring acting as a thermal ratchet*, Biophysics Winter School, KIAS, Seoul, South Korea, 12-17 December 2005, lecture series.
 - Silvestrov, P.G., *Chaos beyond linearized stability analysis: folding of the phase space and distribution of Lyapunov exponents*, international workshop on Aspects of Quantum Chaotic Scattering, Dresden, Germany, 7-12 March 2005.
 - Silvestrov, P.G., *Chaos beyond linearized stability analysis: folding of the phase space and distribution of Lyapunov exponents*, March meeting of the American Physical Society, Los Angeles, USA, 21-25 March 2005.
 - Silvestrov, P.G., *Semiclassical electron transport in case of spin-orbit interaction: a way to spin-polarize the current*, March meeting of the American Physical Society, Los Angeles, USA, 21-25 March 2005.
 - Somfai, E., *Jamming and vibrational spectrum of granular packings*, scientific meeting FOM Statistical Physics, Lunteren, the Netherlands, 20-21 January 2005.
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 - Somfai, E., *Diffusion-limited aggregation and Laplacian growth*, MIT, Massachusetts, USA, 15 March 2005.
 - Somfai, E., *Modeling non-equilibrium systems*, Dept. Mathematics, Univ. Bristol, UK, 30 March 2005.
 - Somfai, E., *Granular packings: force chains, jamming and vibrational spectrum*, Univ. Libre Brussels, Belgium, 12 September 2005.
 - Somfai, E., *Scale invariance and jamming in granular systems*, University of Warwick, UK, 17 November 2005.

- Storm, C., *Multiphase membrane tubes*, national seminar Statistical Physics, Lunteren, the Netherlands, 21 January 2005.
- Storm, C., *Multiphase membrane tubes*, March meeting of the American Physical Society, Los Angeles, USA, 25 March 2005.
- Storm, C., *Non-linear elasticity in biological gels*, Leiden University, the Netherlands, 24 May 2005.
- Storm, C., *Non-linear elasticity in biological gels*, Leiden University Medical Center Anatomy and Embryology seminar, Leiden, the Netherlands, 29 November 2005.
- Storm, C., *Non-linear elasticity in biological gels*, FOM Decemberdagen, Veldhoven, the Netherlands, 14 December 2005.
- Trauzettel, B., *Fractional charge in the noise of Luttinger liquid systems*, SPIE international symposium on Fluctuations and Noise, Austin, USA, 24-26 May 2005.
- Trauzettel, B., *Current fluctuations of an interacting quantum dot*, University of Texas, Austin, USA, 23 May 2005.
- Trauzettel, B., *Excess noise of electrical current can be negative*, Ruhr-Universität Bochum, Bochum, Germany, 8 July 2005.
- Trauzettel, B., *Current fluctuations in Luttinger liquid systems*, Max Planck Institut für Physik komplexer Systeme, Dresden, Germany, 10 August 2005.
- Trauzettel, B., *Entangled microwave photons from quantum dots*, ESF research conference on Fundamental Problems of Mesoscopic Physics, Acquafredda di Maratea, Italy, 3-8 September 2005, poster.
- Trauzettel, B., *Optimal spin-entangled electron-hole pair pump*, Universität Basel, Switzerland, 18 October 2005.
- Trauzettel, B., *Optimal spin-entangled electron-hole pair pump*, Universität Freiburg, Germany, 20 October 2005.
- Trauzettel, B., *Entanglement and teleportation in the Fermi sea*, Universiteit Twente, the Netherlands, 30 November 2005.
- Trauzettel, B., *Optimal quantum entanglement pump*, FOM Decemberdagen, Veldhoven, the Netherlands, 13-14 December 2005.
- van den Brink, J., *Quantum shot noise*, Vienna Physics Colloquium, Vienna, Austria, 17 January 2005.
- van den Brink, J., *A new route towards ferroelectric magnets*, University College London, UK, January 2005.
- van den Brink, J., *Electronic correlations in organic molecular crystals*, Leibniz-Institut für Werkstofforschung, Dresden, Germany, January 2005.
- van den Brink, J., *Limit to quantum coherence due to spontaneous symmetry breaking*, Universität Osnabrück, Osnabrück, Germany, April 2005.
- van den Brink, J., *Limit to quantum coherence due to spontaneous symmetry breaking*, DRSTP symposium Trends in Theory, Dalfsen, the Netherlands, 19-20 May 2005.
- van den Brink, J., *Limit to quantum coherence due to spontaneous symmetry breaking*, Casimir Research School, Egmond, the Netherlands, May 2005.
- van den Brink, J., *A new route towards ferroelectric magnets*, theory colloquium, University of Milan, Italy, June 2005.
- van den Brink, J., *A new route towards ferroelectric magnets*, Argonne National Laboratory, Chicago, Illinois, USA, July 2005.

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- van den Brink, J., *A new route towards ferroelectric magnets*, University of Groningen, the Netherlands, August 2005.
- van den Brink, J., *Limit to quantum coherence due to spontaneous symmetry breaking*, physics colloquium, University of Groningen, the Netherlands, September 2005.
- van den Brink, J., *Magnetism versus ferroelectricity; a new route to combine both*, conference on Dynamic Properties of Solids, esky Krumlov, Tjechia, September 2005.
- van den Brink, J., *Limit to quantum coherence due to spontaneous symmetry breaking*, Van der Waals Zeeman Colloquium, Universiteit van Amsterdam, the Netherlands, October 2005.
- van den Brink, J., *Limit to quantum coherence due to spontaneous symmetry breaking*, Universiteit van Amsterdam, the Netherlands, December 2005.
- van Saarloos, W., *Surprising aspects of traveling waves with non-linear diffusion: bacterial growth vortex diffusion models*, International Conference on Applications of Dynamical Systems, Snowbird, UT, USA, 22-26 May 2005.
- van Saarloos, W., *When soft condensed matter gets hard: a jamming transition in granular media?*, colloquium AMOLF, the Netherlands, 13 June 2005.
- van Saarloos, W., *Flow instabilities and turbulence in visco-elastic fluids*, International Conference Liquids, Utrecht University, Utrecht, the Netherlands, 2 July 2005.
- van Saarloos, W., *Non-linear flow instabilities and turnbulence*, workshop on Limits and Perspectives on Non-linear Polymer Flow Modeling, Eindhoven, the Netherlands, 8 July 2005.
- van Saarloos, W., *Front propagation into unstable states: an introduction and review*, workshop Universal Features in Turbulence: from Quantum to Cosmological Scale, University of Warwick, UK, 5-9 December 2005.
- Zaanen, J., *A critical account of quantum criticality in cuprates*, Stanford-Tokyo meeting on phonons in high T_c superconductors, Tsukuba, Japan, January 2005.
- Zaanen, J., *A critical account of quantum criticality in cuprates*, Los Alamos National Laboratory, Los Alamos, USA, February 2005.
- Zaanen, J., Nazario, Z. and Santiago, D.I., *Spin currents, coherent or not*, Stanford University, Stanford, USA, February 2005.
- Zaanen, J., *Stripes and mottness in high T_c superconductors*, annual conference of the AAAS, Washington, USA, February 2005.
- Zaanen, J., *The orderly limit of superconductivity*, international workshop Collective Quantum States, Dresden, Germany, February 2005.
- Zaanen, J., *Emergent gravity as the nematic dual of Lorentz invariant elasticity*, conference on Higher Dimensional Quantum Hall Effect, Chern-Simons Theory and Non-Commutative Geometry in Condensed Matter Physics and Field Theory, Trieste, Italy, March 2005.
- Zaanen, J., conference summary, Dresden, Germany, international workshop NANO05,

- Dresden, Germany, March 2005.
- Zaanen, J., *The orderly limit of superconductivity*, Department of Physics, Harvard University, Boston, USA, April 2005.
 - Zaanen, J., *The orderly limit of superconductivity*, Department of Physics, MIT, Boston, USA, April 2005.
 - Zaanen, J., *The orderly limit of superconductivity*, Department of Physics, Boston University, Boston, USA, April 2005.
 - Zaanen, J., *The Orderly limit of Superconductivity*, Department of Physics, University of California, Los Angeles, USA, June 2005.
 - Zaanen, J., *The orderly limit of superconductivity*, Lawrence Berkeley National Laboratory, Berkeley, USA, July 2005.
 - Zaanen, J., *The orderly limit of superconductivity*, Department of Physics, University of British Columbia, Vancouver, Canada, July 2005.
 - Zaanen, J., *The orderly limit of superconductivity*, international conference Orbital 2005, Hamburg, Germany, October 2005.
 - Zaanen, J., *A critical account of quantum criticality in cuprates*, Hahn-Meitner Institute, Berlin, Germany, October 2005.
 - Zaanen, J., *The orderly limit of superconductivity*, Sixth Taiwan-Korea-Japan symposium on correlated electron systems, Taipei, Taiwan, December 2005.
 - Zaanen, J., *Observing the shear photon with RIXS*, sixth Taiwan-Korea-Japan symposium on Correlated Electron Systems, Taipei, Taiwan, December 2005.

Radboud University Nijmegen

- Katsnelson, M.I., *Kondo physics beyond simple one-spin scattering*, University of Leiden and University of Amsterdam, January 2005.
- Katsnelson, M.I., *Quantum dynamics and decoherence in nanoscale spin systems*, Institute for Theoretical Physics, Utrecht University, February 2005.
- Katsnelson, M.I., *Magnetism and nonquasiparticle states on metal surfaces*, University of Hamburg, March 2005.
- Katsnelson, M.I., *Nanoscale world between quantum and classical*, Colloquium Ehrenfestii, Leiden, March 2005.
- Katsnelson, M.I., *Local perturbative approach to electronic structure of actinide systems*, workshop Electronic structure of correlated materials, Hamburg, May 2005.
- Katsnelson, M.I., *Nanoscale world between quantum and classical*, DRSTP symposium Trends in Theory, Dalfsen, May 2005.
- Katsnelson, M.I., *Correlation effects in real materials*, University of Groningen, May 2005.
- Katsnelson, M.I., *Solvent driven bending of single bolaamphiphilic layers*, workshop Magnetic manipulation of molecular and nanoscale materials, Nijmegen, June 2005.
- Katsnelson, M.I., *Electron self-trapping at quantum and classical critical points*, workshop Low-D quantum condensed matter, Amsterdam, July 2005.
- Katsnelson, M.I., *Kondo physics beyond simple one-spin scattering*, workshops Complex behavior in correlated electron systems (Leiden) and Progress in nonequilibrium Green's functions, Kiel, August 2005.
- Katsnelson, M.I., *Magnetic interactions in molecules and crystals from first prin-*

- icles*, workshop Novel trends in magnetism, spin dynamics, spintronics, etc., Corfu, October 2005.
- Katsnelson, M.I., *Intramolecular magnetic interactions in molecular magnets*, Advances and prospects in molecular magnetism, Bad Honnef, November 2005.
 - Katsnelson, M.I., *Correlation effects in electronic structure of actinide compounds*, workshop Actinide theory and experiment, Karlsruhe, December 2005.
 - Katsnelson, M.I., *Nanoscale world between quantum and classical*, University of Hamburg, December 2005.

Utrecht University

- Barbosa da Silva Neto, M., *Magnetic response properties of La_2CuO_4 - An example of a successful field-theoretical description of a condensed-matter system*, Institute for Theoretical Physics, Utrecht University, the Netherlands, 2 May 2005.
- Barbosa da Silva Neto, M., *Understanding the unusual magnetic susceptibility anisotropies of La_2CuO_4* , DRSTP symposium Trends in Theory, Dalsssen, the Netherlands, 19-20 May 2005, poster.
- Barbosa da Silva Neto, M., *Interplay between disorder and quantum and thermal fluctuations in ferromagnetic alloys: The case of $UCu_2Si_{2-x}Ge_x$* , University of Rome La Sapienza, Rome, Italy, 15 June 2005.
- Barbosa da Silva Neto, M., *Magnetic and Raman response properties in La_2CuO_4* , workshop Complex Behaviour in Correlated Electron Systems, Lorentz Center, Leiden University, the Netherlands, 18 August 2005.
- Barbosa da Silva Neto, M., *Magnetic and Raman response properties in La_2CuO_4* , Materials Science Center, University of Groningen, the Netherlands, 15 September 2005.
- Barbosa da Silva Neto, M., *Magnetic and Raman response properties in La_2CuO_4* , Institute for Theoretical Physics, Utrecht University, Utrecht, the Netherlands, 22 September 2005.
- Barbosa da Silva Neto, M., *Magnetism a very attractive topic*, Institute for Theoretical Physics, Utrecht University, the Netherlands, 28 September 2005.
- Barbosa da Silva Neto, M., *Magnetic and Raman response properties in La_2CuO_4* , Leiden University, the Netherlands, 17 November 2005.
- Barkema, G., *Structure formation in polymeric systems*, Institute for Theoretical Physics, Utrecht University, Utrecht, the Netherlands, 14 March 2005.
- Barkema, G., *Structure formation in polymeric systems*, Leiden University, the Netherlands, 17 March 2005.
- Barkema, G., *Texture control in polymeric systems: a computational approach*, Friesland Foods, Deventer, the Netherlands, 6 October 2005.
- Ernst, M., *Brownian motion and irreversible thermodynamics*, international workshop Brownian Motion 100 Years after Einstein, Oud Poelgeest, Leiden, the Netherlands, 12-15 March 2005.
- Ernst, M., *On the approach to equilibrium Fisica Aplicada I*, UCM, Madrid, Spain, 22 March 2005.
- Ernst, M., *The rich behaviour of the Boltzmann equation for inelastic fluids*, KFA -Jülich, Germany, 24 May 2005.
- Ernst, M., *Granular physics*, Fisica Fonamental-University, Barcelona, Spain, 18

November 2005.

- Feiner, L.-F., *Orbital physics*, DRSTP postgraduate course Statistical Physics and Theory of Condensed Matter, Nijmegen, the Netherlands, 25-29 April 2005, lecture series.
- Feiner, L.-F., *Length scales in semiconductor nanowires*, Heraeus Seminar on Science and Technology of Inorganic Nanowires and Nanotubes, Bad Honnef, 15 February 2005.
- Grassberger, P., *Applications of mutual information: from phylogenetic trees to independent component analysis*, Institute for Theoretical Physics, Utrecht University, the Netherlands, 14 September 2005.
- Grassberger, P., *Applications of mutual information: from phylogenetic trees to independent component analysis*, University Leiden, Leiden, the Netherlands, 29 September 2005.
- Grassberger, P., *Applications of mutual information: from phylogenetic trees to independent component analysis*, University Nijmegen, Nijmegen, the Netherlands, 30 November 2005.
- Haque, M., *Non-equilibrium many-body physics with Feshbach resonances in ultracold atomic gases*, Karlsruhe, Germany, 5 July 2005.
- Haque, M., *Non-equilibrium many-body physics with Feshbach resonances in ultracold atomic gases*, Frankfurt, Germany, 7 July 2005.
- Haque, M., *Reaction front and pattern formation in an electronic system: Ring-shaped luminescence pattern in quantum wells*, national seminar Statistical Physics, Utrecht University, Utrecht, the Netherlands, 4 November 2005.
- Haque, M., *Reaction front and pattern formation in an electronic system: Ring-shaped luminescence pattern in quantum wells*, Rutherford Laboratory (ISIS facility), UK, 8 November 2005.
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- Morais Smith, C., *First-order phase transitions in quantum Hall systems*, national seminar Statistical Mechanics, Nijmegen, the Netherlands, 13 May 2005.
- Morais Smith, C., *High- T_c superconductors: the status of research nearly 20 years after their discovery*, DRSTP symposium Trends in Theory, Dalfsen, the Netherlands, 19-20 May 2005.
- Morais Smith, C., *The different phases of quantum Hall systems*, University Aachen, Aachen, Germany, 28 June 2005.
- Morais Smith, C., *A second generation of composite fermions*, EP2DS 2005, Albuquerque, USA, 10-16 July 2005.
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 - Morais Smith, C., *Sripes in high- T_c superconductors*, summerschool Theoretical Physics, Utrecht, the Netherlands, August 2005.
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 - Morais Smith, C., *Zooming in on the quantum Hall effect*, Groningen University, Groningen, the Netherlands, 27 October 2005.
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 - Morais Smith, C., *Zooming in on the quantum Hall effect*, Regensburg University, Regensburg, Germany, 5 December 2005.
 - Mousseau, N., *The intermediate phase of topological rigidity*, summerschool Theoretical Physics, Utrecht, the Netherlands, August 2005.
 - Panja, D., *Field-theory of fluctuating fronts*, Laboratoire Physique Théorique, University Paris-Sud, Orsay, 18 March 2005.
 - Panja, D., *Response of a hexagonal granular packing under a localized overload: effects of pressure*, Powders and Grains 2005, Stuttgart, Germany, 18-22 July 2005, poster.
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 - Stoof, H.T.C., *Ultracold superstrings*, Colloquium Department of Physics and Astronomy, Utrecht University, the Netherlands, 24 June 2005.
 - Stoof, H.T.C., *Dressed Feshbach molecules in the BEC-BCS crossover, new phenomena in superfluidity and superconductivity*, Camerino, Italy, 5 July 2005.
 - Stoof, H.T.C., *Ultracold superstrings*, COSLAB 2005, Smolenice, Slovakia, 29 August 2005.
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- van Beijeren, H., *Chaos and kinetic theory*, international workshop Brownian Motion One Hundred Years after Einstein, Oud-Poelgeest, Oegstgeest, the Netherlands, 15 March 2005.
- van Beijeren, H., *The uphill turtle race: how do nucleation rates depend on time?*, UPoN4-2005, Gallipoli, Italy, 8 August 2005.
- van Beijeren, H., *Can Brownian particles dominate a Lyapunov spectrum?*, 100 years of Brownian motion. An ESF Stochdyn conference, Erice, Italy, 27 August 2005.
- van Beijeren, H., *Simple derivations of long time tails*, Dufty Fest, University of Florida, Gainesville, USA, 23 September 2005.
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- van Beijeren, H., *Simple derivations of long time tails*, Afscheidssymposium Hubert Knops, Radboud University, Nijmegen, the Netherlands, 7 October 2005.
- van Beijeren, H., *On the connections between chaos theory and statistical mechanics*, Institute for Theoretical Physics, Utrecht University, Utrecht, the Netherlands, 5 December 2005.
- van Roij, R., *Sedimentation of charged colloids: a competition between entropy, gravity, and electrostatics*, annual scientific meeting FOM Statistical Physics, Lunteren, the Netherlands, 21 January 2005.
- van Roij, R., *The physics of colloidal suspensions: the hidden power of entropy*, summerschool Theoretical Physics, Utrecht University, Utrecht, the Netherlands, 23 August 2005.

7 | Science-related activities

This chapter presents an overview of the science-related activities of DRSTP staff members and postdoctoral fellows. Besides publications in professional journals (sect. 7.1) and publications about physics in daily newspapers (sect. 7.2) also public lectures (sect. 7.3) are given. All other outreach activities like forum discussions, television interviews, personal columns in newspapers etc. are listed in the paragraph ‘other contributions’ (sect. 7.4). Science-related activities of PhD students can be found in chapter 3 (sects. 3.6 and 3.7).

7.1 Professional publications

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- Bais, F.A., *De Natuurwetten*, Amsterdam University Press, Amsterdam, 2005, ISBN 90-5356-7143, book.
- Bais, F.A., *The Equations*, Harvard University Press, Cambridge, USA, 2005, ISBN 0-647-01967-9, book (translation).
- Bais, F.A., *Die Gleichungen der Physik*, Birkhauser, Basel, Switzerland, 2005, ISBN 3-7643-7235, book (translation).
- de Lang, H.N. and Mulders, P.J., *Ken uw klassieken: bedwingers van de oneindigheid*, NTvN 71 (2005) 358.
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- Snoek, M. and Stoof, H.T.C., *Ultrakoude supersnaren op bestelling*, NTvN 71 (2005) 248.
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7.2 Other publications

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- Dijkgraaf, R.H., *Het begin van de tijd*, NRC Handelsblad, 8 January 2005.
- Dijkgraaf, R.H., *Er is een logische reden voor het bestaan van het universum*, NRC Handelsblad, 22 January 2005.
- Stoof, H.T.C. and Vandoren, S., *A recipe for making strings in the lab*, Physics Web. Org., 11 May 2005.
- Stoof, H.T.C. and Vandoren, S., *Ingevroren superstring*, Kennislink.nl, 12 May 2005.
- Stoof, H.T.C. and Vandoren, S., *Echte snaartheorie uit Utrechtse diepvries*, Volkskrant, Weekend editie, 20 November 2005.

7.3 Public lectures

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- Achúcarro, A., *Cosmology in the sky, cosmology in the lab*, LWSK (Leids Weer- en Sterrekundige Kring), Leiden, the Netherlands, 15 March 2005.
- Achúcarro, A., *Cosmologia : un reto científico para el nuevo milenio*, Univ. of the Basque Country, Bilbao, Spain, 19 October 2005.
- Arutyunov, G., *Gauge/string duality conjecture*, Department’s day, Utrecht University, the Netherlands, 22 June 2005.
- Barbosa da Silva Neto, M., *Magnetism a very attractive topic*, Department’s day, Utrecht University, the Netherlands, 22 June.
- Beenakker, C.W.J., *De magie van quantum technologie*, NWO-Huygenslezing, Den Haag, the Netherlands, 22 March 2005.
- Beenakker, C.W.J., *Star Trek, in Einstein’s ketenen gevangen*, Studium Generale, Delft, the Netherlands, 23 March 2005.
- Beenakker, C.W.J., *Fysica van Star Trek*, Science Unlimited, NEMO Science Center, Amsterdam, the Netherlands, 17 June 2005.
- Beenakker, C.W.J., *Science en Fiction van Star Trek*, Lowlands Festival, Biddinghuizen, the Netherlands, 21 August 2005.
- Beenakker, C.W.J., *Wat zoekt Einstein in Rijnsburg?*, Cleveringabijeenkomst, Leiden, the Netherlands, 25 November 2005.
- Beenakker, C.W.J., *Einstein in Nederland*, Nederlands Forensisch Instituut, Rijswijk, the Netherlands, 29 November 2005.
- Betouras, J., *2005. the year of Physics: Einstein’s work and scientific thinking*, public lecture, organized by the City Council of the City St. Nikolas, Crete, Greece, October 2005.
- Dijkgraaf, R.H., *String theory and quantum gravity*, symposium W. Hoogland, 4

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- Dijkgraaf, R.H., *Symmetrie*, Studium Generale, Universiteit Utrecht, 9 March 2005.
- Dijkgraaf, R.H., *Snaartheorie en het universum*, prijsuitreiking van de twintigste Vlaamse Wiskunde Olympiade, KU Leuven, 18 May 2005.
- Dijkgraaf, R.H., *De quantum meetkunde van ruimte en tijd*, KNAW, Amsterdam, the Netherlands, 26 September 2005.
- Dijkgraaf, R.H., *Einsteins droom en de wiskundige werkelijkheid*, Natuur- en Letterkundig Genootschap Physica, Alkmaar, 3 October 2005.
- Dijkgraaf, R.H., *Strings, black holes, and the end of space and time*, symposium Ed van den Heuvel, 27 October 2005.
- Dijkgraaf, R.H., *Von Spinoza zur Stringtheorie*, Haus der Niederlande, Münster, 27 October 2005.
- Dijkgraaf, R.H., *Van oerknal tot Einstein*, Artis, Amsterdam, 1 November 2005.
- Dijkgraaf, R.H., *Einstein en de oerknal*, VCL, Den Haag, 23 November 2005.
- Dijkgraaf, R.H., *Het begin en einde van de tijd*, symposium, De Jonge Akademie, KNAW, 7 December 2005.
- Ernst, M., *Het Manhattan project*, Probus 85, Hotel Oud Londen, Zeist, the Netherlands, 15 February 2005.
- Feiner, L.-F., *PISA Mathematical literacy and beyond*, Mathematical Institute, Utrecht, the Netherlands, 24 March 2005.
- Feiner, L.-F., *Mathematical literacy versus mathematics: the PISA 2003 survey*, Joint BeNeLuxFra conference in Mathematics, Gent, Belgium, 21 May 2005.
- Kleiss, R., *Relatief eenvoudig; Einsteins visie*, World Year of Physics, Radboud University Nijmegen, 14 June 2005.
- Kleiss, R., *Fysica, ten minste houdbaar tot ...*, Marie Curie symposium, RU Nijmegen, 11 May 2005.
- Laenen, E., *Theorie van bijna alles*, VvTP Symposium on Elementaire Deeltjes Fysica, Delft University, Delft, The Netherlands, 22 November 2005.
- Loll, R., *The microstructure of space and time*, Studium Generale, Maastricht, the Netherlands, 4 October 2005.
- Mulders, P.J., *Het ongrijpbare neutrino*, NVWS Galaxis, Den Bosch, the Netherlands, 16 November 2005.
- Sahlmann, H., *Loop Quantengravitation - Fluch und Segen einer QFT ohne klassische Raumzeit-Geometrie*, Göttingen, Germany (organized by Göttingen Academy of Sciences), 19 November 2005.
- Smit, J., *De oerknal*, lezing voor VUA studentenvereniging Plancius, 2 February 2005.
- Stoof, H.T.C., *Ultracold superstrings*, Department of Physics and Astronomy, Utrecht University, Utrecht, the Netherlands, 24 June 2005.
- Stoof, H.T.C., *Ultracold superstrings*, NiNA, Utrecht, the Netherlands, 3 November 2005.
- 't Hooft, G., *Unified theories for all elementary particles and forces of nature- the great challenges for physics*, launch conference international Year of Physics 2005, UNESCO, on the Future of Physics, Paris, France, 14 January 2005.
- 't Hooft, G., *The universe inside the atom*, Commemorative Lecture Afternoon

- Symposium by the Japan-Netherlands Institute, 30th Anniversary, Tokyo, Japan, 4 February 2005.
- 't Hooft, G., *The universe inside the atom*, Nagoya University, Japan, 7 February 2005.
 - 't Hooft, G., *New horizons in physics*, NTU, Singapore, 1 March 2005.
 - 't Hooft, G., *Atoms and universes, unifying small and big in the world year of physics 2005*, WSPC, Singapore, 2 March 2005.
 - 't Hooft, G., *Black holes and the information paradox*, Carl Friedrich von Siemens Stiftung, München, Germany, 8 March 2005.
 - 't Hooft, G., *Quanta, Hoe deeltjes golven kunnen zijn en golven deeltjes*, Studium Generale, Utrecht University, the Netherlands, 16 March 2005.
 - 't Hooft, G., *Van relativiteit en quantummechanica naar het standaardmodel, hoe enige brandende vragen uit het verleden konden worden beantwoord*, Studium Generale, University Leiden, the Netherlands, 22 March 2005.
 - 't Hooft, G., *Einstein's nalatenschap: onzekerheden over zwarte gaten*, Lustrumlezing, Studium Generale, University Maastricht, the Netherlands, 21 April 2005.
 - 't Hooft, G., *The universe inside the atom*, Jim Simons Lecture, Stony Brook, USA, 2 May 2005.
 - 't Hooft, G., *Gewetenloze zwarte gaten*, OKW-Wetenschapslezingen 'Ongekend - het raadsel van informatie', Paradiso, Amsterdam, the Netherlands, 22 May 2005.
 - 't Hooft, G., *Unraveling nature's elementary building blocks: challenges of big science*, Einstein Symposium and Roundtable Discussion Creativity in Science, Bibliotheca Alexandrina, Egypt, 4 June 2005.
 - 't Hooft, G., *De wereld van het allerkleinste*, Exposition Science Unlimited, Nemo, Amsterdam, the Netherlands, 19 June 2005.
 - 't Hooft, G., *From quarks to the quantization of gravitation - challenges and obstacles in our search for the fundamental forces*, Academic ceremony, Solvay Institutes, Brussels, Belgium, 22 June 2005.
 - 't Hooft, G., conclusive talk at the Albert Einstein Century Conference, Palais de l'Unesco, Paris, France, 22 July 2005.
 - 't Hooft, G., *De oneindige lussen in het standaardmodel*, Johannes Diderik Van der Waalscolloquium (Studievereniging Technische Natuurkunde, Eindhoven, The Netherlands, 15 September 2005.
 - 't Hooft, G., *To the moon and beyond - Physics and science fiction*, Estec, Noordwijk, The Netherlands, 30 September 2005.
 - 't Hooft, G., *Relativiteitstheorie en quantummechanica, 100 jaar na Einstein*, Kroniglezing, Vereniging voor Technische Physica, Delft, The Netherlands, 19 October 2005.
 - 't Hooft, G., *De kleinste deeltjes*, Rotary Wageningen, Wageningse Berg, the Netherlands, 24 November 2005.
 - 't Hooft, G., *De grenzen van de moderne fysica*, Answering questions from the audience at the Day of the Public, Karel de Grotegebouw, Wetstraat 170, Brussels, Belgium, 4 December 2005.
 - 't Hooft, G., *Black holes in elementary particle physics*, Bhubaneswar University, India, 23 December 2005.
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 - van Roij, R., *Einstein en Brownse beweging*, Physics Masterclass 2005, Utrecht University, the Netherlands, 17 October 2005.
 - van Saarloos, W., *Spontane patroonvorming in niet-evenwichts systemen*, Koninklijke Maatschappij voor de Natuurkunde, Diligentia, the Netherlands, 26 September 2005.

7.4 Other contributions

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- Bais, F.A., Weten wat je niet weet: Aan genen zijde, BRES, 232, 2005, article.
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- Bais, F.A., De algemene relativiteitstheorie, Academische Boekengids 50, 2005, article.
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- Dijkgraaf, R.H., forum discussion, Stichting Democratie & Media, 7 February 2005.
- Dijkgraaf, R.H., *Vroeg oud*, Folia, 20 February 2005.
- Dijkgraaf, R.H., *Historisch besef*, NRC Handelsblad, 3 March 2005.
- Dijkgraaf, R.H., *L'université, cest moi*, Folia, 13 March 2005.
- Dijkgraaf, R.H., *Dali en de wetenschap*, Studium Generale, Erasmus Universiteit Rotterdam, 16 March 2005.
- Dijkgraaf, R.H., discussion with Pieter Laurens Mol, Vrije Academie, Den Haag, 18 March 2005.
- Dijkgraaf, R.H., *Een kleine groene Jezus*, Propria Cures, 23 March 2005.
- Dijkgraaf, R.H., *Crisis in het middelbaar onderwijs*, Spinozaclub, Rijnsburg, 29 March 2005.
- Dijkgraaf, R.H., *Dada*, NRC Handelsblad, 2 April 2005.
- Dijkgraaf, R.H., *Dali en de wetenschap*, Museum Boijmans van Beuningen, Rotterdam, 2 April 2005.
- Dijkgraaf, R.H., Talentendag, NWO, Zeist, 5 April 2005.
- Dijkgraaf, R.H., *Tienstappenplan*, Folia, 10 April 2005.
- Dijkgraaf, R.H., *Extreme makeover*, Propria Cures, 14 April 2005.
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- Dijkgraaf, R.H., forum, Studium Generale, Universiteit Utrecht, 22 April 2005.
- Dijkgraaf, R.H., Videoportret, Ministerie OCW, 27 April 2005.
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- Dijkgraaf, R.H., interview, Happy Chaos, Odeon, Amsterdam, 8 May 2005.
- Dijkgraaf, R.H., *Trieste*, Propria Cures, 11 May 2005.
- Dijkgraaf, R.H., *Blog aan je been*, ???????, 12 May 2005.
- Dijkgraaf, R.H., presentation, World Year of Physics Competition, NIKHEF, 20 May 2005.
- Dijkgraaf, R.H., book presentation, *The equations*, by Sander Bais, 24 May 2005.
- Dijkgraaf, R.H., *Examenvrees*, NRC Handelsblad, 28 May 2005.
- Dijkgraaf, R.H., *Hogere afgeleide*, Folia, 4 June 2005.
- Dijkgraaf, R.H., *De canon*, Universiteitsdag, Universiteit van Amsterdam, 11 June 2005.
- Dijkgraaf, R.H., *Anti-Amerikanisme*, Universiteitsdag, Universiteit van Amsterdam, 11 June 2005.
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- Dijkgraaf, R.H., interview Lars Gustavsson, Poetry International, 19 June 2005.
- Dijkgraaf, R.H., *Academische spaghetti*, Propria Cures, 21 June 2005.
- Dijkgraaf, R.H., *Talent in het onderwijs*, Ministerie OCW, 23 June 2005.
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- Dijkgraaf, R.H., *Zomergasten*, VPRO television, 7 August 2005.
- Dijkgraaf, R.H., *Vijf vragen voor de Einstein van nu*, M magazine, NRC Handelsblad, 7 August 2005.
- Dijkgraaf, R.H., *Fanmail*, Propria Cures, 24 August 2005.
- Dijkgraaf, R.H., *Grootkapitaal*, NRC Handelsblad, 3 September 2005.
- Dijkgraaf, R.H., *Het belang van de betawetenschappen voor maatschappij en cultuur*, Comenius leergang, Arnhem, 8 September 2005.
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- Dijkgraaf, R.H., *Nooit meer lanterfanten*, Folia, 12 September 2005.
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- Dijkgraaf, R.H., *Creativiteit in kunst en wetenschap*, Gerrit Rietveld Academie, 6 October 2005.
- Dijkgraaf, R.H., *Bericht uit de toekomst*, Propria Cures, 10 October 2005.
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- Dijkgraaf, R.H., *Wereldtaal*, Folia, 31 October 2005.
- Dijkgraaf, R.H., *Beauty from garbage*, BRES 2, 3, 4, October/November 2005.
- Dijkgraaf, R.H., *Avond van wetenschap en maatschappij*, Ridderzaal, Den Haag, 7 November 2005.
- Dijkgraaf, R.H., *Wetenschappelijke creativiteit*, AUV-lezing, Amsterdam, 12 Novem-

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- Dijkgraaf, R.H., *Onderzoek is altijd belangrijker!*, SoFoKleS, Felix Meritis, 15 November 2005.
 - Dijkgraaf, R.H., *Is er een crisis in de autoriteit van de wetenschap?*, forum discussion, Premium Erasmianum, Rode Hoed, Amsterdam, 15 November 2005.
 - Dijkgraaf, R.H., *Toppie, toppie*, Folia, 20 November 2005.
 - Dijkgraaf, R.H., *Wetenschap en kinderen*, VTB-congres, Utrecht, 21 November 2005.
 - Dijkgraaf, R.H., *Ontwikkelingen en verwachtingen voor de toekomst*, Lustrum VUmc, 22 November 2005.
 - Dijkgraaf, R.H., *Locatie, locatie, locatie*, NRC Handelsblad, 3 December 2005.
 - Dijkgraaf, R.H., *Brussel*, Folia, 11 December 2005.
 - Dijkgraaf, R.H., *Een kerstgrol*, NRC Handelsblad, 24 December 2005.
 - Dijkgraaf, R.H., *Museumgasten*, AVRO television, Artis, 31 December 2005.
 - Dijkgraaf, R.H., *Hoe?Zo!*, Teleac television, series 2005.
 - Kleiss, R., *Proficiat, Albert Einstein!*, talk, Science cafe Nijmegen, 15 February 2005.
 - Kleiss, R., *De Einstein code; Ontcijfer het geheim van de kosmos; Leer elementaire deeltjes herkennen; Deel je kennis met Europa*, talk, Radboud University Nijmegen, 12 March 2005.
 - Kleiss, R., *Natuurkunde op de markt*, talk, 4 June 2005.
 - Loll, R., TV appearance Nachtstudio, ZDF, Berlin, Germany, 5 March 2005.
 - Loll, R., *The role of causality in contemporary physics*, Public debate, Interdisciplinair Studieforum, Amsterdam, the Netherlands, 12 November 2005.
 - 't Hooft, G., several interviews, a.o. Tanja Rudez Novinarika, Europapress, Zagreb; Groningse students, launch conference International Year of Physics, Paris, France, 13-15 January 2005.
 - 't Hooft, G., interview and article in 'Scientific American', the Netherlands/Belgium issue, 20 January 2005.
 - 't Hooft, G., interview and article in 'Nature, a celebration of the Year of Physics', vol. 433, no. 7023, 20 January 2005, citation on *A theory of everything?*, 257.
 - 't Hooft, G., book launch *50 Years of Yang-Mills theory*, World Scientific, Singapore, 2 March 2005.
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 - 't Hooft, G., five interviews with TV stations in Alexandria, concerning the Einstein Symposium in the Bibliotheca Alexandrina, Alexandria, Egypt, 4-6 June 2005.
 - 't Hooft, G., putting autographs on certificates (Bullen) issued for children (and grown-ups) participating in the exposition Science Unlimited, Nemo, Amsterdam, the Netherlands, 19 June 2005.

- 't Hooft, G., citations in 'Kijk' on 'Bernini Mystery' by Dan Brown, July 2005.
- 't Hooft, G., interview with Filip Fontani of 'Quest', issue October 2005, 46, Kleine deeltjes, grote prijs, 27 July 2005.
- 't Hooft, G., plenary session, *The great adventures of modern science*, Alpbacher Technologie Gespräche, Europäisches Forum, Alpbach, Austria, 27 August 2005.
- 't Hooft, G., *A small contribution Pure power of mind/Macht des Denkens*, for 'Der Einstein-komplex, 99 Philosophien, Schriftsteller, Knstler und Wissenschaftler ber ein Genie.' Verlag Das Wunderhorn, Heidelberg, ISBN 3-88423-243-6. p. 68, September 2005.
- 't Hooft, G., presentation of the document 'Steeds minder leren' of the Stichting Vrienden van het Gymnasium at the Symposium 'Het Cultuurdebat begint bij het Onderwijs', Aula Domplein 29, Utrecht, the Netherlands, 15 October 2005.
- 't Hooft, G., interview with Ananda Gefter on the internet site 'Want to win a Nobel Prize? How to become a GOOD theoretical physicist', New Scientist, 44, 3 September 2005.
- 't Hooft, G., discussion with Jan Terlouw and artikel in 'Lumen' (Nuon), Kwartaal-magazine over energiebeleid, pp. 42-46 (text Ton van der Brandt), 1 October 2005.
- 't Hooft, G., short radio-interviews on the Nobel prize Fysica 2005, 4 October 2005.
- 't Hooft, G., interview TV ET3, (National Greek TV Channel), 12 October 2005.
- 't Hooft, G., interview, Angeliophoros (Messenger, Gr. Krant), 12 October 2005.
- 't Hooft, G., interview to Vima, (The Podium. Gr. Krant), 12 October 2005.
- 't Hooft, G., article in Phenomenon, (University Thessaloniki), 12 October 2005.
- 't Hooft, G., interview, with Jan van den Berg in 'Onzichtbare Dimensies' Theater Ad Hoc, 29 October 2005.
- 't Hooft, G., press conference, Solvay Meeting, Hotel Métropole, Brussels, Belgium, 1 December 2005.
- 't Hooft, G., interview with Andrea Parlangei, magazine 'Focus', Milan, Italy, 2 December 2005.
- 't Hooft, G., interview, *Conducive environment, key to scientific temper*, with The New Indian Express and Times of India, Puri, India, 15 December 2005.

8 | Research funding

Below an overview is presented of funding organizations that financially supported the research of the DRSTP in 2005. Regular university funding is not listed.

8.1 Personal grants

University grants

- University USF Grant VUA, P.J. Mulders (VUA) (1999-2005)
- University USF Grant VUA, F.C. MacKintosh (VUA) (2001-2007)
- High Potentials Grant UU, R. van Roij (UU) (2005-2010)

KNAW

- Fellowship, D. Boer (VUA)(2001-2006)
- Academy professorship, G. 't Hooft (UU) (2005-2010)

NWO

- Spinoza grant (1999), C.W.J. Beenakker (UL) (2000-2009)
- Spinoza grant (2003), R.H. Dijkgraaf (UvA)(2004-2008)
- Pionier grant (2000), K. Schoutens (UvA) (2000-2005)
- VICI grant (2002), H.T.C. Stoof (UU) (2003-2008)
- VICI grant (2003), A. Achúcarro (UL) (2004-2009)
- VICI grant (2004), R. Loll (UU) (2005-2010)
- VIDI grant (2001), K. Skenderis (UvA) (2001-2005)
- VIDI grant (2004), K.E. Schalm (UvA) (2005-2009)
- VIDI grant (2004), M.M. Taylor (UvA) (2005-2009)
- VIDI grant (2005), K. Peeters (UU) (2006-2011)

EU Marie Curie fellowships

- F.S. Saueressig (UU), *A new string duality for gauged supergravity and its physical and mathematical applications* (1 November 2005 - 1 November 2007).
- G.S. Krishnaswami (UU), *Large-N Yang-Mills Theory* (1 October 2005 - 1 October 2007).

Other

- F. Aquiar de Moura (UvA), Portugal Science and Technology Foundation, *Accoes efectivas em Teorias de Supercordas*.
- R. Doretto (UU), fellowship of the Brazilian agency Conselho Nacional de Desenvolvimento Científico e Tecnológico (1 June 2005 - 1 June 2006).

- D. Rodriguez-Gómez (UvA), Spanish Ministry of Science (M.A.R. Osario), *Matter at very high energy, density and finite temperature*, (2006).
- B.P. Williams (UvA), International Research Fellowship of the National Science Foundation USA (2005-2006).

8.2 FOM funding

- **FOM-A-01** (group leader F.A. Bais)
 - Fundamental interactions (FOM programme 31)*
 - 99FI01: Fundamental interactions (F.A. Bais, J. Smit)
 - 02FI02: Holographic aspects of string theory structure of QCD (J. de Boer)
 - 02FI11: Fundamental interactions (J. Smit)
 - Projectruimte*
 - 00PR1889: Strings, black holes and holography (J. de Boer, R.H. Dijkgraaf)
- **FOM-A-05** (group leader B. Nienhuis)
 - Mathematical physics (FOM/GBE programme 11)*
 - 01MF11: Application of stochastic Lowner evolution to critical phenomena (B. Nienhuis)
 - Collective and cooperative statistical physical phenomena (FOM programme 46)*
 - 00CCSPP01: Static and dynamic phenomena in stackings (B. Nienhuis)
 - 04CCSPP26: Correlations in groundstates without finite size corrections (B. Nienhuis)
 - Overgangsprogramma BUW*
 - 00SF05: Universal scaling functions (B. Nienhuis)
 - 00SF06: Biological neural networks (B. Nienhuis)
- **FOM-A-13** (group leader A.M.M. Pruiskén)
 - Strongly interacting condensed matter (FOM programme 34)*
 - 02SIC15: Studying duality and topological excitations in disordered materials (A.M.M. Pruiskén)
- **FOM-A-15** (group leader Th.M. Nieuwenhuizen)
 - Strongly interacting condensed matter (FOM programme 34)*
 - 02SIC16: Thermodynamics and measurement in the quantum world: challenging the validity of standard knowledge (Th.M. Nieuwenhuizen)
- **FOM-A-20** (group leader R.H. Dijkgraaf)
 - Mathematical physics (FOM/GBE programme 11)*
 - 01MF08: Holography and topological invariants (J. de Boer)
 - String theory and quantum gravity (FOM programme 57)*
 - 01STQG01: Thermodynamics of strings, fluxes and branes (J. de Boer, R.H. Dijkgraaf)
 - 02STQG07: Matrix models and supersymmetric gauge theory (R.H. Dijkgraaf)
 - 02STQG08: String theory beyond supergravity (R.H. Dijkgraaf)

Projectruimte

02PR2149: String theory and cosmology (J. de Boer)

03PR2266: Supersymmetric gauge theories and matrix models (R.H. Dijkgraaf and J. de Boer)

04PR2387: Connecting gauge interactions with gravity through string theory (E.P. Verlinde)

– **FOM-A-25** (group leader K. Schoutens)

Collective and cooperative statistical physical phenomena (FOM programme 46)

04CCSPP23: The challenges of the chiral metal (J.-S. Caux)

04CCSPP24: Collective behavior vs entanglement in atomic matter (K. Schoutens)
FOM-Springplankplaatsen

02SP002: FOM-Springplankplaats (J.-S. Caux)

– **FOM-G-01** (group leader E.A. Bergshoeff)

Fundamental interactions (FOM programme 31)

02FI12: Braneworlds (E.A. Bergshoeff/M. de Roo)

String theory and quantum gravity (FOM programme 57)

01STQG03: String theory and quantum gravity (E.A. Bergshoeff/M. de Roo)

02STQG06: Towards a formulation of coinciding M5-branes (E.A. Bergshoeff/M. de Roo)

– **FOM-G-18** (group leader A.C.D. van Enter)

Mathematical physics (FOM/GBE programme 11)

99MF02: States and metastates in disordered lattice systems (M. Winnink/A.C.D. van Enter)

– **FOM-L-01** (group leader P. van Baal)

Fundamental interactions (FOM Programme 31)

02FI13: Fundamental interactions (P. van Baal)

02FI14: Fundamental interactions (W.L.G.A.M. van Neerven)

Projectruimte

99PR1797: A hybrid model for long distance QCD (P. van Baal)

– **FOM-L-03** (group leader G. Nienhuis)

Quantum optics of small systems (FOM Programme 15)

97QOSS3 Microlasers (G. Nienhuis)

– **FOM-L-05** (group leader C.W.J. Beenakker)

Physics of electronic and magnetic structures and devices (FOM Programme 38)

02PSD17: Current fluctuations in mesoscopic systems (C.W.J. Beenakker)

Waves in complex media (FOM Programme 45)

02WCM02: Chaotic wave dynamics (C.W.J. Beenakker)

Projectruimte

04PR2285: Controlled quantum entanglement in the Fermi sea (C.W.J. Beenakker)

05PR2407: Antibunched and entangled microwaves in nanostructures (C.W.J. Beenakker)

ker)

- **FOM-L-07** (group leader W. van Saarloos)
Collective and cooperative statistical physical phenomena (FOM programme 46)
 04CCSPP15: Efficient statistical physical models for simulating macroscopic visco-elastic flow instabilities and turbulence (W. van Saarloos)
Physics of granular matter (FOM Programme 63)
 03PGM03: Fundamental aspects of statics and dynamics of granular media (W. van Saarloos)
Dynamics of patterns (FOM/GBE programme 79)
 633.000.403: Visco-elastic instabilities and the nature of weak visco-elastic turbulence (W. van Saarloos)
Projectruimte
 03PR2182-2: Instabilities in polymer processing (W. van Saarloos)
 03PR2263: Why is green fluorescent protein green? A quantum Monte Carlo study (C. Filippi)
 05PR2438: When soft condensed matter gets hard: the "jamming transition" in granular media (W. van Saarloos)

- **FOM-L-15** (group leader J. Zaanen)
Strongly interacting condensed matter (FOM programme 34)
 02SIC20-2: Complexity in quantum-mechanical electron systems: Dynamical stripes and Z₂ gauge invariance (J. Zaanen)
Collective and cooperative statistical physical phenomena (FOM programme 46)
 04CCSPP13: Quantum phase transitions and fermion signs (J. Zaanen)
 04CSSPP31: Orbital physics in oxides: novel types of quantum order (J. van den Brink)
Projectruimte
 01PR1977: Quantum liquid crystals (J. Zaanen)
 04PR2295: Stripe fractionalization: the quest for emergent gauge principle (J. Zaanen)
 04PR2358: Does spontaneous symmetry breaking limit quantum coherence? (J. van den Brink)
FOM-Springplankplaatsen
 02SP001: FOM-Springplankplaats (J. van den Brink)

- **FOM-L-26** (group leader H. Schiessel)
Material properties of biological assemblies (FOM programme 90)
 05MPBA09: Theory of the role and behavior of membranes in composite systems (H. Schiessel)

- **FOM-N-01** (group leader R.H.P. Kleiss)
Fundamental interactions (FOM programme 31)
 02FI15: Fundamental interactions (R. Kleiss)
FOM-Springplankplaatsen
 00SP: FOM-Springplankplaats 2000-2007 (W.J.P. Beenakker)

- **FOM-N-09** (group leader M.I. Katsnelson)
Fundamental properties of surfaces and interfaces (FOM programme 39)
99PSI11: Theoretical studies of friction at contacting surfaces (A. Fasolino)
02PSI18: Dynamical mechanisms of energy transfer at surfaces and solid-solid interfaces (A. Fasolino)
Projectruimte
05PR2427: Magnetic adatom clusters on metal surfaces as tunable many-body systems (M.I. Katsnelson)

- **FOM-U-01** (group leader G. 't Hooft)
Fundamental interactions (FOM programme 31)
02FI17: Fundamental interactions (G. 't Hooft)

- **FOM-U-05** (group leader H.T.C. Stoof)
Strongly interacting condensed matter (FOM programme 34)
02SIC25: Quantum spin nematic states in spinor Bose-Einstein condensates (F. Zhou)
Collective and cooperative statistical physical phenomena (FOM programme 46)
00CCSPP11: Quantum phases of matter (H.T.C. Stoof/P. Denteneer (UL))
Projectruimte
02PR2172-2: Low-dimensional Bose gases in optical lattices (H.T.C. Stoof/P. van der Straten)

- **FOM-U-07** (group leader H. van Beijeren)
Collective and cooperative statistical physical phenomena (FOM programme 46)
00CCSPP09: Nonequilibrium systems and SRB measures (H. van Beijeren)

- **FOM-U-10** (group leader F. Zhou)
Projectruimte
00PR1929: Mechanisms of decoherence (P.C.E. Stamp)

- **FOM-U-29** (group leader B. de Wit)
String theory and quantum gravity (FOM programme 57)
01STQG02: New approaches to hypermultiplets/local field theory couplings of BPS states (B. de Wit)
02STQG09: Non-perturbative quantum black holes (R. Loll)
02STQG10: Instantons in string theory (S. Vandoren/G. 't Hooft)

- **FOM-U-31** (group leader R. van Roij)
Structure, function and flow of soft materials (FOM programme 27)
01SFFSM30: Phase behaviour, structure and dynamics of colloidal suspensions (R. van Roij)
FOM-Springplankplaatsen
99SP22: FOM-Springplankplaats (R. van Roij)
Projectruimte
03PR2241: Inhomogenous suspensions of charged colloids: voids, sedimentation, wetting and nucleation (R. van Roij)

FOM/DFG Physics of colloidal dispersions in external fields (FOM programme 61)
in collaboration with DFG (transregio SFB 6018)

Duration: 2002-2008

Scientist in charge: A. van Blaaderen (UU)

Co-ordinator DFG: H. Löwen (Düsseldorf, Germany)

Participating theorist: R. van Roij (UU)

- **FOM-V-01** (group leader P.J. Mulders)
Fundamental interactions (FOM programme 31)
02FI18: Fundamental interactions (P.J. Mulders)
Projectruimte
98PR1714: Gluon dynamics in the proton (P.J. Mulders)
04PR2302: Exposing the color glass condensate (D. Boer)
- **FOM-V-13** (group leader F.C. MacKintosh)
Physical biology II (FOM programme 56)
01FB28-3: Mechanosensing and chemical signalling in single oocytes-3 (F.C. MacKintosh)
Biomolecular physics (FOM programme 60)
03BMP23: Micromechanics and active response of biopolymer networks (F.C. MacKintosh)
Material properties of biological assemblies (FOM programme 90)
05MPBA04: Cytoskeletal/filamentous protein networks and assemblies (F.C. MacKintosh)
05MPBA05: Active cytoskeletal protein assemblies (G. Koenderink/
F.C. MacKintosh)
05MPBA06: Microrheology and non-equilibrium fluctuations of active cytoskeletal networks (F.C. MacKintosh/G. Koenderink)
05MPBA10: Guest budget (F.C. MacKintosh)
05MPBA11: Personal budget, program leader (F.C. MacKintosh)

8.3 EU-networks

- Physics at colliders (HPRN-CT-2000-00149)
Duration: from 01-08-2000 until 31-01-2005
Network coordinator: F. del Aguila (Granada, Spain)
Scientist in charge for RU: R.H.P. Kleiss
- Dynamics and statics of glasses and spin glasses: from aging to memory and equilibrium structures (G. Aquino) Human Potential Programme - (RTN)
Duration: until 1 September 2006
Scientist in charge for UvA: Th.M. Nieuwenhuizen
- Non-equilibrium physics of complex fluids and biological systems (EU RTN 2-2001-

00339)

Duration: 2002-2006

Network coordinator: University of Bayreuth, Germany

Scientist in charge for UL: W. van Saarloos

- Hadron physics (integrated infrastructure initiative RII3-CT-2004-506078)
Duration: 2004-2007
Network coordinator: C. Guaraldo (Frascati, Italy)
Scientist in charge for VUA: P.J. Mulders
- Fundamentals of nanoelectronics (MRTN-CT-2003-504574)
Duration: 2004-2008
Network coordinator: University of Lancaster, UK
Scientist in charge for UL: C.W.J. Beenakker
- Soft matter composites-an approach to nanoscale functional materials (6th framework programme, network of excellence 502235-2)
Duration: from 01-06-2004 until 01-06-2009
Network coordinator: D. Richter (Jülich, Germany)
Scientists in charge: A. van Blaaderen/H. Lekkerkerker
Participating theorist: R. van Roij (UU)
- Constituents, fundamental forces and symmetries of the universe (MRTN-CT-2004-005104)
Duration: from 01-11-2004 until 31-10-2008
Network coordinator: D. Lüst (München, Germany)
Scientist in charge for RUG: E.A. Bergshoeff
Scientist in charge for UU: B. de Wit
- Superstring theory (MRTN-CT-2004-512194)
Duration: from 01-01-2005 until 31-12-2009
Network coordinator: L. Brink (Göteborg, Sweden)
Scientist in charge for UvA: R.H. Dijkgraaf
Scientist in charge for UU (associated with UvA): G. 't Hooft
- European network on random geometry (MRTN-CT-2004-005616)
Duration: from 01-09-2005 until 31-08-2009
Network coordinator: R. Loll (UU)
- PSI-K F-electron (HPRN-CT-2002-00295)
Duration: from 01-09-2005 until 31-08-2006
Network coordinator: A. Svane (Arhus University, Denmark)
Scientist in charge for RU: M.I. Katsnelson

8.4 ESF

- Challenges in molecular simulations: bridging the length and time-scale gap (ESF-PESC)
Duration: from 2000
Network coordinators: M. Mareschal (Brussels), G. Ciccotti (Rome) and D. Frenkel (Amsterdam)
Scientist in charge for UU: G.T. Barkema

- Network COSLAB - Laboratory Cosmology (ESF)
Duration: from 2001 until 2006
Network coordinator: G. Volovik, T.W.B. Kibble
Scientist in charge for UL: A. Achúcarro

- Programme towards atomistic materials design (Psi-k)(ESF)
Duration: 2003-2008
Network coordinator: V. Heine (Cambridge)
Scientist in charge for UL: C. Filippi

- Interdisciplinary statistical and field theory approaches to nanophysics and low dimensional systems (INSTANS)
Duration: 2005-2010
Network coordinator: G. Mussardo (SISSA, Trieste).
Scientist in charge for UvA: K. Schoutens

8.5 Other

NWO

- Mathematical Physics project (D. Lenstra, B. Krauskopf)(VUA)
Dynamics of Patterns; Delay dynamics of laser patterns (K. Green)

- Geometric aspects of quantum theory and integrable systems (NWO-047017015)
Duration: from 30-10-2005 until 30-10-2008
Network coordinator: G. Helminck (University of Twente)
Scientist in charge: G. Arutyunov (UU)

- NWO Van Gogh travel grant: Physical models of DNA biochips
G. Barkema (UU) (2004-2006)
Participant: E. Carlon (Lille, France)

- NWO Van Gogh travel grant: Holography, duality and time dependence in string theory
M.M. Taylor (UvA) (2005)
Participant: J. Troost (Laboratoire de Physique Théorique, Paris, France)

STW

- VTF 5386 (T. Visser) (VUA): Towards quantitative near-field optics (H. Schouten)
- ETC 5963 (D. Lenstra) (VUA): Towards ultrafast communication (Freeband Communication Programme) (W. Wang)
- Freeband Communication BSIK programme (D. Lenstra) (VUA): Broad band photonics (M. van Iersel)

INTAS

- Strings, branes and higher-spin gauge fields (INTAS-03-51-6346)
Duration: from 01-11-2004 until 31-10-2007
Network coordinator: A. Sagnotti (Rome)
Scientist in charge: B. de Wit (UU)

UU grant

- Prestige masters grant (UU) (2004-2008)

9 | Organisation DRSTP 2005

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Appendix A

Mission statement

Objectives

The Dutch Research School of Theoretical Physics (DRSTP) is a cooperation between the theoretical physics groups of six Dutch universities with the following purpose:

- to implement a joint programme of graduate education in theoretical physics that draws upon a dynamic research environment
- to maintain and strengthen research in theoretical physics from a broad unifying perspective that exploits the interrelationships between different fields of theory
- to strengthen, both in research and graduate education, connections with experimental physics, and of multidisciplinary ties, for instance with mathematics, computational science, astrophysics, earth science, physical chemistry and the life sciences.

The DRSTP is based on the conviction that a joint venture of all the moderately sized local theory groups, each with its own profile, offers added value for the achievement of these objectives. The DRSTP represents a sizable part of the national activity in theoretical physics, a field that has a strong tradition in the Netherlands. At present there exists no other organization that represents this field of research at the national level. The DRSTP welcomes further growth, for instance, by cooperation with institutions in neighbouring countries that share these goals. Often its educational activities already attract students from neighbouring countries and occasionally some of these activities are based on a close collaboration with partners abroad.

Mandate

The governing board of the DRSTP, which consists of representatives of the partners, is responsible for undertaking any suitable initiative to further its goals. The scientific director of the DRSTP is responsible for implementing the overall policy on behalf of the board and for coordinating the DRSTP activities. The mandate to carry out these tasks is based on an official agreement between the boards of the participating universities, as a result of which the DRSTP has been accredited by the Royal Netherlands Academy of Arts and Sciences (KNAW) in June of 1994 and re-accredited in 1999 and 2004. The agreement guarantees means for a six year period in terms of explicit staff commitments as well as graduate student positions. The DRSTP is

assisted in its endeavor by an international advisory committee of distinguished scientists.

Research

Theoretical physics is based on universal principles. New concepts often have a much wider validity than the field in which they are discovered, and methods of description developed in one field are sometimes very fruitful in another. Hence theoretical physics is characterized by unity in diversity.

The research programme of the DRSTP comprises two themes:

- Theme 1: Quantum field theory and elementary particle physics.
- Theme 2: Statistical physics, condensed matter theory and quantum optics.

The specific content of the research programme depends on the responsible project leaders, on their creativity as well as their initiative to obtain research funding from their home universities, the Dutch research councils of NWO, or from international sources such as European Union programmes.

The research programme is carried out under the responsibility of the governing board and the scientific director in accordance with the agreement. The governing board of the DRSTP safeguards the objectives of the research school. It monitors the overall coherence and quality of the research programme. The board discusses periodically whether the programme remains on the forefront of international developments. The scientific advisory committee plays an essential part in these matters.

The DRSTP is also accountable to the faculties of the participating universities. Therefore it reports regularly on past and planned activities, both in research and graduate education, on the basis of information presented in its yearly reports.

Graduate programme

The six universities in the DRSTP offer a joint programme of graduate education leading to a PhD. As part of the research training, under the supervision of a member scientist in a participating university, the Research School guarantees a wide range of educational opportunities for its PhD students. They consist of advanced courses, seminars and topical courses in the Netherlands, and international experience in the form of workshops, summer schools or extended research visits abroad.

The governing board of the DRSTP decides on admission and monitors the evaluation of progress with a prognosis of ultimate success after the first year. This takes place on the basis of an “agreement of education and guidance” between each individual PhD student and its supervisor(s), to be submitted to and approved by the board upon admittance.

A board of education advises the governing board. It also assembles the content of the yearly programme of regular activities. Standard advanced courses are published in a nationwide survey. Special PhD courses are offered within the DRSTP, in quantum field theory, statistical physics and in theoretical condensed matter physics, or result from joint efforts with other research schools.

The input of graduate students in the school takes place in the form of a graduate student council that meets regularly with the director and the chairman of the governing board and board of education (which also has one student member).

Individual members of the DRSTP play a pivotal role in helping to organize many

summer schools and workshops, in the Netherlands as well as abroad, and in serving as teachers in all the activities that the DRSTP undertakes by itself or in cooperation with others.

Other responsibilities

The responsibilities of the DRSTP includes:

- the promotion of a stimulating research environment in theoretical physics
- setting uniform standards of quality
- making educational supplements available tailored to individual research needs.

The board also develops a wide range of activities in order to support an exciting research climate from fund-raising, e.g. for postdoctoral fellows, guest teachers or international mobility of DRSTP students, to the selection of visiting professors, for example on the Kramers (UU), Lorentz (UL) or Van der Waals (UvA) Chairs.

Appendix B

Selection and supervision procedure of PhD students

Selection and supervision of PhD students

When a PhD research position opens up at one of the participating universities, there is usually an open round of applications. Important criteria in the selection procedure are the potential of the student for doing independent scientific research and the level and skills demonstrated in the master programme.

Admission to the DRSTP requires to submit a ‘plan for training and supervision’ [opleidings- en begeleidingsplan], containing a global description of educational activities with details provided for the first year. The plan also specifies how individual guidance will be provided under responsibility of the thesis advisor. The Research School safeguards a consistent implementation of the agreement, with uniform standards. The plan has to be submitted to the DRSTP bureau. Formal admission is subject to approval by the governing board.

After one year the progress is evaluated, based on an interview with the thesis advisor and an independent second referee. The school safeguards this procedure without interfering with the responsibilities of the employer. Participation in the educational programme is an explicit element of the evaluation. The outcome of the evaluation will reflect on whether the student will be able to complete the research programme within the amount of time allotted. If the prognosis is negative, the student will be asked to leave the DRSTP. Such outcomes should be, and are, extremely rare provided proper care is given to the initial selection.

A student can appeal a negative evaluation with the governing board of the school; a decision will be reached within one month. If the student does leave the school before completing the PhD, a diploma, specifying the student’s accomplishments in the educational programme, will be provided.

After the first year, throughout the duration of the PhD project, the progress will be closely monitored, for example by additional yearly evaluation interviews.

Appendix C

Postgraduate AIO/OIO schools

Theoretical High Energy Physics

Date:

24 January - 4 February 2005

Location:

Conference Centre Jonkerbosch, Nijmegen, the Netherlands

Scientific organisers:

E. Laenen (NIKHEF/UU)

S. Vandoren (UU)

Lecturers:

G. 't Hooft (UU): *Topics in advanced quantum field theory*

T. Prokopec (UU): *Inflation, baryogenesis and the CMB spectrum*

E. Verlinde (UvA): *String theory and black holes*

S. Weinzierl (MPI, München): *Higher-order perturbation theory*

Guest lecturer:

F.A. Bais (UvA): *To be or not to be: monopoles in gauge theories*

Participants (31):

Adam, Joke (KU Leuven)

Arsiwalla, Xerxes (UvA)

Benedetti, Dario (UU)

Bertrand, Bruno (UC Louvain)

Bleeken, Dieter van den (KU Leuven)

Bomhof, Cedran (VUA)

Bouatta, Nazim (ULB Belgium)

Bruers, Stijn (KU Leuven)

Chemissany, Wissam (RUG)

Cheng, Miranda (UvA)

Kok, Mark, de (UL)

Manschot, Jan (UvA)

Messamah, Ilies (UvA)

Meulen, Meindert van der (UvA)

Motylnski, Patrick (NIKHEF)

Passerini, Filippo (KU Leuven)

Ploegh, Andre (RUG)

Riet, Thomas van (RUG)

Rosseel, Jan (KU Leuven)

Salmi, Petja (UL)

Compre, Geoffrey (ULB Belgium)	Sousa, Kepa (UL)
Hartong, Jelle (RUG)	Vroome, Mathijs de (UU)
Hollands, Lotte (UvA)	Wagenaar, Jan Willem (RU)
Kampmeijer, Leo (UvA)	Wessels, Erik (VUA)
Kessel, Marcel van (RU)	Westra, Willem (UU)
Koers, Hylke (UvA/NIKHEF)	

Student presentations:

Joke Adam (KU Leuven): *Dielectric brane actions*

Bruno Bertrand (UC Louvain): *Topological aspects of Maxwell-Chern-Simons theory*

Stijn Bruers (KU Leuven): *Superconformal tensor calculus*

Wessam Chemissany (RUG): *Non-abelian born infeld theory*

Miranda Cheng (UvA): *AdS/CFT and Witten's proof of the positive energy theory*

Geoffrey Compère (ULB): *How to compute the mass of a black hole*

Mark de Kok (UL): *Remarks on SUSY lattice gauge theory*

Mathijs de Vroome (UU): *T-duality in 4D N=2 supergravity*

Jelle Hartong (RUG): *Black holes in de Sitter space*

Lotte Hollands (UvA): *Building blocks of topological strings*

Leo Kampmeijer (UvA): *Monopoles in non-abelian gauge theories*

Hylke Koers (UvA/NIKHEF): *Neutrinos from hot GRB fireballs*

Jan Manschot (UvA): *Black hole entropy from strings and branes*

Patrick Motylinski (NIKHEF): *MC NLO and single top*

Andre Ploegh (RUG): *ADS/CFT and instantons*

Petja Salmi (UL): *Scaling of the length of domain walls*

Meindert van der Meulen (UvA): *Topological defects in cold electroweak baryogenesis*

Thomas van Riet (RUG): *Scalar cosmology with exponential potentials*

Willem Westra (UU): *Quantum geometry: dynamical triangulations and all*

Statistical Physics and Theory of Condensed Matter

Date:

25 - 29 April 2005

Location:

Conference Centre Jonkerbosch, Nijmegen, the Netherlands

Scientific organisers:

H. van Beijeren (UU)

A. Fasolino (RU)

Lecturers:

H. Knops (RU): *From real space to dynamical renormalization*

C.W.J. Beenakker (UL): *Quantum information and quantum computers*

H. Schiessel (UL): *From DNA to chromatin: the physics of DNA compaction*

L.-F. Feiner (Philips/UU): *Orbital physics*

Guest lecturer:

N.G. van Kampen (UU): *The changing face of physics*

Participants (17):

Becherer, Paul (UL)

Di Marco, Igor (RU)

Ellenbroek, Wouter (UL)

Falco, Gianmaria (UU)

Manyuhina, Oksana (RU)

Marcelis, Bout (TUE)

Michaelis, Bjorn (UL)

Qian, Xiaofeng (UL)

Sanchez, Edmundo (UL)

Snoek, Michiel (UU)

Snyman, Izak (UL)

Straeten, Erik van der (Univ. Antwerpen)

Torres Valderrama, Aldemar (UU)

Uitham, Rudolf (RUG)

van Wezel, Jasper (UL)

Vocks, Henk (UU)

Zaccheddu, Maurizio (UL)

Student presentations:

- Paul Becherer (UL): *Amplitude expansion for subcritical instabilities*
- Igor di Marco (RU): *Reliable solver for Anderson impurity model and dynamical mean-field theory calculations on real materials*
- Wouter Ellenbroek (UL): *Probing the jamming transition in granular media*
- Gianmaria Falco (UU): *Atom-molecule theory for cold fermi-gas at Feshbach resonances*
- Oksana Manyuhina (RU): *Molecular dynamics and glass transition in the simplified model of cellulose*
- Bout Marcelis (TU/e): *Quantum gases with strong interactions*
- Bjorn Michaelis (UL): *Disentanglement of chaotic two-particle scattering*
- Xiaofeng Qian (UL): *Three-state Potts model with long-range interaction*
- Edmundo Sanchez (UL): *Bond- versus site-centered ordering and possible ferroelectricity in manganites*
- Izak Snyman (UL): *How neighbouring mesoscopic circuits affect each other*
- Michiel Snoek (UU): *Nematic order in spin-one bosons in optical lattices*
- Aldemar Torres Valderrama (UU): *Sedimentation of charged colloids*
- Rudolf Uitham (RUG): *Photonic crystals*
- Erik van der Straeten (Univ. Antwerpen): *A two-parameter random walk*
- Jasper van Wezel (UL): *Orbital driven spin ordering in 1-d chains*

Appendix D

Symposium Trends in Theory

DRSTP symposium 'Trends in Theory'

Date:

19 - 20 May 2005

Location:

Conference Centre De Bron, Dalfsen, the Netherlands

Lecturers:

Thursday, 19 May

R.H. Dijkgraaf (UvA): *The quantum geometry of strings and black holes*

H. Schiessel (UL): *DNA folding: the physics of chromatin*

E. Pallante (RUG): *From lattice QCD to astrophysics: building the bridge with terascale computers*

C. Morais Smith (UU): *High-Tc superconductors: the status of research nearly 20 years after discovery*

Friday, 20 May

M. Katsnelson (RU): *Nanoscale world between quantum and classical*

D. Frenkel (AMOLF): *Unconventional Monte-Carlo algorithms*

C. Timmermans (NIKHEF/RU): *Science and outreach: The HiSPARC project*

T. Prokopec (UU): *Baryogenesis: the quest for the origin of matter*

J. van den Brink (UL): *A limit to quantum coherence due to spontaneous symmetry breaking*

F. van Lunteren (UU): *Lorentz, Einstein, Ehrenfest and the rise of theoretical physics*

Participants (100):

prof. dr. Achucarro, A. (UL)
dr. Alday, L.F. (UU)
dr. Arrizabalaga, A. (NIKHEF)
drs. Arsiwalla, X.D. (UvA)
dr. Arutyunov, G. (UU)
dr. Bakker, B. (VUA)
dr. Barbosa da Silva, M. (UU)
dr. Barkema, G. (UU)
drs. Becherer, P. (UL)
drs. Benedetti, D. (UU)
prof. dr. Bergshoeff, E. (RUG)
dr. Bongaarts, P. (UL)
dr. Bouttier, J. (UvA)
drs. Brendel, K. (UU)
dr. Caux, J.-S. (UvA)
drs. Chemissany, W. (RUG)
drs. Conti, E. (VUA)
drs. Cvetkovic, V. (UL)
drs. Davidse, M. (UU)
prof. dr. de Boer, J. (UvA)
drs. de Kok, M. (UL)
prof. dr. de Leeuw, S. (TUDelft)
prof. dr. de Wit, B. (UU)
drs. Dickerscheid, D. (UU)
prof. dr. Dijkgraaf, R. (UvA)
drs. Dijkstra, T. (NIKHEF)
dr. Dubbeldam, J. (TUE)
drs. Eenink, M. (RUG)
drs. Ellenbroek, W. (UL)
dr. Freire, F. (UL)
prof. dr. Frenkel, D. (AMOLF)
drs. Hagemans, R. (UvA)
dr. Haque, M. (UU)
drs. Hartong, J. (RUG)
drs. Hollands, L. (UvA)
dr. Imeroni, E. (UU)
drs. Juricic, V. (UU)
drs. Kager, W. (UvA)
drs. Kampmeijer, L. (UvA)
prof. dr. Katsnelson, M. (RU)
drs. Koers, H. (UvA)
dr. Krishnaswami, G. (UU)
prof. dr. Laenen, E. (NIKHEF/UU)
prof. dr. Lande, A. (RUG)
prof. dr. Lodder, A. (VUA)
ir. Manschot, J. (UvA)
dr. Maoz, L. (UvA)
drs. Mboyo Esole, J. (UL)
drs. Messamah, I. (UvA)
prof. dr. Morais Smith, C. (UU)
dr. Morozov, A. (UL)
dr. Mostovoy, M.V. (RUG)
drs. Motylinkski, P. (NIKHEF)
prof. dr. Mulders, P. (VUA)
prof. dr. Nienhuis, B. (UvA)
drs. Nobbenhuis, S. (UU)
dr. Noldus, J. (UU)
drs. Ostojic, S. (UvA)
dr. Pallante, E. (RUG)
dr. Panja, D. (UU)
drs. Papadimitriou, I. (UvA)
drs. Ploegh, A. (RUG)
dr. Postma, M. (NIKHEF)
dr. Prokopec, T. (UU)
dr. Proukakis, N. (UU)
drs. Romans, M. (UU)
drs. Sanchez, E. (UL)
dr. Santachiara, R. (UvA)
dr. Saueressig, F. (UU)
prof. dr. Schiessel, H. (UL)
prof. dr. Schoutens, K. (UvA)
prof. dr. Smit, J. (UvA)
drs. Snoek, M. (UU)
drs. Sousa, K. (UL)
drs. Stavenga, G. (UU)
dr. Surendran, N. (UvA)
dr. Suttorp, L. (UvA)
dr. ten Wolde, P.R. (AMOLF)
dr. Timmermans, Ch. (NIKHEF/RU)
drs. Torres Volderrama, A. (UU)
drs. Uitham, R. (RUG)
prof. dr. van Beijeren, H. (UU)
drs. van Kessel, M. (RU)
prof. dr. van Lunteren, F. (UU)
drs. van Riet, Th. (RUG)
dr. van Roij, R. (UU)
drs. van Wezel, J. (UL)
drs. van Zon, J. (VUA)
dr. van den Brink, J. (UL)
ir. van der Meulen, M. (UvA)

dr. Loll, R. (UU)

dr. Vandoren, S. (UU)

prof. dr. Verlinde, E. (UvA)

drs. Vocks, H. (UU)

drs. Vroome, M. de (UU)

drs. Wagenaar, J.W. (RU)

drs. Wessels, E. (VUA)

drs. Westra, D. (RUG)

drs. Westra, W. (UU)

drs. Zoetekouw, B. (UU)

Poster presentations PhD students:

Arsiwalla, X.D. (UvA): *From 2D Yang-Mills to 4D gauge duals 2*

Barbosa da Silva Neto, M. (UU): *Understanding the unusual magnetic susceptibility anisotropies of La_2CuO_4*

Becherer, P. (UL): *Amplitude expansions for subcritical instabilities*

Benedetti, D. (UU): *3D quantum gravity and products of random matrices*

Brendel, K. (UU): *Nucleation times in the 2D Ising model*

Chemissany, W. (RUG): *Born-Infeld theory*

Cvetkovic, V. (UL): *Ordered limit of superconductivity*

Davidse, M. (UU): *Non-perturbative effects in supergravity*

de Kok, M. (UL): *On SUSY and the lattice*

de Vroome, M. (UU): *Relating black holes and instantons*

Dickerscheid, D. (UU): *Feshbach resonances in an optical lattice*

Dijkstra, T. (NIKHEF): *An abundance of standard model spectra from open strings*

Eenink, M. and Westra, D. (RUG): *Group manifold reduction of dual $N=1$ $d=10$ supergravity*

Ellenbroek, W. (UL): *Probing the jamming transition in granular matter*

Hagemans, R. (UvA): *Correlation functions for Heisenberg spin chains*

Hartong, J. (RUG): *Time-dependent solutions in supergravity*

Hollands, L. (UvA): *Topological strings*

Juricic, V. (UU): *Dissipative dynamics of vortices in a spiral state and transport in the spin-glass phase of LSCO*

Kager, W. (UvA): *Reflected brownian motion in generic triangles and wedges*

Kampmeijer, L. (UvA): *Monopoles in phases with non-abelian gauge symmetry*

Koers, H. (UvA/NIKHEF): *Neutrino emission from hot GRB fireballs*

Manschot, J. (UvA): *Multi-center black hole solutions*

Messamah, I. (UvA): *Black rings*

Motyliniski, P. (NIKHEF): *MC NLO and the single top production*

Nobbenhuis, S. (UU): *The cosmological constant problem*

Ostojic, S. (UvA): *Fractal nature of force networks in jammed matter*

Papadimitriou, I. (UvA): *AdS/CFT correspondence and holography*

Ploegh, A. and Riet, T. (RUG): *Non-extremal D-instantons and the ADS/CFT duality*

Romans, M. (UU): *BEC-BCS crossover near a Feshbach resonance*

Sanchez, E. (UL): *Bond- versus site-centered ordering and possible ferroelectricity in manganites*

Snoek, M. (UU): *Ultracold superstrings*

Torres Valderrama, A. (UU): *Sedimentation of charged colloids: an effective one-component approach*

Uitham, R. (RUG): *Pulse propagation in photonic crystals: the Sommerfeld precursor*

van der Meulen, M. (UvA): *Defects in a tachyonic electroweak transition*

van Kessel, M. (RU): *The concavity of the effective potential*

van Wezel, J. (UL): *A limit to quantum coherence due to spontaneous symmetric breaking*

Vocks, H. (UU): *The thermodynamically-weighted activation-relaxation technique*

Wagenaar, J.W. (RU): *Strong meson-baryon interactions*

Wessels, E. (VUA): *Gauging the constancy of constants*

Westra, W. (UU): *Sum over topologies in 2D quantum gravity*

Zoetekouw, B. (UU): *Phase diagrams of charged colloids from linear and non-linear Poisson-Boltzmann theory*

Appendix E

Statistics

Statistics 2005

On 31 December 2005 seventy-one (71) PhD students were affiliated to the DRSTP. In 2005 fourteen (14) PhD students joined the DRSTP.

Nineteen (19) PhD degrees were granted in 2005 (11% to women). The average duration of their PhD research (from start of contract to PhD exam date) was 52,1 months (52,5 in 2004).

Statistics 2000-2005

**PhDs (AIO/OIO) granted
1 January 2000 - 31 December 2005
(per theme)**

	2000	2001	2002	2003	2004	2005	Total AIO + OIO
Theme 1	5	5	7	6	7	9	39
Theme 2	8	5	5	7	6	10	41
AIO/OIO	7/6	5/5	6/6	4/9	4/9	9,5/9,5	35,5/44,5
Total	13	10	12	13	13	19	80

PhD efficiency

In the period 1 January 2000 - 31 December 2005, 80 PhD degrees were granted. Of these students 67% finished their PhD research within four years and six months. The full distribution is as follows:

within 4 years:	22 (28%)
within 4 years and 6 months:	31 (39%)
within 5 years:	13 (16%)
more than 5 years:	14 (18%)

The fraction of PhD degrees granted to women in the period 1 January 2000 - 31 December 2005 is 9%.

To monitor the PhD efficiency at a slightly longer time scale, we also present some data for the period 1 January 1998 - 31 December 2005. In this period 126 PhD students have started their research work. At the end of this period (31 December 2005) 53 of them have graduated and 4 of them have prematurely discontinued their contract. Of the remaining 69, 18 will graduate in 2006. For 51 students the PhD exam date is not yet known; 49 of these 51 students have started their PhD research after 1 January 2002.

Employment following the PhD		
2000-2005		
	aantal	%
<i>Postdoctoral positions in theoretical physics:</i>		
the Netherlands	7	
EU	29	
USA	9	
Abroad elsewhere	2	
subtotal	47	59%
<i>Positions in academia and in public (research) institutions not related to theoretical physics:</i>		
Postdoc philosophy RU	1	
Research scientist abroad	1	
Dutch Cancer Inst.	1	
Leiden Univ. Medical Center	1	
Utrecht Univ. Medical Center	1	
Computing center RU	1	
subtotal	6	8%
<i>Positions in the government and in government related organizations:</i>		
Ministry of Justice	1	
CBS The Hague	2	
Ministry of Public works	1	
Coordinator funding agency FOM	1	
subtotal	5	6%
<i>Positions in commercial companies:</i>		
Philips research	2	
NXP semiconductors	1	
Research telephone company	1	
Banking	2	
Actuary assistant	1	
Pension insurance	1	
Various software companies	6	
Consultancy (Ernst&Young/McKinsey)	4	
subtotal	18	23%
<i>Teaching positions:</i>		
High school teacher	2	
subtotal	2	3%
<i>Other:</i>		
Military service	1	
Unknown	1	
subtotal	2	3%
Total	80	