



Scientific Report 2008

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Cover

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Contents

Preface by the Director	v
Mission Statement	ix
Program Boards	xi
Reports:	
January 9 - 11 Computer-based Clinical Guidelines and Protocols A. Ten Teije, P. Lucas, F. van Harmelen	1
January 14 - 18 Keeping track of the seasons M.E. Visser, A. Dawson, B. Helm	3
January 21 - 23 Astronomy in Europe: An Evolving Collaboration J. Krautter, E. Brinks, T. Courvoisier, A. Dutrey, H.J. Habing	5
January 28 - February 1 Galaxy evolution from mass-selected samples M. Franx	7
February 4 - 6 The dark side of the universe through extragalactic gravitational lensing M. Radovich, A. Taylor, Y. Mellier, P. Schneider, L. Van Waerbeke, M. Bartelmann, S. Seitz, K. Kuijken	8
February 11 - 22 Crystallization and Jamming in Soft Matter under Driving - Colloidal Suspensions, Granular Media, Foams, and Complex Plasmas M. Sperl, S. Luding, H. Löwen	9
February 25 - 29 UNAWÉ: Development of Educational Materials G. Miley, C. Odman, S. Levin	11
February 28 UNAWÉ - Docentendag G. Miley, C. Odman, S. Levin	
March 11 - 14 Symmetry as a Modern Scientific Concept. Historical and Philosophical Perspectives G. Hon, V. Icke, J.W. McAllister	13
March 18 - 20 Ultravista Science Team meeting J. Dunlop, O. Le Fevre, M. Franx, J. Fynbo	15
March 26 - 28 RFID Security: Theory and Practice M. Rieback, A. Stubblefield, A. Juels, K. Fu	16
March 31 - April 3 From exoplanets to galaxy clusters: science with Astro-WISE E.A. Valentijn, E.R. Deul, G.A. Verdoes Kleijn	17

April 7 - 11	Evolutionary Algorithms for Many-Parameter Physics M. Vrakking, T. Baeck	19
April 21 - 25	Qumran - a Holistic View J. Gunneweg, A. Adriaens, J. Dik	21
May 6 - 9	Numerical Modelling of Complex Dynamical Systems J. Blom, J. Frank, W. Hundsdorfer, B. Sommeijer, J. Verwer	23
May 13 - 17	New algorithms in macromolecular crystallography and electron microscopy N.S. Pannu, J.P. Abrahams, R.B.G. Ravelli	25
May 19 - 30	Network Synchronization: from dynamical systems to neuroscience N. Brunel, A. Torcini, F.P. Battaglia, M. Cencini	26
June 2 - 6	Hash functions in cryptology: theory and practice R. Cramer, B. de Weger, M. Stam, L. Knudsen	28
June 9 - 20	Physics of Micro- and Nanofluids L. Bocquet, P. Tabeling, F. Toschi, D. Lohse	29
June 23 - 27	Low-Frequency Pulsar Science B. Stappers, D. Stinebring, R. Strom	31
June 30 - July 4	Algebraic Geometry B. Edixhoven, E. Looijenga, G. van der Geer	32
July 7 - 11	The Geometric Langlands Program E. Frenkel, G. Heckman, E.J.N. Looijenga, E.M. Opdam	33
July 21 - 25	Operator Structures and Dynamical Systems M.F.E. de Jeu, N.P. Landsman, S. Silvestrov, C.F. Skau, J. Tomiyama, S.M. Verduyn Lunel	34
July 28 - August 1	Central Mass Concentrations in Galaxy Nuclei R. McDermid, E. Emsellem	35
August 4 - 8	Artificial Cold and International Cooperation in Science K. Gavroglu, G. Somsen, D. van Delft, F. van Lunteren	37
August 11 - 15	Quantum Decoherence and Quantum Information Science D. Bouwmeester, M.J.A. De Dood	38
August 25 - September 5	Dynamical heterogeneities in glasses, colloids and granular media G. Biroli, J.P. Bouchaud, W. van Saarloos	39
September 8 - 12	The Cool, Cooler and Cold - Cluster Cooling Flows in a New Light A.C. Edge, A.C. Fabian, F. Combes, C. O'Dea, W.J. Jaffe	42

September 15 - 19	
Galaxies in Real Life and Simulations	
R. Somerville, M. Kriek, A. Cimatti, N.M. Forster Schreiber, J. Schaye, P. van Dokkum	43
September 22 - 26	
Logic and information security	
H. van Ditmarsch, J. van Eijck, P. Balbiani	45
October 6 - 10	
Interstellar Surfaces: From Laboratory to Models	
H. Cuppen, H. Linnartz, E. van Dishoeck, E. Herbst, S. Viti	46
October 13 - 17	
I-science workshop on data mining, distributed computing and visualization for astronomy	
J. Van Wijk, E. Valentijn, F. Arbab, C. De Laat, J. Roerdink	47
October 20 - 23	
The physics of genome folding and function	
D.W. Heermann, B.M. Mulder, R. van Driel	48
October 27 - 31	
DIAMANT meets GQT	
G. Cornelissen, J. Draisma	49
November 3 - 6	
Long Term consequences of exposure to famine	
L.H. Lumey	50
November 10 - 14	
PDE approximations in Fast reaction - Slow diffusion scenarios	
T. Aiki, D. Hilhorst, M. Mimura, A. Muntean	51
November 17 - 21	
Fitting the spectral energy distributions of galaxies	
B. Groves, C.J. Walcher	53
November 24 - 28	
Electrocatalysis@nanoscale: techniques and applications	
M.T.M. Koper, A.I. Yanson, D.J. Fermin, P.R. Unwin	55
December 1 - 5	
KAM Theory and its applications	
H.W. Broer, H. Hanßmann, M.B. Sevryuk	56
December 8 - 9	
Integrable Systems in Quantum Theory	
G.F. Helminck	57
December 10 - 12	
The first Science with LOFAR surveys	
H. Rottgering, P. Barthel, P. Best, M. Brueggen, M. Jarvis, G. Miley, R. Morganti, I. Snellen	58
Funding sources	59

Preface by the Director

To the outsider, the year 2008 at the Lorentz Center looks probably like a “business as usual” year: we had a strong workshop program comparable to what we had in the last few years, while there were no new programs or major changes in the way the center operated.

Internally within the Lorentz Center, there have nevertheless been a few important developments. First of all, within the organization, our day to day operation was affected quite a bit by the fact that two of our program assistants left the organization on short notice in the spring, so that the two new program assistants had to “learn the ropes” on the fly. I would like to take this opportunity to thank the whole staff for their enormous drive to keep the Lorentz Center running smoothly during the summer. I am very happy with how the present staff is running as a team. Secondly, our science coordinator has been busy with consolidating and optimizing the changes in the way proposals for workshops are evaluated by the boards – our switching over to a system of three evaluation rounds per year is appreciated by most of the members of the program advisory boards, but the fact that three times a year six (!) program advisory boards have to receive a number of proposals *and* provide feedback on them does put a large pressure on the organization. It also requires that all board members (some 60 of them!) do respond promptly – given all the pressure that scientists are under nowadays, this is asking a lot. As a result of this and other factors, the evaluation procedure has sometimes taken longer than we would wish – the science coordinator and I will discuss ways to speed up the proposal evaluation procedure at the future meetings of the program advisory boards. We deliberately do not want to introduce different deadlines for different disciplines, since quite a few proposals span across several disciplines and therefore are evaluated by more than one program advisory board.

Since 2006, the NIAS (*Netherlands Institute for Advanced Study* in the Humanities and Social Sciences) and the Lorentz Center have a collaborative program, through which we offer the opportunity to organize workshops at the Lorentz Center at the interface between the natural sciences on the one hand and the social sciences and humanities on the other. In addition, individual scientists working at this interface are offered to work for an extended period at the NIAS as a Lorentz Fellow. In order to strengthen the program, NIAS and the Lorentz Center have created in 2008 the *Distinguished Lorentz Fellowship*, an award for a prominent individual (or a small group of individuals) who does bring these disciplines together through his or her research. The *Distinguished Lorentz Fellow* is offered the opportunity to work at the NIAS for a certain period and to organize a high-level interdisciplinary workshop at the Lorentz Center. The first *Distinguished Lorentz Fellowship* will be awarded in the spring of 2009.

There were several noteworthy workshops in 2008 that I would like to highlight. The workshop *Long Term consequences of exposure to famine*, which was organized in November via the collaborative program with NIAS, brought together researchers from various nationalities and disciplines to study the long term consequences of famine (as happened, e.g., in Holland during the “hunger winter” of 1944/1945, and in Leningrad during the siege of 1941-1944) in order to synthesize current findings from human studies and to quantify the potential health implications of severe under-nutrition at specific points in the life-course on present and future generations. The workshop was a very nice example of how modern techniques from the natural sciences (epigenetic markers) can contribute to an issue that has severe societal and political implications. It is therefore no surprise that the topic received quite a bit of coverage in the popular press. Another noteworthy workshop

that was organized through the program with NIAS was the workshop *Qumran – a holistic view* in April.

Several workshops within the natural sciences actually bridged disciplines as well: The *Physics of Genome Folding and Function* brought life scientists as well as physicists to the Lorentz Center in October, while at *Evolutionary Algorithms for Many-Parameter Physics* in April computer scientists and physicists worked together. Of course, there were many excellent mono-disciplinary workshops as well – e.g., the nine workshops in astronomy ranged in topic from gravitational lensing, pulsars and galaxies to the first science results of the international program *LOFAR*, while the mathematics program ranged from *Numerical Modeling of Complex Dynamical Systems* to *Algebraic Geometry* and *KAM Theory*.

It is also worth reporting that a new format was used in the workshop *Dynamical heterogeneities in glasses, colloids and granular media*, which was held in August and of which I was a co-organizer. We borrowed an idea from the field of economics to have all keynote talks be followed by a presentation by a so-called "discussant". Each speaker had been asked to send the workshop presentation to his or her discussant well ahead of time, and this discussant was given 20 minutes immediately after the talk to put the work of the speaker in perspective. After this the general discussion was held. This format worked very well, as it stimulated much discussion and often helped to get clear what precisely the open issues were. Several participants liked this setup so much that they intend to copy it in future workshops.

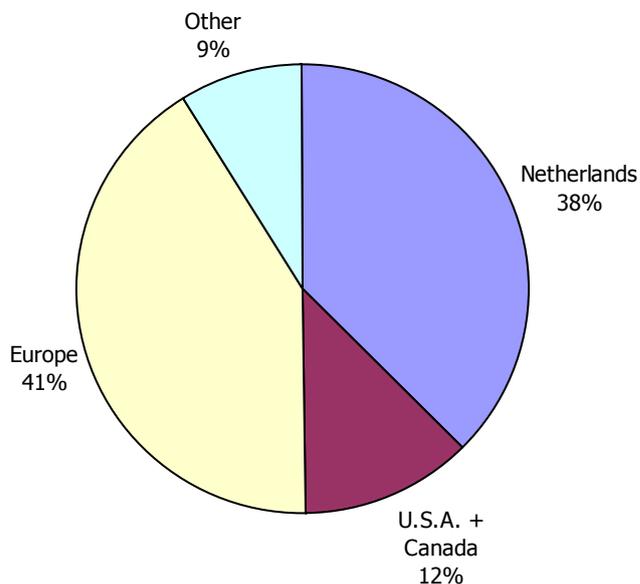
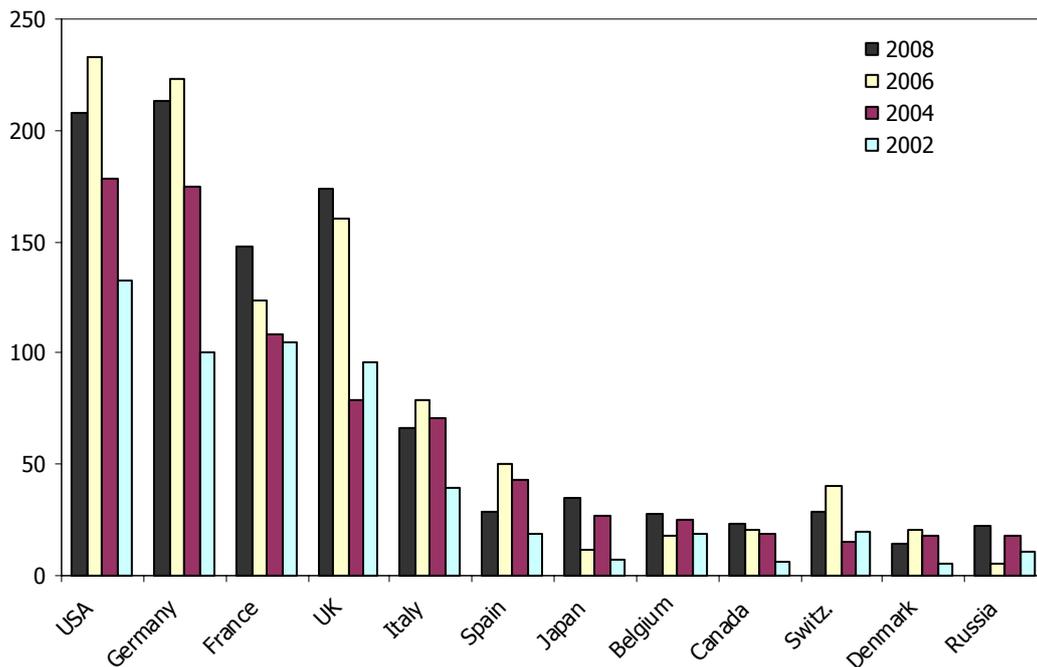
As I already pointed out in the preface to last year's report, my hope is to have the Lorentz Center play a bigger role in connecting the academic world with industry. We are far from there yet, but several informal contacts that I've made do make me optimistic that we will achieve this in the near future.

In line with what was already noticeable last year, the number of workshops and participants is leveling off in the last few years: now that the Lorentz Center is operating year round we are close to maximum capacity. The table below illustrates this.

YEAR	2000	2001	2002	2003	2004	2005	2006	2007	2008
Number of Meetings	23	31	34	31	38	41	45	45	44
Number of Workshops	15	21	23	22	31	35	41	42	40
Number of Visitors	880	1002	1421	1436	1640	1693	2009	2136	2090
Reg.workshop participants	640	735	1005	1007	1133	1562	1729	2008	1871

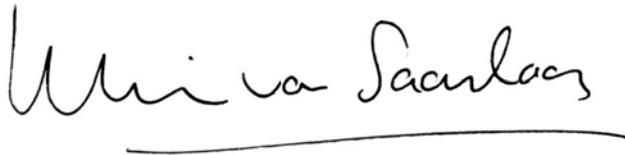
We continue to draw increasing numbers of participants from Europe, North-America and Asia, while the number of participants from the Netherlands has been pretty stable at about 35-40% over the years – see the charts below.

It is worth mentioning that about 37% of our workshop participants are junior scientists, i.e., graduate students and postdocs. This number is also quite stable over the years.



It is worth reminding the reader that the Lorentz Center is open to workshop proposals from outside the Netherlands, and that we deliberately do not impose quota for the number of participants from the Netherlands. The fact that each year some 700 scientists from the Netherlands participate in Lorentz Center workshops is due to the quality of our workshops and our accessibility and open door policy. In particular also graduate students and postdocs keep track of our program and do take advantage of the possibility to participate in interesting workshops.

Finally let me draw your attention again to the possibility to sign up for email announcements of workshops via our webpage. These announcements are sent out once the program of a workshop has been published on the web, usually a couple of weeks before a workshop begins. It is a good way to stay informed about what is happening and to check whether it might be of interest to register for a workshop or to even come over for a day or so. If you want to sign up too, go to <http://lorentzcenter.nl/email.php>. Also, should you contemplate organizing a workshop yourself, it is good to know that you can look into our agenda via our webpage <http://www.lorentzcenter.nl> to check for available timeslots, and that there are detailed instructions on the web for how to write a proposal.

A handwritten signature in black ink, reading "Wim van Saarloos". The signature is written in a cursive style and is underlined with a single horizontal line.

Wim van Saarloos
Director Lorentz Center

December 2008

Mission Statement

The Lorentz Center is an international center that coordinates and hosts workshops in the sciences, based on the philosophy that science thrives on interaction between creative researchers. Lorentz Center workshops focus on new collaborations and interactions between scientists from different countries and fields, and with varying seniority.

The Lorentz Center concept

In order to allow both junior and senior researchers to catch up with the rapid international developments and to establish new contacts and collaboration, Lorentz Center workshops bring together groups of 20 to 50 junior and senior researchers in a stimulating environment with working space for all participants: offices with a desk, personal computer, white boards, meeting rooms. Through a combination of informal talks, working sessions and discussions, participants are able to assess the status of a field and its future, and to collaborate, establish new international contacts, and spot upcoming talent.

Workshops can be proposed and organised by any researcher from any country. Workshops organised by researchers from different scientific backgrounds and nationalities are encouraged. Proposals for workshops are reviewed by the Program Advisory Boards. Currently there are Advisory Boards for astronomy, computer science, lifesciences, mathematics, and physics. The Center is also open to proposals outside these fields. Submission procedures are aimed at rapid evaluation.

In collaboration with the social sciences and humanities institute NIAS, the Lorentz Center welcomes proposals for interdisciplinary workshops that bring together one or more disciplines of the Lorentz Center with those of the NIAS. Proposals for these workshops are reviewed by the Interdisciplinary Advisory Board.

Surrounded by excellence

The Lorentz Center is located in Leiden University's J.H. Oort Building which also hosts the Instituut-Lorentz for theoretical physics, the Kamerlingh Onnes Laboratory and the Leiden Observatory. The Mathematics and Chemistry Departments and the Leiden Institute of Advanced Computer Science are located in adjacent buildings. All Dutch universities and research institutes can easily be reached by public transport; the universities in Amsterdam, Utrecht, Delft and Rotterdam can be reached by train within an hour. Schiphol International Airport is only 15 minutes by train.

Collaboration with NIAS

In collaboration with the social sciences and humanities institute NIAS located nearby, the Lorentz Center welcomes proposals for interdisciplinary workshops that bring together one or more disciplines of the Lorentz Center with those of the NIAS. Lorentz Fellowships are awarded by NIAS to scholars who are engaged in research across the boundaries of the humanities, the social sciences and the natural sciences. As part of the fellowship, the Lorentz Fellow is offered the opportunity to organize an interdisciplinary workshop at the Lorentz Center. Applications for Lorentz Fellowships should be sent to NIAS.

Support

The Lorentz Center is supported by Leiden University, Ministerie van OCW (the Dutch Ministry of Education, Culture and Science), FOM (the Dutch Physics Funding Foundation "Fundamenteel Onderzoek der Materie"), NWO, Research Council EW. The Lorentz Fonds regularly supports workshops in Physics.

Interdisciplinary Program Board

The interdisciplinary program board oversees the collaboration of NIAS (Netherlands Institute for Advanced Study in the Humanities and Social Sciences) and Lorentz Center, including the selection of interdisciplinary workshops, and the selection of the Lorentz Fellows at NIAS.

Chair

A.H.G. Rinnooy Kan Sociaal Economische Raad Den Haag

Members

J. Bouma	Wageningen Universiteit
C.M. Colijn-Hooymans	TNO Delft
R.H. Dijkgraaf	Universiteit van Amsterdam
J.W. McAllister	Universiteit Leiden
P. Tindemans	Euroscience Den Haag
K. van Berkel	Rijksuniversiteit Groningen
D. van Delft	Museum Boerhaave Leiden
R. van der Ploeg	European University Institute San Domenico di Fiesole
L.C. Verbrugge	Rijksuniversiteit Groningen

Computer-based Clinical Guidelines and Protocols

January 9 – 11, 2008

Aim

The aim of the workshop was to bring together researchers from different branches of computer science (in particular AI), medical informatics and medicine to examine cutting-edge approaches to computer-based guideline modelling and development and work on completing a book on computer-based guidelines and protocols (see below).

With the rise in the complexity and costs of healthcare, on the one hand, and increased expectations from society what healthcare is able to deliver, on the other hand, health-care professionals have developed a, sometimes urgent, need for care-practice support. Medical guidelines and protocols have become the main instruments for disseminating best practices in healthcare. They promote safe practices, reduce inter-clinician practice variations and support decision-making in patient care while containing the costs of care.

In many cases, medical guidelines and protocols have been useful in improving the quality and consistency of healthcare, by supporting healthcare quality assessment and assurance, clinical decision making, workflow and resource management. The benefits of having access to medical guidelines and protocols are widely recognized, yet the guideline development process is time and resource consuming, and the size and complexity of guidelines remains a major hurdle for effectively using them in clinical care.

Many researchers expect that the computer-based development, use and dissemination of guidelines will have a positive effect on the time required for the development of new guidelines and protocols, for the revision of existing ones, for deployment in daily care and dissemination. Guideline development institutes are increasingly exploiting computer based techniques in the development process; at the same time guidelines are made available through the world wide web. Current guidelines are evidence based, i.e., based on carefully weighed scientific evidence from literature. Computer-based methods are indispensable for ensuring that guidelines are in agreement with the latest requirement for guideline development.

Despite the guideline-related research spanning a large range of the AI research community, as well as other research areas, a comprehensive integration of the results of these communities is still lacking. Through working in small groups on specific topics (see below), and plenary feedback sessions, and some invited talks on important issues in the area, the workshop worked toward a comprehensive review of the area.

Outcome

The outcome of the workshop was the publication of the book "A. ten Teije, S. Miksch and P.J.F. Lucas (Eds.). Computer-based Clinical Guidelines and Protocols: a Primer and Current Trends, IOS Press, Amsterdam, 2008". It includes both research papers from the field and tutorial-style papers reviewing the state of the art.

Topics

- guideline development and deployment in medical practice
- guideline representation languages
- guideline modelling methods
- use of formal methods in guidelines

Scientific Report

- temporal aspects of guidelines
- vocabularies, ontologies and terminologies
- planning
- guideline adaptation
- visualization and guidelines
- guideline compliance
- research agenda for the coming years

Participants

There were 23 participants from many different countries. Most of the participants were involved in writing the book on computer-based guidelines and protocols. Some of the participants were PhD students and postdocs.

Final remarks

The Lorentz Center offered really excellent support for the organization of the workshop, and all participants were impressed by the facilities offered, in particular by the availability of offices, computers, printing facilities, meeting rooms, and the common room. The pleasant working atmosphere at the centre had a very positive effect on the outcome of the workshop.

Peter Lucas (Radboud University, Nijmegen, Netherlands)

Annette ten Teije (Free University Amsterdam, Netherlands)

Frank van Harmelen (Free University Amsterdam, Netherlands)

Keeping Track of the Seasons

The ecology and physiology of annual cycles in mammals and birds

January 14 – 18, 2008

Scientific background and motivation

Seasonal change in behavior and physiology is of growing interest to both the general public and scientists in diverse fields, including ecology and physiology. Associated with global change, many animals modify seasonal behavior, and ecologists are investigating associated fitness consequences. Simultaneously, evidence is mounting for far-reaching seasonal changes in diverse aspects of an animal's phenotype, and physiologists are beginning to reveal these processes at a molecular level. Although both approaches are driven by interest in annual cycles, they have not been well integrated in the past. Ecologists and physiologists don't meet often and if they do, use different conceptual approaches and technical terms. Further, much of the physiological advance has been achieved in research of mammals whereas ecologists have focused on avian studies. Thus, the workshop was aimed at bringing together ecologists and physiologists who work on seasonality in mammals and birds.

The workshop

The Lorentz workshop was attended by 40 researchers from six countries, representing a good mix of disciplines as well as of "old wisdom" and "young and plastic brains". Over its five days of duration, we aimed to transect our overall grounds in several steps. The first day was dedicated to getting to know each other and to introducing fundamentals of each discipline. The second day explored the role of the environment in shaping seasonality and attempts of quantifying it. This theme led up to a first intense exchange between ecologists and physiologists over the way annual cycles and environments are conceptualized. The third day was dedicated to the mechanistic basis of time-keeping in the two taxa. The overall impression was that there are relatively few clearly identifiable differences between mammals and birds. Some of the perceived differences may have related to particular approaches and conceptual emphasis in the two taxa. On the fourth day, research on mammals and birds was addressed in parallel, integrating over the disciplines and attempting to identify sorely needed research. On the last day we exchanged visions for the "Road ahead" in the study of animal seasonality.

The format of a Lorentz workshop proved to be ideal for the interdisciplinary goal of our workshop. The unique mix of people, created by the integrative theme, facilitated first direct interactions between many researchers working in parallel in different fields. The idea of being "a department" for a week and flexible schedules allowed for a wealth of one-on-one interactions, leading to much more fundamental discussions than would be possible at international meetings. In addition, during six sessions we broke up the attendance into small groups so that each participant, junior or senior, led a discussion on a topic of her or his own choice. This turned out to be a powerful stimulant of cross-disciplinary exchange. As a consequence, there was general consensus that the meeting has been exceptionally stimulating. Research progress, which had been hampered because of lacking integration between various approaches, may now advance at a faster pace. First steps into this direction were already initiated at the end of the workshop. Participants are currently discussing several possible funding schemes to continue fruitful interactions. As a direct first

Scientific Report

step, delegates are being asked to submit relevant electronic material that can be used as a resource based on the Lorentz Center website. Overall, we hope to have gained major impulses for the understanding of animal ecology, physiology, and also conservation, and for future research in this field.

Acknowledgments

The workshop profited enormously from the wonderful setup and thoughtful assistance offered at the Lorentz Center. It would not have been possible without its financial support, as well as that of the Dobberke Foundation. We gratefully acknowledge this crucial help.

M.E. Visser (NIOO, Netherlands)

A. Dawson (CEH, United Kingdom)

B. Helm (MPG, Germany)

Astronomy in Europe: An Evolving Collaboration

January 21 – 23, 2008

The European Astronomical Society (EAS) invited all its Affiliated Societies to a Workshop held in Leiden, at the Lorentz Center, from 21-23 January 2008, entitled: "Astronomy in Europe: An Evolving Collaboration", the first ever meeting of its kind.

The aims of the meeting were manifold: i) to exchange information of what role the Affiliated Societies currently play at a national and European level; ii) to discuss the role of the EAS, now and in the future; iii) to promote collaboration between National Societies, on a regional as well as European basis; iv) to design a model of cooperation between the EAS and Affiliated Societies which optimises the interaction and information flow between astronomers in the member states on the one hand, and pan-European institutes on the other; v) to work towards a Memorandum of Understanding which defines how the EAS and Affiliated Societies, by working together, can increase their effectiveness and visibility.

It is important to have a well functioning collaboration between the EAS and the national (Affiliated) Societies in order to gain maximum benefit for European Astronomy as a whole. This also means that the respective positions and tasks of the main players have to be well defined.

The 3-day meeting was held under the auspices of the European Astronomical Society and organised by its Secretary on behalf of EAS Council. The local organization was in the able hands of the staff of the Lorentz Center and Prof. Harm Habing (Leiden Observatory) acted as local contact person.

In total 38 participants, predominantly presidents or secretaries representing 23 Affiliated Societies plus the entire EAS Council participated in what turned out to be an extremely useful event. The meeting opened with a talk by Peter Barthel, the chair of the Program Board for Astronomy of the Lorentz Center who presented the mission statement of the Lorentz Center and encouraged the community to consider making use of its excellent facilities.

The main topic of the first day was a presentation and discussion of the EAS position paper. The second day was devoted to presentations by each of the Affiliated Societies. If one thing stood out of those presentations it was the enormous diversity in scope and purpose of the various societies. Some are strictly set up for professional astronomers, others count large numbers of amateur astronomers among their members. Some societies are active players on the astro-political scene, whereas others fulfill a more social need. Clearly, there is strength in this diversity and it will be up to the EAS to harness this and put to good use. On an individual basis, representatives of the societies present were able to exchange experiences and set up bilateral agreements for further collaboration.

The final day was used to highlight the services currently offered by the EAS and to explore ways to improve the communication between the EAS and its Affiliated Societies, and between the societies. Part of the discussion was devoted to the proposed changes to the EAS Constitution and Bye-Laws.

Scientific Report

The workshop has been a resounding success and EAS Council is now working hard on the implementation of several of the suggestions which were endorsed by the Affiliated Societies. Astronomy in Europe is blessed with a diverse community. It is up to the EAS, in partnership with the National Societies, to encourage and promote collaboration among all participants, to the benefit of its membership and of the European community as a whole.

Elias Brinks (Secretary, EAS)

Thierry Courvoisier (Vice-President, EAS)

Anne Dutrey (Treasurer, EAS)

Joachim Krautter (President, EAS)

Galaxy evolution from mass-selected samples

January 28 – February 1, 2008

We organized the work shop "Galaxy evolution from mass-selected samples" in the Lorentz Center, during the week of January 28 - February 1 2008. Twenty four astronomers from Europe and the USA participated. The workshop was organized to have ample time for discussion and actual work. The program consisted of 23 talks, which were all scheduled for the morning. The subject of the meeting was the evolution of galaxies, focussing on the redshift range from $z=3$ to $z=0$, and with special attention to mass selected samples, i.e., samples which were selected in the rest frame optical. A variety of new results were reported. Special attention was given to results from theoretical models. The level of detail in the simulations and predictions is steadily increasing, and comparisons between models and observations are shedding important insight into the physics of the galaxies at high redshift. The schedule allowed ample time for discussion after each talk, which is nearly unique these days, as most conferences are too tightly packed to allow for proper discussions.

In the afternoons, discussion sessions were organized, small progress meetings, and actual work was done. The setup of the Lorentz Center is ideal for these types of activities, as there are sufficient rooms for discussions and small group meetings. Furthermore, quite a bit of work was done on collaborative projects and papers. The fact that all participants were supplied with a desk helped greatly to increase the output of the meeting.

We ended the meeting with a discussion of what to do in the future. This session was particularly useful, as it generated many new ideas, and helped to focus on the important measurements which need to be made.

We would like to thank the Lorentz Center for its hospitality, support, and financial contribution towards the workshop. Without the Lorentz Center, this workshop would not have been possible.

Marijn Franx (Leiden Observatory, Netherlands)

The dark side of the universe through extragalactic gravitational lensing

February 4 – 6, 2008

This workshop was organized in the framework of the EU-funded network 'DUEL'. The network involves research groups from Edinburgh, Leiden, Munchen, Bonn, Heidelberg, Paris and Naples working on weak gravitational lensing, specifically with the aim of studying the dark energy. This workshop was one of the series of rotating six-monthly meetings organized by the network, at which researchers at the nodes exchange their latest results and discuss further plans. Such meetings are particularly useful for the younger members of the network, of whom there are many (the EU funding allows two PhD students or postdocs to be appointed per network).

For the Lorentz Center meeting we took the opportunity of inviting a number of people from outside the network. They were asked to review aspects of weak lensing in long talks, which were then followed by related shorter talks, mainly from the younger people. Topics alternated between theoretical talks and ones focusing on very practical issues, such as how to best estimate photometric redshifts, or shape measurement techniques.

The final day was used for a team meeting of one of the upcoming lensing surveys, the Kids survey, that is led from Leiden.

M. Radovich (INAF – OAC, Naples, Italy)

A. Taylor (University of Edinburgh, United Kingdom)

Y. Mellier (IAP, Paris, France)

P. Schneider (Argelander-Institut für Astronomie, Bonn, Germany)

L. van Waerbeke (Vancouver, Canada)

M. Bartelmann (Heidelberg, Germany)

S. Seitz (Universitätssternwarte München, Germany)

K. Kuijken (Leiden Observatory, Netherlands)

Crystallization and Jamming in Soft Matter under Driving – Colloidal Suspensions, Granular Media, Foams, and Complex Plasmas

February 11 – 22, 2008

It was the purpose of this workshop to bring together researchers who work on different soft-matter model systems. The focus was on driven systems in the dense regime where crystallization or jamming occurs. The workshop lasted two weeks as planned and had more than 80 participants with between 30 and 50 in residence at any given time. The participants came from 11 different countries: Denmark, France, Germany, India, Italy, The Netherlands, Slovenia, Sweden, Switzerland, United Kingdom, United States.

While there was the expected division between first and second week, all four fields were represented over the entire time of the workshop. Many participants met each other for the first time or became acquainted with other fields only at this workshop. Having two conference dinners, one each week, helped further to create a relaxed atmosphere for open discussions. In addition, the traditional wine-and-cheese parties should be mentioned here as wonderful opportunities to discuss in the nice atmosphere of the Lorentz Center.

There were one to two broader review talks of one hour length per day as well as a few half-hour talks. The review talks were given by the invited speakers who gave a basic introduction in order to bridge the gaps between the communities. Several shorter talks were grouped into symposia and panels that covered a topic either across the fields (crystallization, rheology, crystallization in 2D, soft matter under microgravity) or for a specific field (granular solid state, crystallization in colloidal suspensions) in greater depth. Short (up to 5min) clip talks were scheduled just before the lunch breaks in order to introduce the poster presentations. The experience with these clip talks was very good for the audience and satisfying for the presenters; the distribution of the clip talks between the two weeks was a little bit uneven following the demand.

The talks covered both introductions and current topics in all the fields so the workshop gave a good overview of soft-matter research in general and pointed to interesting questions for researchers in the individual fields. Experimental issues discussed broadly were the application of light-scattering techniques (best known for colloids) in foams and granular media, and the benefit of experiments under microgravity for phase transitions. Adequately, the safe arrival of the European Columbus module at the International Space Station could be celebrated during the workshop.

The interactions among participants triggered during the workshop range from continued discussions, future mutual visits and planned joint proposals to fully established collaborations. Interactions within and across fields included in detail the following topics: compaction in the framework of energy landscapes (granular/colloid), statistical fabric tensor applied to concentrated colloidal suspensions under macroscopic confinement (granular/colloid), comparison of experiments and simulations on the global equation of state (granular), cage dynamics in driven granular media (granular/colloid), compaction and creep of powder and colloids (granular/colloid), transport coefficients and continuum modeling of granular flows (granular), glassy dynamics in complex plasmas (colloid/plasma), statics and dynamics at defects in 2D crystals (colloid/plasma), soft interaction potential for colloids and

Scientific Report

bubbles (colloid/foam), modelling of yield stresses (colloid/ foam), crystallization in two dimensions (foam/plasma), lane formation and shear banding (colloid/plasma), aggregation dynamics with long range interactions (granular), monodisperse particle (granular/plasma), colloidal Rayleigh-Taylor instability (colloid), similarities and differences for the Rayleigh-Taylor instability in granular and colloidal matter (granular/colloid), crystalline structures of foam bilayers (colloid/foam), difference between dry and wet granular media (granular).

Concerning the topic of arrest transitions in dense systems there was frequent and often lively debate during and after the sessions. A central result of the panel discussion in the second week was that crystallization transitions are generally better understood or agreed upon than transitions into disordered states: It was interesting to realize that people from different communities would initially not even agree on the existence of well-defined transitions to be understood. It was the special environment of the Lorentz Center that allowed for enough discussion time and also room for larger and smaller groups to clarify such differences in great depth. We see the long-term benefit of the workshop in more coherent discussions between the fields and a number of formal collaborations in the near future.

We thank the Lorentz Center, the DFG SFB-TR6, the Delft Center for Materials (DCMat), and DLR MP for financial and logistic support, and especially the local staff for their competent and efficient help.

Matthias Sperl (DLR Cologne, Germany)

Stefan Luding (Universiteit Twente, Netherlands)

Hartmut Löwen (Universität Düsseldorf, Germany)

3rd Universe Awareness Multidisciplinary workshop

February 25 – 29, 2008

Introduction

Universe Awareness (UNAWE) is an international program that exposes very young children in underprivileged environments to the scale and beauty of the universe. UNAWE has been met internationally with great enthusiasm. It has developed into a worldwide community of astronomy enthusiasts who believe in the power of the beauty of the Universe to broaden children's minds and spark their curiosity and world citizenship. In 2007 UNAWE was selected to be a global cornerstone program of the International Year of Astronomy 2009 (IYA2009).

Following two very successful workshop mid-2005 at ESO in Garching, Germany and end 2006 at the Lorentz Centre in Leiden, The Netherlands, the next logical step in the development of UNAWE was to bring members of the UNAWE network together to discuss the activities and materials used in the implementation of UNAWE in various countries and environments.

Members of the international UNAWE community and selected experts gathered between February 25 and 29 at the Lorentz Centre to focus on the materials, techniques and resources that the program has developed thus far and should develop in the future. For three days, 32 participants from 17 different countries shared their ideas and experiences in astronomy education and communication resources for very young children. We welcomed educators who had been present at previous workshops and representatives of active UNAWE programs that exist in Italy, Spain, Chile, India, Colombia, South Africa, Germany, Venezuela, UK and Indonesia. We also welcomed members of existing, like-minded organizations with a view to collaboration.

The fourth day was a dedicated event for Dutch primary school teachers (UNAWE Docentendag) and on the last day, the UNAWE International Steering Committee got together to discuss the status and future steps of the development of the program.

The workshop

The participants presented 17 specific educational activities ranging from how to engage a group of young children to making a model of the galaxy using only water and sand. The majority of those activities is now available on the newly dedicated UNAWE Materials website (<http://www.unawe.org/materials>). A number of the demonstrated activities were also used on the UNAWE Docentendag. In addition, a presentation and discussion about astronomy programs designed for the radio took place.

Moreover, desired materials and their production in different parts of the world were discussed: children's books, posters, teachers' manuals, games and toys, models, simplified scientific instruments suitable for children, cartoons, astronomy kits ("the Universe in a box"). Some of the materials were discussed in the context of professional design and production, while others were said to be preferred as hands-on, do-it-yourself models and instruments.

Evaluation was discussed at length, especially the aspects of children's understanding, their development and attitude. Those evaluations are not trivial like testing only acquisition of knowledge.

Scientific Report

Outcomes

A number of new collaborations and projects were initiated thanks to this workshop, e.g. UNAWE Kenya or a collaboration with Pratham, an organization in India which reaches about 100,000 children in the UNAWE age range at any time.

One valuable lesson learnt from collating the materials for publication, is that UNAWE materials currently available cover some topics very thoroughly (e.g. the solar system) while others are hardly covered (e.g. galaxies). It should be noted that this is not an indication that those topics are too difficult for children, rather that they are too new to have reached general scientific culture.

A new website acting as a repository and online database of materials has been developed since the workshop.

Conclusion

The idea that began UNAWE, has now evolved into a successful international program bringing together like-minded organizations dedicated to making the inspiring nature of astronomy accessible to children who would previously never have encountered it.

This was amply demonstrated in the workshop by the range of materials that are actively in use in a variety of cultural and environmental contexts. These activities are fun. They are inspiring very young children and in many cases they are now a permanent platform on which to build long term sustainable programs.

G. Miley (Leiden Observatory, Netherlands)

C. Odman (Leiden Observatory, Netherlands)

S. Levin (Leiden Observatory, Netherlands)

Symmetry as a Modern Scientific Concept: Historical and Philosophical Perspectives

March 11 – 14, 2008

Goals and Themes

The modern concept of symmetry has proved remarkably fruitful in science. It plays a role in delineating fundamental epistemic and ontological principles. The aim of this interdisciplinary Lorentz Center workshop was to review conceptions of symmetry and to investigate their possible underlying links by addressing the following themes:

Day 1: Order vs. disorder

Day 2: The epistemological status of symmetry principles in physics

Day 3: Symmetry and symmetry breaking in morphogenesis

Day 4: Overarching perspectives: D'Arcy Thompson and Hermann Weyl

The workshop was conceived within the program of collaboration between the Lorentz Center, Leiden University, and the Netherlands Institute for Advanced Study in the Humanities and Social Sciences (NIAS, Wassenaar), to foster interdisciplinary research involving diverse scientific and academic disciplines. In this workshop collaboration took place between historians and philosophers of science, physicists, biologists, and mathematicians, as well as aestheticians and historians of art.

Realization

We were successful in attracting prominent scholars from diverse domains who have been pursuing different conceptions of symmetry. The talks were appropriately designed and achieved the states aims. The discussions following the talks were constructive and lively, and extended in the spirit of the Lorentz Center into the plentiful coffee, lunch, and tea breaks. The goal of fostering interaction between natural scientists on the one hand and philosophers, historians, and scholars in the humanities on the other hand was largely achieved. Of the speakers at the workshop, 6 are based in the Netherlands, 5 in the United States, 2 in Israel, 1 in Canada, 1 in Italy, and 1 in Germany. The workshop attracted 33 registered participants.

There were two outreach elements. The first was a lecture by Professor Giora Hon, one of the organizers of the workshop, "Symmetry – The Power of a Modern Scientific Concept", in *This Week's Discoveries*, an open lunchtime colloquium at the Faculty of Mathematics and Natural Sciences. The second was an illustrated public lecture by Professor Jan van de Craats, "Symmetry in Mathematics and in Art". This lecture was held at the Kamerlingh Onnesgebouw in the centre of Leiden and was followed by discussion with the audience. The workshop dinner took place after the public talk in a modest restaurant to the enjoyment of all the participants.

The idea that each day should be dedicated to one theme, to be addressed from different perspectives, proved most productive. For example, on day 3 the relation between symmetry breaking and morphogenesis was discussed by a cosmologist in the context of structure formation in the early universe, by an evolutionary biologist in the context of bilateral asymmetries in organisms, and by a philosopher of physics in the context of wave-function collapse in quantum mechanics. Looking back, the organizers feel that the focus of the discussion could have been sharpened even further by starting each day with a programmatic introduction, or by scheduling a round table discussion at the end of the day.

Scientific Report

The organizers will keep these suggestions in mind for future similar events. Nonetheless, both the interdisciplinary nature of the discussion and its concrete focus were more than sufficient to regard the workshop as a success.

One of the contributors to the workshop wrote to us upon arriving back home: "Thank you and congratulations on the symmetry workshop. It was well conceived and very well executed, an extraordinary experience for me. I appreciated the opportunity to interact with such a diverse group of symmetricians, and I enjoyed the hospitality of the Lorentz Center, the city of Leiden, and yourselves." Another contributor commented in writing: "I thank you once again for organizing such a successful and enjoyable workshop at the Lorentz Center, where I was pleased to be able to meet you and exchange ideas about symmetry."

The workshop organizers are very grateful to the Lorentz Center team that supported this workshop, especially Dr. Martje Kruk-de Bruin, Dr. Henriette Jensenius, and Ms. Yolande van der Deijl. The organizers received support and advice also from Professor Wim van Saarloos, Director of the Lorentz Center, and Professor Wim Blockmans, Rector of the NIAS as well as Drs. Jos Hooghuis, Head of Research Planning and Support. Lastly, we are grateful to all the financial sponsors of the Lorentz Center and the NIAS that made it possible to organize this workshop.

Giora Hon (University of Haifa, Israel)

James W. McAllister (Leiden University, Netherlands)

Vincent Icke (Leiden University, Netherlands)

Scientific Report

Ultravista Science Team meeting

March 18 – 20, 2008

The Ultravista Science Team met in the Lorentz Center from March 18 to 20, 2008. The Ultra Vista survey is an ultra deep survey that will be performed on VISTA telescope which is being built on Paranal, Chile. The survey has been allocated 180 nights of telescope time on VISTA, and is scheduled to start in 2009. The ULTRA-VISTA survey will detect very high redshift galaxies over a field of 0.7 sq. degrees, and will thereby be the largest high redshift survey until the advent of JWST.

The meeting brought together the scientists involved with the ULTRA-VISTA project, and the scientists involved in the data reduction. The first day of the meeting was used for presentations concerning the VISTA telescope, presentations of other surveys, and the science goals of the ULTRA-VISTA survey. The second day concerned more detailed presentations and details concerning the observing strategy, and practical details. Small discussion groups were formed to discuss specific science items in more detail. The last day was specifically used for discussions on the data processing. Presentations were given by various groups, and problems and "lessons learned" from previous surveys were discussed.

Overall, the meeting was a great success. It was the first time that the science team met, and the positive outcome of the meeting was largely due to the very good facilities and support of the Lorentz Center. A total of 27 scientists participated in the meeting. This size was ideal for fruitful discussions and brainstorm sessions. It is a pleasure to thank the staff of the Lorentz Center for the excellent support, and we are very grateful that we could use the facilities and support of the Lorentz Center.

J. Dunlop (Royal Observatory Edinburgh, United Kingdom)

O. LeFevre (Lab. d'Astrophysique de Marseille, France)

M. Franx (Leiden Observatory, Netherlands)

J. Fynbo (Dark Cosmology Centre, Denmark)

RFID Security: Theory and Practice

March 26 – 28, 2008

Radio Frequency Identification (RFID) is the latest phase in the decades-old trend of the miniaturization of computers. RFID transponders are tiny resource-limited computers that do not have a battery that needs periodic replacement. RFID tags are inductively powered by their external reading devices, called RFID readers. Once the RFID tag is activated, the tag then decodes the incoming query and produces an appropriate response by modulating the request signal, using one or more subcarrier frequencies. RFID Tags can do a limited amount of processing, and have a small amount of storage.

As people start to rely on RFID technology, it will become easy to infer information about their behavior and personal tastes, by observing their use of the technology. To make matters worse, RFID transponders are also too computationally limited to support traditional security and privacy enhancing technologies. This lack of information regulation between RFID tags and RFID readers may lead to undesirable situations. One such situation is unauthorized data collection, where attackers gather illicit information by either actively issuing queries to tags or passively eavesdropping on existing tag-reader communications.

The 'RFID Security: Theory and Practice' workshop at the Lorentz Center was part II of a workshop series (Part I was at Johns Hopkins University in January 2008) that aimed to give voice to the security needs of intensive deployers of RFID in the pharmaceutical, medical, transportation, consumer payment, and retail industries. By representing a broad cross-section of the RFID community, the workshop looked to shape the research programs of technologists in the service of pressing, real-world problems and to connect industrial RFID users with the scientists crafting next-generation RFID systems. The workshop included three days of invited talks, panel discussions, and breakout sessions. The workshop was off the record for media attendees.

The meeting was successful on many levels. We had speakers talk about very current topics (including the first ever live demonstration of MIFARE contactless smart card cloning!). Additionally, the workshop was useful for networking purposes, and helped create enduring contacts between the workshop speakers and participants. The workshop also allowed us to brainstorm about the needs of a future "RFID Security Industry", allowing us to formulate the basis of an infrastructure that would be needed for further collaboration and formation of an RFID Security.

The Lorentz Center was an excellent setting for our workshop, which accommodated our invited talks, brainstorm sessions, and also provided an excellent social dinner. The feedback from both the workshop participants and speakers was very positive! The organizers are very grateful to the Lorentz Center for helping us to organize this very interesting and productive workshop.

Melanie Rieback (Vrije Universiteit, Netherlands)
Adam Stubblefield (Johns Hopkins University, USA)
Kevin Fu (UMass Amherst, USA)
Ari Juels (RSA Security, USA)

From exoplanets to galaxy clusters: science with AstroWise

March 31 – April 3, 2008

Context

The aim of this workshop was to bring together astronomical large-survey communities to share latest science results and exchange ideas on solutions for the astronomical and information-technological challenges posed by their survey research. Many large surveys are on-going and in the near-future several optical, infrared and radio surveys with unprecedented data volumes will start operations (e.g., OmegaCAM at the VLT Survey Telescope and PAN-STARRS and the VISTA telescope and LOFAR). This was therefore a suitable time to hold this workshop. The surveys presented at the workshop covered a wide range of astronomical topics including exoplanets, stellar binaries, dark matter and dark energy, galaxy clusters and the early Universe. Various of these upcoming large surveys will use the Astro-WISE information system to process and analyze the tens of Terabytes of data in a completely distributed manner. The system has been built and is operated by the Astro-WISE consortium which consists of survey teams in the Netherlands, Germany, France and Italy. The workshop brought together the Astro-WISE survey community with other survey teams which presented their work at the meeting. Over 40 participants joined the workshop from institutes all over Europe.

Program

Each workshop session combined particular astronomical topics and the information-technological topics directly related to them. Astronomical presentations on the progress and latest science results from surveys were programmed back-to-back with presentations which focused on the computational and information-technological solutions and challenges directly related to these surveys.

The progress and scientific niches of weak-lensing galaxy surveys to map the distribution of dark matter and to detect dark energy were presented and compared. Such surveys require very precise photometric and astrometric calibration of large imaging surveys with superb image quality. The information-technology talks assessed how astrometric and photometric pipelines can meet these requirements. These surveys also rely heavily on photometric estimates of millions of galaxy redshifts. This in turn requires homogenization of observations at different wavelengths in terms of their image point spread function. Thus photometric redshift estimators and homogenization routines were also presented. The involved survey collaborations are geographically very distributed in terms of person and hardware. A presentation on the federation of the Astro-WISE information system discussed how to meet the related challenges such as sharing and keeping track of process results for the Terabytes of data with minimal data transfer.

Latest results on radii and densities of exoplanets from transiting exoplanet surveys were presented in the same session with results on the evolution of ultracompact stellar binaries. Both types of surveys require image differencing analysis of millions of objects. The information-technology presentations compared different approaches to the image convolution and differencing algorithms.

Another session focused on ultradeep infrared surveys. Results on the mass function of high redshift galaxies, the growth of clustering and the formation of the red-galaxy sequence from these surveys were presented. They detect and analyze extremely faint objects via stacking of images with a high and highly variable atmospheric background. The information-

Scientific Report

technological talks focused on the challenge in processing and related quality control to calibrate at the same time accurately and efficiently large data volumes with such highly varying observing conditions.

For wide-field galaxy cluster studies the latest results on morphological variations/transitions as a function of environment and galaxy number density were presented. Such results require reliable extraction of surface brightness quantities and model fits over a wide range of intrinsic galaxy morphologies. The algorithms and pipelines to do this were discussed back-to-back with the results.

Finally, the capabilities of the Virtual Observatory infrastructure were assessed for sharing and combining wide-field imaging survey data at both image and catalog level.

In the afternoon of sessions ample time was reserved for plenary and more informal splinter meetings to have targeted follow-up discussions. This turned out to be a good format to for example translate the survey operational experiences of ongoing surveys to the even larger upcoming surveys.

We would like to emphasize that the series of office spaces and meeting rooms available in the Lorentz Center proved to be perfect for the afternoon splinter meetings. The easy computer and internet access ensured that relevant information during the discussions was at the participants' fingertips. A successful workshop has been achieved also thanks to the professional organization of the Lorentz Center. The workshop organizers express their special thanks to Gerda Filippo and dr. Martje Kruk for their help prior to and during the workshop.

Edwin Valentijn (Kapteyn Institute, Groningen, Netherlands)

Gijs Verdoes Kleijn (Kapteyn Institute, Groningen, Netherlands)

Erik Deul (Leiden Observatory, Netherlands)

Evolutionary Algorithms for Many-Parameter Physics

April 7 – 11, 2008

Summary

To start with, we cite the original goals of the workshop (as stated in our original proposal) below:

The aim of this workshop is to bring together researchers from leading physics and evolutionary computation groups in the world and advance the state-of-the-art in both the physics and the evolutionary computation field as well as in their interactions. In particular, we planned to have leading researchers of both fields at the workshop, to have many PhD students attend the workshop, and to allow for strong interaction to identify key scientific questions for physics as well as evolutionary computation. To achieve this goal, we also invited interested parties from companies to attend the workshop.

To summarize, we define the main goals of the workshop as follows:

1. Stimulate interaction, research collaborations, and joint research proposals between researchers in many-parameter physics and evolutionary computation.
2. Advance the state of the art in solving many-parameter physics problems in computer simulations as well as in experimental applications.
3. Collect and publish a representative state-of-the-art overview of applications of evolutionary computation to many-parameter physics tasks.
4. Stimulate the emergence of new research ideas and research results through intensive collaboration and brainstorming between PhD students and leading experts during the workshop.

The organizers are absolutely convinced that those goals have been achieved, and the workshop was a full success – going far beyond our original expectations. To support this claim, we give some key facts regarding the workshop activities.

Participants

We succeeded to get key participants from both fields (physicists with a focus on quantum control applications, computer scientists with a focus on evolutionary computation) to the workshop, and to stimulate their interaction very successfully. All participants were unanimously of the opinion that the workshop was a full success!

Scientific Results

The workshop was characterized by a lot of stimulating discussions along the lines of identifying and answering some of the key questions relevant for applications of evolutionary computation in quantum control. Those questions were summarized in a discussion paper, which is made available to all workshop participants.

Moreover, the workshop results in a number of new national as well as international collaborations – starting now on an informal level, but with ideas to turn them into formal collaborations, e.g., by joint project proposals.

Examples include collaborations among

- Princeton – Leiden
- Twente – Leiden

Scientific Report

- INRIA – Nijmegen
- Dortmund – Leiden

Further discussions on joint research ideas are under way.

In addition, the workshop organizers plan on editing a workshop book, entitled “Evolutionary Algorithms for Many-Parameter Physics” (or similar), combining an introduction into evolutionary computation and its details with an introduction into quantum control as well as examples of applications in physics and quantum control, specifically. Springer has already agreed to publish this within their “Natural Computing” book series.

Organization and Funding

The organization through the staff at the Lorentz Center, specifically the help of Dr. Martje Kruk and Corrie Kuster (her first workshop!) was just amazingly perfect! It is just a great support for the scientific organizers to have all of the organizational issues handled in such a smooth way by the Lorentz Center – these are perfect conditions for running such an event!

Regarding the support from the Lorentz Center, the organizers would like to express their gratefulness again for receiving organizational support as well as funding! This way, it was possible for us to conduct a wonderful workshop and give the participants a really great experience!

Marc Vrakking (AMOLF, Amsterdam, Netherlands)

Thomas Bäck (Leiden University, Netherlands)

Scientific Report

Qumran – a Holistic View

April 21 – 25, 2008

The Qumran Lorentz Center Workshop took place from 21-25 April 2008, as part of my fellowship at the NIAS from 1 September 2007- 1 July 2008. Both have to do with transdisciplinary research in Humanities, Social Science and especially the Hard Sciences, the reason why I was elected as a fellow for both institutions.

The facilities of the Lorentz Center include 20 offices for participating scientists, which have been a haven to lance interdisciplinarity on a larger scale than within my own group of COST-based research (Cooperation of Science and Technology) in the European Community. I got not only renowned experts for the Qumran Workshop from various countries in Europe, Israel and the USA, but also the new generation of students from Leiden University. They worked not only at the Technical University of Delft as part of the Honour Class in a joint project to develop lye that is needed for the hypothetical fabrication of soap at Qumran, but saw also during two full days how science integrates with archaeology and witnessed the academic cooperation that is needed to get to the results that one expects from interdisciplinary research. The students also lectured, which will be a paper in the forthcoming Proceedings.

The Lorentz Center gave me the opportunity, often wished but seldom obtained, to include many and long discussions between the members of the workshop. Only a relatively few selected 40-minutes during lectures were planned and in such a way that there was a natural way for individual and group talks without people disappearing for sightseeing and the like.

Also my lunch lecture of "Recent Highlights" at the Leiden Science Faculty on Tuesday 23 April for the entire Institute of Wis en Natuurkunde was highly appreciated because even within the various domains of Physics, Chemistry and Biology, scientists not always get first-hand information what others are working on.

The cooperation between the Lorentz Center staff and myself has been excellent from the very first moment we met, which is important if the scholar can focus on the content of the workshop solely.

The Lorentz Center workshop of April 21-25, 2008 provided a holistic view on Qumran and the famous Dead Sea manuscripts by treating Qumran animal bones by DNA, dating parchment by radio-carbon dating and pottery by Thermoluminescence dating. Moreover, Synchrotron Radiation and Neutron Activation Analysis studied scroll parchment for destructive actions due to various chemical elements as detected. Finally, the provenance (origin) of pottery and clay at Qumran came under research – important to underline the purity of the sectarian movement at Qumran – after which a scroll exegete communicated us what he expected from science to endorse the knowledge of who wrote the Dead Sea scrolls and what ink the scribes used.

Lorentz Center Book

In the Proceedings of the Lorentz Center Workshop, provisionally entitled "Holistic Qumran and the Dead Sea scrolls" I will edit thirteen scientific papers, among which three of myself. These papers consist of INAA research in clay and pottery, Qumran textile and dye research,

Scientific Report

revisiting the date of a wine jar found at Qumran, soap fabrication and, finally, degradation of the Dead Sea scrolls. The latter is based on my new research that is performed at the ESRF in Grenoble and the TU of Delft by three-dimensional Calculated Tomography and Laminography, respectively. The obtained results so far look highly promising. The goal is to be able to find the reason why and how parchment degrades and to stop this process.

The various contributions for the Lorentz Workshop Proceedings should be in at the end of December 2008; Brill's Publishing House in Leiden will publish the Proceedings.

J. Gunneweg (Hebrew University, Jerusalem, Israel)

A. Adriaens (Ghent University, Belgium)

J. Dik (TU Delft, Netherlands)

Numerical Modelling of Complex Dynamical Systems

May 6 – 9, 2008

Computer simulations are used to investigate increasingly complex dynamical models of physical systems from application areas such as biology and earth systems, material science and manufacturing. The models of interest often do not fit the standard classifications into ordinary or partial differential equations (e.g. particulate or continuum models), but rather have a hybrid character.

As the systems being studied become more advanced, there is an increasing demand for sophisticated, specialized algorithms that do more than just satisfy the traditional requirements of accuracy and stability.

The workshop addressed current subjects of intense research in numerical modelling of dynamical problems (time-dependent ordinary and partial differential equations and hybrid models). One great challenge confronting numerical analysis (as in other fields) is how to effectively treat the interaction between dynamics on very different spatio-temporal scales. Unique to numerical analysis is the incorporation of additional length scales associated with the discretization, such as the time stepsize or spatial meshwidth which determine the resolution of the method, and the interplay of these (e.g. numerical resonances). Work on this subject ranges from early investigations on implicit integrators for stiff problems to more recent topics as stochastic modelling and appropriate methods; model reduction, homogenization techniques, and equationfree methods. All such methods demand new techniques for their analysis.

At all scales, an important challenge is the development of numerical methods that respect the dynamical properties (conservation laws, symmetries, limit behavior, etc.) of a problem being modelled over long simulation times. This is especially significant when dealing with problems in which the dynamics are highly sensitive to perturbations, where rapid error growth precludes accurate simulation of a particular solution trajectory over long time, and where the goal of simulation is the computation of statistical averages in an appropriate ensemble measure. In coarse grained PDE models, the treatment of infinite dimensional dynamical systems entails a whole slew of challenges, including order reduction due to unbounded operators, finite domain effects, and the discord between conservation on one hand and the nonlinear cascade to unbounded scales on the other. Naturally, more traditional topics of numerical analysis such as development of efficient higher-order methods, semi-implicit (including exponential) integrators, error estimation and adaptivity play an essential role as well.

Workshop

The workshop lasted 4 days, with 7 talks per day and a period of three hours for informal discussion and collaboration. On the first day there was additionally a poster presentation after lunch and a reception with wine and cheese at the end of the day. On the second evening the workshop dinner entailed a four hour boat cruise over the Kager Plassen, accompanied by beautiful weather.

The workshop was warmly received in general, and we received positive feedback from a number of participants. Especially, there was enthusiasm for the combination of scientists from different communities. A number of potential collaborations were reported: Lang &

Scientific Report

Verwer; Lang & Vandewalle; Bond, Leimkuhler & Vanden-Eijnden; Hairer & Skeel; Owren & Quispel; Bokhove & Cotter. Funding from the Lorentz Center and the NDNS+ Mathematics Cluster are gratefully acknowledged. The support provided by the Lorentz Center staff was superb.

Joke Blom (CWI, Netherlands)

Jason Frank (CWI, Netherlands)

Willem Hundsdorfer (CWI, Netherlands)

Ben Sommeijer (CWI, Netherlands)

Jan Verwer (CWI, Netherlands)

New algorithms in macromolecular crystallography and electron microscopy

May 13 – 17, 2008

We aimed to bring together computational methods development experts in X-ray crystallography and electron microscopy to work towards developing algorithms of the future that improve both methods and combine the complementary information from both techniques optimally. The workshop consisted of 40-50 participants.

Since researchers from two different but related fields were brought together, the workshop began with an overview of both techniques. Next, the current application of maximum likelihood methods in both X-ray crystallography and electron microscopy was presented.

Solving electron microscopy reconstructions or X-ray crystal structures often requires computational demanding algorithms. The workshop devoted a day to discuss current solutions for efficient computation exploiting parallel processors. The general methods of exploiting Open-MP and MPI software for computational clusters and exploiting graphical processor unit hardware were presented. Presentations on docking crystal structures into electron microscopy reconstructions and using electron microscopy maps as a starting point for phasing X-ray data were given. The workshop also had presentations on algorithmic advances in both fields, including increasing the resolution of EM reconstructions for exploiting astigmatism, assessing the accuracy of docking crystal structures in EM maps, and accelerated orientation determination using FFTs and spherical harmonics. Finally, recent developments of the "overlap" of both techniques - electron diffraction, were presented.

Throughout the meeting, special attention was given to current limitations of the algorithms in both experimental techniques. For example, in X-ray crystallography, the inadequacy of computational methods at resolutions lower than 4 Ångströms resolution was highlighted. Possible solutions for this shortcoming were proposed and included a different parameterization of models, improved error analysis and error refinement, validation of models, and more advanced strategies for incorporating prior information of models. As similar approaches can be used to fully exploit electron microscopy images, we concluded that continual and regular contact amongst computational developers of X-ray crystallography and electron microscopy algorithms would be mutually beneficial.

In addition to the support of Max-inf2 and the Lorentz Center, financial assistance was also provided by Cyttron, FEI and Bruker-AXS. The proceedings of the workshop will be published in a special edition of Acta Crystallographica.

Navraj S. Pannu (Leiden University, Netherlands)
Raimond B.G. Ravelli (LUMC, Leiden, Netherlands)
Jan Pieter Abrahams (Leiden University, Netherlands)

Network Synchronization: from dynamical systems to neuroscience

May 19 – 30, 2008

Introduction

In recent years, the emergence of collective phenomena and synchronization in complex networks, made of many interacting elements, have gathered much attention in several disciplines as mathematics, physics and both experimental and theoretical neuroscience. Indeed, synchronization phenomena have been observed in many different brain structures and behavioral contexts, under both physiological and pathological conditions. Synchronized oscillations (mainly in the Gamma-band) have received particular attention because they can be observed in the cortex of the awake brain during attentional tasks, and have been implicated in higher level processes, such as sensory binding, awareness, storage of memories, and even consciousness.

The aim of the workshop was to bring together researchers interested in synchronization phenomena from mathematics, physics and neuroscience and to strengthen the communication channels between the (overlapping) communities of dynamical system theoreticians and of computational and experimental neuroscientists, in order to stimulate fruitful interactions and exchanges of ideas. The workshop was also intended to provide young researchers and PhD students an overview of the most advanced concepts and tools in these fields.

The workshop

Leading scientists in the mentioned fields have been asked to prepare seven tutorial lectures (3 hours, each divided in two modules of 1h 30m) aimed to establish a common language among the participants coming from different backgrounds. Moreover, about 25 shorter (45min) invited talks have focused on more advanced research topics, together with 8 (30min) contributed talks and about 12 contributed posters presented from younger researchers, who applied to participate to the workshop. A typical day consisted of tutorial lectures during the morning, and focus talks in the afternoon with free discussion time in between.

Globally, 86 people participated in the workshop, 50 as active participants and 36 as guests, the main part of the latter were students from Leiden, Amsterdam and Nijmegen universities. However, we should mention also the presence of a few guests coming from Spain, Japan and USA as well as from Philips Company. Some of these students were also extremely active during the discussions and present throughout the workshop. We believe that the presence of so many students demonstrate a rising interest in a more systematic and mathematical approach to neuroscience in the Dutch universities.

Outcome of the workshop

The workshop was successful in stimulating the exchange of ideas and methods across people coming from different communities. The success of the workshop has been evident since the very first days, when many (young) participants already declared their appreciation for the workshop. For example, several participants exploited the opportunity of sharing the office with colleagues from different backgrounds to exchange ideas and information. Moreover, four general discussions have been organized by the participants themselves

Scientific Report

during the time free from talks and lectures on specific thematic subjects, one of them was requested and led by Phd students. During most of the talks very lively discussions and comments arose from the audience as a further demonstration of the active involvement of all participants. In particular, students were very happy about the opportunity to have a different vision on subjects they were working on, e.g. synchronization as described by theoretical physicists compared to the neuroscience community's vision of the same subject.

The relatively long duration of the workshop (two weeks) was also very important, as it allowed for the correct time to establish a common language and for the various participants to grasp the different views on synchronization phenomena as coming from different experiences.

Overall, the workshop surely stimulated new ideas and collaborations among the participants, especially among the youngest ones.

Acknowledgements

We are very grateful to the Lorentz Center for the generous funding and, above all, the nice work environment that was put at disposal of the participants. Special thanks are for Corrie Kuster and Martje Kruk who helped us and the participants, in all the necessities that emerged. We also acknowledge partial support from KNAW, the Swammerdam Institute for Life Sciences of the Universiteit van Amsterdam and the Italian Consiglio Nazionale delle Ricerche.

M. Cencini (INFN - CNR, Rome, Italy)

N. Brunel (University Rene Descartes, Paris, France)

F.P. Battaglia (UvA, Amsterdam, Netherlands)

A. Torcini (ISC - CNR, Florence, Italy)

Hash functions in cryptology: theory and practice

June 2 – 6, 2008

The workshop aimed to bring together people working on the different aspects of cryptographic hash functions. To this end a large number of participants from the diverse fields related to hash functions in cryptology were invited to attend the workshop, representing both theory and practice.

The scientific program consisted of fifteen invited and five keynote talks. The speakers and topics of the talks were carefully selected and arranged to create a logical narrative throughout the week, culminating in a panel discussion on Friday.

On Monday morning, the workshop started with an eye on recent attacks against hash functions still used in practice, before veering towards more theoretical constructions of hash functions in the afternoon. This provided a bridge to the Tuesday programme, whose theme was the use and role of hash function in provable security (in particular encryption and signature schemes). Wednesday concentrated again on design paradigms. On Thursday practical issues took the foreground once more with an emphasis on speed and (in)security of existing hash function. Friday morning was dedicated to the future, in particular the upcoming SHA-3 competition by the US National Institute for Standards and Technology (NIST), before finishing the workshop looking at structural properties (or flaws) in hash functions. This very brief overview of the program already indicates that scientifically the workshop was a great success, achieving a wide view of the topic at hand without sacrificing depth.

Thanks to the excellent organization by the Lorentz Center and the wonderful offices of the Center, people really got to interact with each other. This was evident during the breaks and problem sessions when people were grouping together for continued discussion on problems, as well as during the talks that were given with an eye to audience interaction. The high point in this respect was the keynote talk (followed by a panel discussion) on how to choose SHA-3 (the next generation hash function), where discussions were very lively and involving a significant part of the audience.

On a daily basis there were around 40 to 50 participants. Over the whole week there were 55 participants, including the organizers. About a third of the participants was from the Netherlands (either by residence or nationality). The workshop attracted a healthy proportion of graduate students (40%) and postdocs (20%).

After the workshop a lot of participants expressed how much they had appreciated attending and enjoyed interacting with others. The only complaint we are aware of is that the workshop coincided with a bus strike. We are grateful for the financial and managerial support provided by the Lorentz center. We are also indebted to ECRYPT, whose kind sponsoring allowed us to both invite several international keynote speakers and offer stipends to a reasonable group of graduate students.

Ronald Cramer (CWI and Universiteit Leiden, Netherlands)

Lars Knudsen (DTU, Denmark)

Martijn Stam (EPFL, Switzerland)

Benne de Weger (TU/e, Netherlands)

Physics of Micro- and Nanofluids

June 9 – 20, 2008

Scientific content of the event

During recent years, the pursuit of scale reduction inherent to nanotechnologies has been extended to the fluidic domain, with the very active development of micro-fluidics and now nano-fluidics. Such microscale “lab on a chip” devices are already widely used in biotechnological applications for target screening, for drug design, and for the analysis of small probes of biological material. However, increasing the density of fluidic operations on a chip even further, i.e. miniaturising fluidic devices more, leads to new questions and challenges, both from a fundamental and an application point of view. A key point is that future devices working at nano-scales cannot be thought on a basis of further scale reduction of existing devices working at larger scales: New solutions have to be found, taking the peculiarities of the small scales into account. This requires fundamental breakthroughs in their intrinsic operation and functionalities.

In this context, the aim of the workshop was to give an important contribution in the comprehension of flows at micro- and nano- scales and their potential couplings to the largest scales. We have gathered a community of experimentalists, theoreticians, computer scientists and technologists, working with different perspectives on fluid dynamics in very small systems and at interfaces. During the talks and accompanying discussions, we have explored the fundamental aspects of the physics of fluids at these scales, their modeling, and the new experimental tools and techniques, which have been specifically developed to assess the dynamics at the smallest scales.

During the workshop, talks and discussions have been organized around three themes:

- Micro- and Nanoflows
- New challenges in experimental fluid dynamics at small scales
- Modelling of fluids in small volumes

Round tables took place with the aim to controversially discuss some important subjects: slippage effects, their origin and implication in future nanofluidic devices; nanobubbles, the existence and control and fundamental understandings.

From the various talks and discussions among the participants, several scientific points have emerged:

- The microfluidic domain has now reached a level of maturation, where applications beyond “simple plumbery” starts to emerge, and which – as a key point – benefit crucially from the small scales involved (Strook, Weitz, Colin, Bocquet, ...). In other words, microfluidics is obviously not just a microscale downsizing of fluidic plumbery, but a clever use of specificity of phenomena occurring at the microscales has shown a very strong potential for future phenomena and applications. New applications are explored in this context, e.g. for desalinization, encapsulation, chemistry... It thus becomes clear that new microfluidic potentialities are being continuously invented, preparing for the future of this domain. New routes to develop nanofluidic systems are now being developed with emerging new routes with high potential. The new physical and chemical phenomena which occur at these scales are currently explored (Lemay, Riedo, Stein, Mugele, Tabeling)
- In parallel, there is a strong effort to develop fundamental understanding of fluid dynamics at the smallest scales, and involving complex – e.g. nanostructured – surfaces (Netz, Lohse, Vinogradova, Bazant, Squires, Bocquet, ...). The role of surface dynamics, surface nanoscale behavior, molecular effects, ... is now actively studied. In particular the recent development of new tools (computational, fundamental) has allowed to re-explore

Scientific Report

“old” phenomena (e.g. like electrokinetics), revisiting/reinventing their potential impact for micro and nano devices. This has driven new experiments in this context (Stein, Eijkel, Tabeling, etc.). This domain has therefore driven a strong back-and-forth interaction between experiments and theory.

- A subject which attracted a lot of attention is the possible existence of surface nanobubbles (Attard, Craig, Lohse, Vinogradova). The discussions addressed both new experimental evidences and possible theoretical explanations.
- Quite similarly to experimental microfluidics, simulations techniques have now reached a level allowing to go beyond the methodology level and address the physical questions raised by the specific behavior at nano and micro scales (Yeomans, Pagonabarraga, Sbragaglia, ...). Computational techniques like Lattice-Boltzmann and phase-field models are employed to study questions involving complex multiscale dynamics connecting the behavior at microscales to phenomena occurring at nanoscales.
- In parallel it is interesting to note that quite similar progress has been made for molecular simulations, e.g. Molecular Dynamics, which are now able to reach large scales (time and spatial) for ever more detailed and realistic models (Netz, Attard).

At the end of the workshop the organizers took several concrete actions towards shaping the field of fundamental micro- and nanofluidics in Europe:

1. In a plenary discussion we jointly explored the possibility to apply for a research network on the fundamentals of micro- and nanofluidics, in order to systematically keep a closer interaction amongst experts who participated to this ESF exploratory workshop.
2. A smaller group of scientists, namely the organizers of the workshop, met to agree on concrete actions to be taken towards a joint European proposal on the subject. Key groups for such a network were identified. Submission in 2008 was considered to be unrealistic because of lack of time. Submission in 2009 is a realistic option. One of the organizers of the present ESF network will coordinate this effort.

Lydéric Bocquet (University of Lyon, France)

Federico Toschi (University of Eindhoven, Netherlands)

Detlef Lohse (University of Twente, Netherlands)

Patrick Tabeling (ESPCI, Paris, France)

Low-Frequency Pulsar Science

June 23 – 27, 2008

Radio pulsars are not only fascinating objects in their own right, they are also versatile probes of fundamental physics and astrophysics. Their signal strength often peaks in the 100-200 MHz range, and there are several intrinsic pulse phenomena that get stronger at low radio frequencies. This is the frequency range being explored by several large-aperture telescopes under construction or beginning operation, including the LOFAR array in the Netherlands, the MWA in Australia and the LWA in the United States of America.

We spent an exciting week at the Lorentz Center exploring the science and technical details of these arrays. The workshop attracted 53 scientists from 11 countries, including 10 people from the Netherlands. Although many senior scientists attended as well, the median age was about 30, and we were pleased with the lively and interactive style of the workshop.

The workshop started with a discussion of techniques, instrumentation, and the numerous large-scale surveys that will be undertaken with the new instruments. Computational constraints and promise were a recurrent theme throughout these discussions. We then spent a day discussing the advances that these instruments will bring to our understanding of how pulsars produce their radio beams. Enthusiastic discussion of theoretical models was interspersed with reviews of crucial low-frequency observations with an emphasis on the key importance of polarisation, which is observationally challenging at these frequencies. We then tackled the topics of transients, one of the LOFAR key science projects, and a scientific driver for many of these areas since they have the potential to instantaneously scan large portions of the sky. The topics of single pulse studies and magnetospheric physics were well covered in both reviews and in-depth discussions.

On Thursday much of the group took a pleasant bus ride through the Dutch countryside to Exloo, site of the first LOFAR station. Ger de Bruyn gave us a tour of one of the central stations. We then took the short ride to ASTRON headquarters in Dwingeloo, where we were welcomed by ASTRON director Mike Garrett and several of his associates. After two informative talks and a tour of the labs, the group enjoyed a delicious Indonesian dinner. The last day of the workshop was devoted to the interstellar medium and looking forward to the “killer applications” of the low-frequency arrays and eventual scientific connections with the Square Kilometer Array.

The halls of the Lorentz Center were filled with posters that were a loci of animated discussions during coffee breaks and other unstructured time. The welcoming facilities and the helpful and skilled staff made the week a pleasure for the organizers. We were able to join in fully in the scientific discussions, which is the ultimate compliment to the local staff! Generous funding was provided by the Lorentz Center, NOVA, and ASTRON. We thank them for their support.

Ben Stappers (University of Manchester, England)

Richard Strom (ASTRON, Netherlands)

Dan Stinebring (Oberlin College, USA)

Algebraic Geometry

June 30 – July 4, 2008

The workshop aimed to focus on some exciting recent developments in algebraic geometry. The participants were chosen with this in mind. Here are some highlights.

Hélène Esnault spoke on her recent work with others on the Grothendieck section conjecture (which characterizes rational points as splittings of an exact sequence that makes an arithmetic fundamental group an extension of a Galois group by a geometric fundamental group).

(Arithmetic) fundamental groups were also the subject of Ravi Vakil's talk. He proposed a new and interesting way to look at them. Stefan Schroeer described the behavior of torsion in Neron models, with special attention to the subtle case where the torsion order is a power of the characteristic of the ground field. Gavril Farkas told us about his new results on the birational type of some moduli spaces of curves with level structure (he determined in many cases whether the space in question is unirational and their Kodaira dimension). Phillip Griffith reported on new developments on Admissible Normal Functions (a notion he introduced 40 years earlier). A better (and deeper) understanding of the singularity spectrum in terms of Motivic integration was presented by Francois Loeser.

During the conference there was a pleasant atmosphere, conducive for informal and useful exchanges among the participants. This was due, we believe, to the facilities offered by the Lorentz center and of having as participants an interesting mix of active senior and junior researchers. Some participants expressed their appreciation of the workshop. The conference enabled many young Dutch algebraic geometers to get into contact with leading foreign algebraic geometers.

E. Looijenga (Utrecht University, Netherlands)

B. Edixhoven (Leiden University, Netherlands)

G. van der Geer (UvA, Netherlands)

The Geometric Langlands Program

July 7 – 11, 2008

The workshop was a satellite activity of the fifth European Mathematical Congress (Amsterdam, 14-18 July 2008). The workshop was organized under the auspices of the NWO-research cluster "Geometry and Quantum Theory". There were more than 45 participants coming from all parts of the world.

The Geometric Langlands Program has deep connections with Number Theory, Algebraic Geometry and with subjects from mathematical physics such as Quantization and Conformal Field Theory. Internationally the subject has quickly become a major theme bridging between these fields. One of the goals of the workshop was to bring together the various research communities in pure mathematics and mathematical physics in the Netherlands and to promote the GLP as a unifying research theme.

In the first half of the workshop we mainly concentrated on certain recent developments in the Geometric Langlands Program. Many of these developments are interrelated and cross fertilize each other. There are deep connections between the Langlands Program and Quantum Field Theory and Statistical Mechanics. In a series of recent works, Gukov, Kapustin and Witten have related the geometric Langlands correspondence to S-duality in four-dimensional supersymmetric Yang-Mills theory. In addition, the Langlands duality has been related to the IM/ODE correspondence in integrable models.

We also intended to make this workshop worthwhile for an audience of young and beginning researchers. For this purpose we organized in the wednesday afternoon meeting a special informal discussion session on GLP. This session was introduced by Edward Frenkel who gave a bird's eye overview of GLP and its underlying ideas and philosophy.

In the second half we also concentrated on the exciting recent progress that was made in the arithmetic Langlands program, through contributions (among others) of Michael Harris (Paris), David Kazhdan (Jeruzalem), Yakov Varshavski (Jeruzalem), and Vincent Lafforgue (Paris).

Acknowledgement

It has been a very inspirational week. The Lorentz center offered excellent facilities which have supported and stimulated the informal scientific interactions between the participants. The organizers would like to express their gratitude to the experienced and efficient staff of the Lorentz center, in particular to Martje Kruk and to our dedicated program assistant Corry Kuster.

E. Frenkel (University of California, Berkeley, USA),
G. Heckman (Radboud Universiteit Nijmegen, Netherlands),
E.N.J. Looijenga (Universiteit Utrecht, Netherlands),
E. Opdam (Universiteit van Amsterdam, Netherlands).

Operator Structures and Dynamical Systems

July 21 – 25, 2008

Many dynamical systems are naturally accompanied by an associated operator structure. A well known instance occurs for a topological group acting on a compact Hausdorff space. One can then form the associated crossed product C^* -algebra, which is the counterpart of the crossed product von Neumann algebra associated with a group of measurable transformations. As is well known, the von Neumann algebra carries information about the measurable system, and likewise the C^* -algebra carries information about the topological system. The first concrete link in this direction was Power's work in 1978 for an action of the integers, showing that the crossed product C^* -algebra is simple precisely when the dynamical system is minimal. Inspired by this, the interplay between topological dynamical systems and C^* -algebras has received considerable attention since then.

In a noncommutative setting, where a group acts on a possibly noncommutative C^* -algebra, it is also possible to construct a crossed product C^* -algebra. The general theory of such algebras is well established and the situation described above is, strictly speaking, a special case of this theory. Thus certainly the general theory has bearing on the interplay between topological dynamical systems and crossed product C^* -algebras, but by its general nature it is hard to obtain as corollaries the more detailed statements which can be given in the more special commutative setting.

The week at the Lorentz Center saw senior as well as younger researchers from both directions. The diversity of experience and resulting informal interaction - the breaks had deliberately been made long enough for that - of the in total 55 participants "from two schools", 16 countries and 5 continents was such that several participants suggested that a similar workshop should be repeated in a few years. It was implicit that this should be done at the Lorentz Center, as the facilities and the support by the staff were greatly appreciated.

The workshop was an official satellite of the Fifth European Congress of Mathematics, which took place in the preceding week in Amsterdam. The proceedings will appear in the well-reputed Contemporary Mathematics series of the American Mathematical Society, edited by Marcel de Jeu, Sergei Silvestrov, Christian Skau and Jun Tomiyama.

This workshop was generously supported by the Lorentz Center, the Royal Dutch Academy of Arts and Sciences, the national research clusters "Geometry and Quantum Theory" and "Nonlinear Dynamics of Natural Systems", the Mathematical Research Institute, the Thomas Stieltjes Institute for Mathematics and the Netherlands Organisation for Scientific Research. The support by STINT and the Crafoord Foundation on behalf of the Swedish participants is also gratefully acknowledged.

Marcel de Jeu (Leiden University, Netherlands)

Klaas Landsman (Radboud University Nijmegen, Netherlands)

Sergei Silvestrov (Lund University, Sweden)

Christian Skau (Norwegian University of Science and Technology, Trondheim, Norway)

Jun Tomiyama (Japan Women's University, Tokyo, Japan)

Sjoerd Verduyn Lunel (Leiden University, Netherlands)

Central Mass Concentrations in Galaxy Nuclei

July 28 – August 1, 2008

The first days of this workshop were focussed on presenting and discussing the latest research on black holes in galaxy centres. The well-known scaling relations between black holes and galaxy properties are being constantly refined with high-quality observations and modelling, which are helping to reduce uncertainties in the individual measurements. The range of galaxies being considered is also growing, connecting galaxies across orders of magnitude in mass. However, even with state-of-the-art modelling and data, including laser-guided adaptive optics and integral field spectroscopy, the problem of securing the physical relationship and processes connecting super-massive black holes to their host galaxies is far from clear. The conclusion from this workshop is that a more homogeneous approach to this problem, both from modelling and observational sides, is needed for a large sample of objects. Covering a large range of galaxy mass will present a challenge, and estimating and acknowledging the degree of systematic uncertainties will be crucial.

Large star clusters are found in the central regions of many galaxies, from late-type disks to early-type galaxies. These clusters have properties that set them apart from other star clusters we see in the universe, in particular by their dense, compact nature, and often complex stellar populations. Moreover, in low-mass galaxies they are found to follow similar scaling relations with galaxy mass as super-massive black holes in high-mass galaxies. A conclusion from this workshop is that nuclear star clusters often, and perhaps always, co-exist with a super-massive black hole, although this is still limited by current observational limits. The best case of this is our own Milky Way, which is the most accurate measurement of the mass of a super-massive black hole. Even in our own nearby Galactic centre, however, the mass measurement is hampered by systematic errors in the observations. Linking the detailed picture from the Milky Way to external galaxies is also difficult, due to a current lack of information of our Galaxy's properties on larger scales.

The formation mechanism for nuclear clusters is still poorly constrained. Their complex populations indicate a protracted sequence of star formation, which happens either in the circum-nuclear region with subsequent migration to the nucleus, or by 'in situ' star formation at the galaxy centre. Models were presented to show how nuclear star formation could be self-regulating, with the same physical mechanisms as those thought to regulate black hole growth. This hints towards the beginning of a holistic formation scenario of both the black hole and the coincident nuclear star cluster, although full consideration of co-evolving clusters and black holes seems to be largely unexplored.

This workshop brought together an international group of active researchers in the distinct fields of nuclear star clusters and super-massive black holes. From this workshop, it became clear that the two communities can clearly benefit from their overlapping expertise. The interactions nurtured by the unique environment of the Lorentz Centre stimulated a number of new collaborative projects to better understand the relationships between these two phenomena. Through such collaborations, we can hope that a more complete picture of galaxy nuclei will emerge, considering both black holes and stellar clusters.

The organizers acknowledge generous funding grants from both the Lorentz Centre and NOVA, which permitted us to offer funding assistance to all of our junior workshop participants, and to waive registration costs in attending the workshop. Support in organizing

Scientific Report

and executing the workshop was outstanding, and all participants agreed that the Lorentz Centre facility continues to stimulate some of the most rewarding scientific gatherings to attend.

Eric Emsellem (CRAL – Lyon, France)

Richard McDermid (Gemini Observatory, Hilo, USA)

Artificial Cold and International Cooperation in Science

August 4 – 8, 2008

On the 10th of July, 1908, Heike Kamerlingh Onnes wrote history when his Leiden Physics Laboratory became the first place in the world where Helium was liquefied. A few months later some 5,000 specialists in the field of artificial cold gathered in Paris to attend the First International Congress of Refrigeration.

A century later, the Lorentz Center workshop 'Artificial Cold and International Cooperation in Science' brought together international scholars working on the history of cryogenics, experts on the history of scientific collaborations and international congresses, historians who focus on the relationships between science and industry as well as active scientists to reflect on the various historical dimensions of these events. Purpose of this week-long workshop was to use the case of cryogenics as a probe to unravel the complex processes through which pure research on a local scale is transformed into an international endeavour with technological and industrial ramifications.

Typical questions that the conference addressed were:

- How did academic research on low temperature science relate to the needs of the refrigeration industry? How and where did collaboration emerge, what form did it take, and how were public and private interests balanced?
- What was the role of international conferences in the development of the relationship between cryogenic science and industry? How international was science around 1900 with regard to education and careers, societies, conferences, private contacts, journals, travels, etc.? How did political and ideological factors express themselves in such contacts?
- To what extent and in what ways did the industrial and international context determine the nature and scope of low temperature research?
- How does the current relationship between science and industry compare to that around 1900?

Another important aim of the workshop 'Artificial Cold and International Cooperation in Science' was to discuss a research agenda for the near future at the cross roads of the history of low temperature science, international cooperation of science and the connections between science and industry.

In total some twenty participants (the Netherlands, US, UK, Greece, France, Sweden) took part in the workshop and enjoyed the stimulating and open atmosphere. The relatively large amount of time for discussions was highly appreciated by all participants, and served to increase the productivity of the workshop. The juxtaposition of different topics, fields and disciplines strongly contributed to the interest and liveliness of the meetings. In general the contributors considered the workshop a most rewarding experience. The organizers would like to thank the staff of the Lorentz Center, in particular dr. Martje Kruk, dr. Henriette Jensenius, Corrie Kuster and Wilfried Reincke, for their kindness and their efficient support.

Dirk van Delft (Leiden Observatory, Museum Boerhaave, Netherlands)

Kostas Gavroglu (University of Athens, Greece)

Frans van Lunteren (Leiden Observatory, Free University Amsterdam, Netherlands)

Geert Somsen (Maastricht University, Netherlands)

Quantum Decoherence and Quantum Information Science

August 11 – 15, 2008

Quantum Information science has established itself as a major field of modern research. Impressive progress has been made towards implementing some of the quantum information protocols, in particular those for quantum communication. There is however a serious worry about the feasibility of large-scale quantum computation. Overcoming quantum decoherence will be the main experimental challenge for many years to come.

Quantum decoherence has recently been investigated in different experiments with macromolecules, superconducting qubits, electron spins and/or excitons in quantum dots, coupled atoms and ions, and micromechanical systems. The aim of the workshop was to bring together the leading theoretical and experimental researchers to address both practical as well as fundamental limits to quantum coherences in the various systems. The recent excitement about the emerging ability of investigating quantum coherence for larger and larger objects results from the fact that prominent scientists have proposed the existence of new fundamental limits to quantum coherences. The workshop is intended to also cover those new theoretical predictions as well as discussions on how those predictions could be tested in future experiments.

The workshop attracted a total of 55 participants from Europe and the United States. There were 18 invited talks given by leading experts in the different fields covered by the workshop. Posters prepared by the participants were available during the entire workshop, which stimulated lively discussions during the breaks and in the afternoons.

Each day was devoted to a particular topic and featured typically 4 talks of ~90 minutes including discussion. The format of the workshop, together with the informal atmosphere of the Lorentz Center, turned out to be very efficient to stimulate discussion between researchers working in different fields. This was generally appreciated by all participants, since it gave an opportunity to catch up with the forefront of research in closely related fields.

This workshop would not have been possible without the excellent support offered by the Lorentz staff, in particular Martje Kruk, Wies Groeneboer and Wilfried Reincke. We acknowledge funding from the Lorentz Center, a Marie Curie Excellence Award and the KNAW.

D. Bouwmeester (UC Santa Barbara and Leiden University, USA and Netherlands)
M.J.A. de Dood (Leiden University, Netherlands)

Dynamical heterogeneities in glasses, colloids and granular media

August 25 – September 5, 2008

Scientific background

Many materials of industrial importance are *glasses*, from window glasses and plastic bottles, to emulsions, foams, dense assemblies of grains, etc. Understanding the formation of these amorphous solids, the so-called glass and jamming transitions, is a challenge which resisted a large research effort in condensed matter physics over the last decades, and which is of interest to several fields from statistical mechanics and soft matter, to material sciences and biophysics. From a theoretical point of view, the question is to know whether the sudden, but continuous freezing is due to a true underlying phase transition, or if it is a mere crossover with little universality in the driving mechanism. In the latter case, not much is to be gained conceptually – glasses might just be liquids that have become so viscous that they cannot flow anymore. Interestingly, however, evidence has mounted in recent years that the viscous slowing down of super-cooled liquids, colloids and granular media might be related to the existence of genuine phase transitions, but of *very peculiar nature*. Contrarily to usual phase transitions, *the dynamics of glass-formers (or granular media) dramatically slows down with nearly no changes in structural properties*. The nature of the amorphous long range order that sets in at the glass transition, the analogies with spin-glasses and their physically observable consequences, are only beginning to be understood. One of the most interesting consequences of these ideas is the existence of dynamical heterogeneities, which have been discovered to be (in the space-time domain) the counterpart of critical fluctuations in standard phase transitions. Intuitively, as the glass transition is approached, increasingly larger regions of the material have to move simultaneously to allow flow, leading to intermittent dynamics, both in space and in time. Although of crucial importance conceptually, only recently did direct experimental evidence for this cooperative motion become available. Numerical studies of glass-forming liquids performed well above the glass temperature have indeed hinted at the existence of growing dynamic lengthscales associated to Dynamical Heterogeneities. Contrary to glass-forming liquids, in colloidal suspensions and granular materials Dynamical Heterogeneities can be measured directly since the “microscopic” lengthscales are much larger than for glass-forming liquids. Indeed confocal microscopy experiments on concentrated colloids have shown increasing Dynamical Heterogeneities when approaching the colloidal glass transition. Very recently, similar results have been obtained for granular assemblies close to jamming. Actually Dynamical Heterogeneities are starting to play an important role also for granular media suggesting a new way to study and characterize the jamming transition. In the mean time, theoretical research has sharpened predictions and questions about the quantitative nature of Dynamical Heterogeneities and their associated lengthscales within different scenarios of the glass transition. Theory has furthermore provided several leads to characterize *quantitatively* Dynamical Heterogeneities in molecular systems, including higher order correlation and response functions (dynamical response and nonlinear susceptibilities) and the special role of boundary conditions and confinement. These ideas have opened the path to a precise, quantitative determination of Dynamical Heterogeneities and cooperative lengthscales in molecular glasses, colloidal glasses and spin-glasses. This should allow one to probe in detail, and prune down, different theories of the glass and jamming transitions, which have remained up to now difficult to confirm or to falsify for lack of precise, testable predictions.

Scientific Report

Highlights of the workshop

The workshop had an exceptionally high attendance. There were 93 registered participants, about 70 participants the first week and some 64 the second week. Nearly all the prominent scientists in the field had agreed to participate, with a surprising low number of cancellations – only three invited speakers finally in the end could not come, which is a good measure of the perceived importance of the workshop in the domain. The New-York Times yet increased the topical nature of the event by publishing in July 2008 a paper called: “**The Nature of Glass Remains Anything but Clear**” on the current theoretical debates on the glass transition.

The level and intensity of scientific discussion was extremely high during the two weeks while remaining very collegial and accessible to PhD students and Postdocs. This was made possible by the presence of world-leading experts in all the fields covered by the workshop, some well known for their clarity and deepness of thoughts. But we believe that one of the key to success was the “experimental” format of the workshop based on “discussants” specifically in charge of clarifying, commenting, and possibly challenging each long talk during 20 minutes immediately after the talk and prior to a general discussion. This format is common practice in other disciplines (such as economics or social sciences), but is not used in the physical sciences. This idea turned out to be a great success and indeed was very instrumental in transmuting many of the contributed talks into rich discussions and animated debates – often followed by dedicated round tables on some specific points (clusters or preferred structures based theories of glasses, the Random First Order Theory, the Edwards Ensemble Hypothesis, etc.). Several participants have actually expressed their interest in the format for future workshops and conferences; we can only hope this practice spreads out in the future. As a guideline for discussants, we had sent the following:

The Discussant will prepare an account of the talk of MAXIMUM 20 MINUTES, to be given immediately after the talk of the speaker. This is NOT meant to be another talk, but a commentary on the Speaker's talk, with the aim of

- *expressing the Discussant's own way of understanding the issues and the results reviewed in the talk.*
- *adding extra information and possibly dissenting views*
- *launching the 20 MINUTES open discussion that will follow in an optimal way, e.g. by summarizing open issues*

In our program, summarized below, each speaker had 50 minutes, so that each session (speaker, discussant, and open discussion) lasted an hour and a half. The 20 minutes allotted for open discussion were always fully used; some participants indicated that in the future a format with 40 minutes for the speakers might in their opinion work even better.

We believe that the Lorentz Center workshop on “Dynamical Heterogeneities in glasses, colloids and granular media” was very timely and held its promises. It certainly provided impetus for devising new experiments to better characterize Dynamical Heterogeneities, for developing new theoretical quantitative approaches that will help to prune down the correct theories of the glass and jamming transitions and understanding in detail the relationship between glass and jamming transitions. The workshop helped bring together different communities working in related but quite distinct subjects. One of the outcomes was certainly a transfer of knowledge between theoretical and experimental physicists and physical chemists working in the areas of glass-forming liquids, colloids and granular media.

Scientific Report

Acknowledgements

We would like to thank the LC for providing excellent facilities and support. Besides grant from the workshop budget of the Lorentz Center, the workshop was generously supported by the Lorentz Fund and the RTRA Triangle de la Physique.

Giulio Biroli (IPhT CEA Saclay, France)

Jean-Philippe Bouchaud (CEA Saclay, France)

Wim van Saarloos (Instituut-Lorentz and Lorentz Center, Netherlands)

The Cool, Cooler and Cold – Cluster Cooling Flows in a New Light

September 8 – 12, 2008

The overarching purpose for this workshop was to bring together those working in the field of cold gas in the cores of clusters of galaxies from both observational and theoretical work over all wavelengths. This goal was achieved beyond our wildest expectations with an attendance of 44 and only a small handful of invitees being unable to come.

Our program was arranged to accommodate both formal talks and open discussion sessions. We had nineteen 20minute talks and all other attendees could give short two viewgraph talks so everyone had the opportunity to present their results. The afternoon discussion sessions had one or two “discussion leaders” but in all sessions once the debate started, very little direction was required.

Our final day was reserved for smaller group discussions that were used for future collaborations and telescope proposals. This was also very productive and allowed time for discussion of a large ESA *Herschel* Key Project and new *Spitzer*, Gemini and VLT proposals.

The highlights of the meeting were the talks by the recently completed PhD students and junior postdocs who had many new results to present. Notably, Ken Cavagnolo (Waterloo), David Rafferty and Laura Birzan (both Penn State) gave excellent reviews of the X-ray and radio observations of cluster cores. The high standard of the talks led to a set of very rewarding and stimulating discussion sessions in the afternoons.

Personally I found that the most rewarding part of the whole workshop was the involvement of the most recent members of the group, students at both PhD and undergraduate level. The two undergraduate students, Danielle Willis (Bristol) and Georgiana Orgean (Bremen), both talked enthusiastically about their future interests in the field and asked about how to apply for PhD positions. I cannot personally remember having such a broad range of experience at a meeting like this before and particularly commend the Lorentz Center for it’s support of student involvement.

We also had 9 PhD students in attendance many of whom had not attended such a focused meeting before and greatly appreciated the opportunity to talk with the main workers in this active field.

The meeting organizers would like to thank the Lorentz Center staff for their hard work and unfailing enthusiasm before, during and after the workshop. The conference dinner at the beach was particularly enjoyable and helped widen the personal contacts between participants.

A.C. Edge (University of Durham, United Kingdom)

A.C. Fabian (University of Cambridge, United Kingdom)

F. Combes (LERMA Observatoire de Paris, France)

C. O’Dea (Dep. of Physics, RIT, United States)

W.J. Jaffe (Leiden Observatory, Netherlands)

Galaxies in Real Life and Simulations

September 15 – 19, 2008

From September 15 through September 19, 2008, 44 invited participants from 11 different countries, and about 10 interested people from the astronomical community in the Netherlands attended the workshop "Galaxies in Real Life and Simulations".

The purpose of this workshop was to look at recent advances and future prospects from observations, theory, and simulations in our understanding of the origin and evolution of massive galaxies. Emphasis was given to cosmic epochs at redshift $z > 1$, corresponding to the first half of the age of the universe and where it is believed that most of the stellar mass in massive galaxies was put in place. Extensive surveys have now well mapped the massive tail of the galaxy population up to $z \sim 1$, and observational and theoretical focus is currently shifting to $z > 1$, largely driven by instrumental progress. In parallel, simulations of increasingly large cosmic volumes and resolution, and incorporating ever better constrained prescriptions for key phenomena now provide extensive sets of testable predictions at all cosmic epochs. These impressive advances are bringing new insights, many of which cause us to reconsider our current views of distant massive galaxies, and of galaxy formation and evolution in general.

The workshop focused on the following themes:

- (i) Censuses and distribution functions of high redshift galaxy populations
- (ii) Co-evolution of massive galaxies/AGN/QSOs/supermassive black holes
- (iii) Linking luminous and dark matter
- (iv) Mass assembly and processes driving evolution (merging/infall, environment, star formation, feedback, dynamical processes).
- (v) Evolutionary synthesis modeling and physical properties.

The main goal of the workshop was to bring together researchers from the observational and theoretical communities for a thorough and lively discussion on these themes. In order to reach this goal, the number of registered participants was limited to 45 and the workshop schedule allowed for ample time for formal and informal discussions. The program consisted of 20 keynote and 16 highlight talks of 25 and 15 minutes, respectively. The talks were grouped according to topic, such that each group contained 2 or 3 talks, and were followed by almost an hour of discussion. Specific goals of the presentations were to report on the latest findings and developments, to identify (in)consistencies between, and uncertainties of observations and models, and to consider ways forward to make progress.

The workshop was successful in all respects. In particular, the presentations triggered lively exchange of ideas and expertise during the dedicated discussion hour chaired by an expert on the relevant topic. The younger participants, including students, were actively involved in the discussions, which were pursued enthusiastically during the breaks, at lunchtime, and in the evenings. The dialogue between all participants, and in particular between observers and theorists, was very fruitful, and the workshop provided the opportunity for several new projects and collaborations to be initiated. The chosen format, with a few grouped talks followed by ample discussion time, proved to be very successful - none of the discussion sessions, not even the wrap-up summary closing the workshop, ended before the scheduled time as the participants kept intervening and "brainstorming", bringing many points of view on various questions raised during the talks and beyond. Summarizing, the workshop

Scientific Report

concept worked extremely well, and many of the outstanding issues concerning the build-up of massive galaxies were addressed in depth.

The quality of the workshop was clearly enhanced by the environment provided by the Lorentz Center, which is ideally conducive to exchange among larger and smaller groups in a relaxed atmosphere. Altogether, the excellent facilities of the Lorentz Center, the concept of the program, and the enthusiasm of the participants made this workshop into a great success. We are very grateful for the efficient and friendly help from the Lorentz Center staff, especially Corrie Kuster, Martje Kruk, and Henriette Jensenius. We are also very grateful for the financial support from the Lorentz Center and NOVA.

Stephane Charlot (MPE Garching, Germany)

Andrea Cimatti (University of Bologna, Italy)

Natascha Forster Schreiber (MPE Garching, Germany)

Mariska Kriek (Princeton University, USA)

Joop Schaye (Leiden University, Netherlands)

Rachel Somerville (Space Telescope Science Institute, Baltimore, USA)

Pieter van Dokkum (Yale University, New Haven, USA)

Logic and information security

September 22 – 26, 2008

The purpose of the workshop Logic and Information Security was to let different research communities interact: information security theoreticians and practitioners on the one hand, and logicians / theoretical computer scientists on the other hand. We also presented matters wherein information security interacts with society as a whole: Bart Jacobs, University of Nijmegen, keynote invited speaker, talked on the security issues around the foreseen introduction of the NS chip card and the 'cracking of the code' of that card as carried out by his research group. During the workshop, we thought to observe that the interaction was indeed the one that was planned. One matter straight on the intersection of logic and information security is: realistic scenarios for higher-order epistemic specifications of protocols and security requirements. Various presentations addressed this matter. For example in the area of protocols to conduct fair electronic voting (as addressed by Mark Ryan, invited speaker) such requirements seem to be really indispensable.

The workshop had 33 participants, coming from all across the globe, India, Australia, Italy, France. The participants were obviously relaxed during the workshop, thanks to the fantastic support of Lorentz staff during and before the workshop. (Support during the workshop was given by Auke Planjer, for who this was her first assignment at the Lorentz Center. We owe her very much.) During the workshop lunch was being provided in the canteen on the ground floor, by way of coupons. We understand that this was an experiment. It was very helpful that the workshop discussions could continue smoothly and without interruption given the short distance between the workshop venue and the canteen, and this service was appreciated by the participants. Many among the participants used the option to rent bicycles during the week of the workshop. This service was helpful.

At the time of the workshop it was still unclear if there would be a follow-up in the form of proceedings. By now, we have made a general call to participants for submissions to a workshop special issue of the Journal of Applied Non-Classical Logics, <http://jancl.e-revues.com/>. Submissions to this special issue are expected March 2009. The special issue, that will have an editorial that will obviously mention the role of the Lorentz Center in detail, is only scheduled to appear (in case of sufficiently quality of submissions) end of 2009 or even 2010.

Philippe Balbiani (University of Toulouse, France)

Hans van Ditmarsch University of Otago, New Zealand & University of Toulouse, France)

Jan van Eijck (CWI Amsterdam and University of Utrecht, Netherlands)

Interstellar Surfaces: From Laboratory to Models

October 6 – 10, 2008

The aim of this workshop was to bring together experimental and theoretical solid state physicists, chemists and astronomers to discuss how laboratory results and astrochemical models should interact in order to interpret or guide astronomical observations.

In recent years it has become clear that the chemistry in large interstellar clouds and around young stellar objects is strongly dominated by solid state processes. Icy dust grains act as catalysts and both thermally and photon or atom induced reactions play an important role in a chemical evolution that explains molecular complexity in the Universe. Recent laboratory studies, for example show that hydrogenation reactions of CO ice result in formaldehyde and methanol, an important precursor molecule for more complex species, providing not only qualitative information, but also (temperature dependent) reaction rates. As a result, theoreticians have started to include grain-surface processes in their models. The problem is, however, that many of the input parameters for surface chemistry are highly uncertain or simply unknown. Moreover, even the correct underlying physical and chemical formalisms are heavily debated.

During the workshop these issues have been addressed in sessions with four different topics:

- What are the challenges that are involved in the interpretation of laboratory data? (e.g. how to interpret experimental information in models and what information do the modelers need?)
- What are the exact physical and chemical formalisms that determine the solid state processes as relevant to astronomy? (e.g., what is the order of thermal desorption of ice?)
- What are the case limiting uncertainties in the model parameters?
- What experiments are needed in the future and still feasible?

The program included more than 20 talks along these four topics. With nearly 50 registered participants from the United States (6), Japan (2), Israel (1) and Europe (France, UK, Italy, Germany and Denmark) the meeting gathered the majority of the leading scientists in the field. Special discussion sessions were scheduled in the program to address the questions mentioned above and extra issues that arouse during the talks and the meeting. On the final day we were able to compose an action list with the main questions for the next five years.

We look back at an interesting meeting, systematic in its approach to deal with the big questions we are facing, with much interaction between the participants both during the formal hours and far beyond. The participants were impressed by the working ambience as well as the infrastructural setting within the Lorentz Center.

Herma Cuppen (Leiden Observatory, Netherlands)
Harold Linnartz (Leiden Observatory, Netherlands)
E. van Dishoeck (Leiden Observatory, Netherlands)
E. Herbst (The Ohio State University, United States)
S. Viti (University College London, United Kingdom)

I-science workshop on data mining, distributed computing and visualization for astronomy

October 13 – 17, 2008

The I-science for astronomy workshop was an interdisciplinary cooperation of three NWO I-science research programs: GLANCE, VIEW and STARE. It stimulated the interaction between computer scientists and astronomers for innovative astronomical applications of data mining, data modeling, distributed computing and visualization. A particular focus was to motivate prospective PhD students and post-doctoral researchers to define innovative I-science developments on the interface of computer science and astronomy.

The workshop brought together 44 astronomers and computer scientists which included more than 20 advanced master students, PhD students and postdoctoral researchers. Half of the time was devoted to presentations by European and US key-note speakers from both the academic world and corporate research institutes. These presentations focussed on the outstanding challenges at the interface of astronomy and computer science. The talks covered the fields of image analysis, visualization and visual analytics, streaming processing, data lineage and large databases, cosmological simulations and virtual observatories. The other half of the time, the participants convened in small groups to further pursue the cross-disciplinary challenges. In this way prospective PhD and postdoctoral researchers could perceive and formulate new innovative collaborative research proposals.

At the end of the workshop it became clear that the perceived challenges for all discussed fields and the complete astronomical research process from sensor networks producing raw data to new astrophysical insight literally fitted together into one big picture. Another illustration of the success of the workshop is the fact that 9(?) PhD/postdoc research proposals were submitted to NWO by workshop participants. These will be judged by an independent committee following the workshop.

The informal atmosphere of the Lorentz Center on combination with its many offices, meeting rooms and ample computational facilities turned out to be an ideal place to hold such an interdisciplinary workshop with the aim of creative innovative ideas. The organizers would like to thank the Lorentz Center staff, in particular the program assistant Corrie Kuster, for their friendly and professional support prior and during the workshop. The organizers also thank NWO, in particular Natasa Golo and Christiane Klöditz, for their valuable help in organizing the workshop.

Edwin Valentijn (Kapteyn Institute, Groningen, Netherlands)

Jack van Wijk (TU Eindhoven - W&I, Netherlands)

Farhad Arbab (CWI, Netherlands)

Cees de Laat (UvA, Netherlands)

Jos Roerdink (University of Groningen, Netherlands)

The physics of genome folding and function

October 20 – 23, 2008

The folding of the eukaryotic genome inside the cell nucleus poses formidable constraints on its functioning in the living cell. For instance in mammalian cells several centimeters of chromatin fiber are contained inside a cell nucleus of about 10 μm diameter. More so, changes in the folding of the chromatin fiber are used by the cell to induce in cell differentiation specific changes in gene expression. Several types of polymer models have been used to explain chromatin folding, however so far only with limited success due to the extreme complexity of the system. Aim of this workshop was to create the theoretical basis for analyzing and understanding the folding of the genome inside the nucleus of living cells.

To discuss these and related issues 36 biologists and physicists from six different countries participated in this four days workshop. About 15 of them can be classified as young scientists, in part newly entering this field.

In six introductory lectures background information about the biology and the physics of the topic of the workshop has been presented. Most of the time has been spent on breakout session of several hours each in which the participants were split up in groups of six persons, consisting of biologists and physicists. The first breakout session in the afternoon of the first day was devoted to defining the main issues. To this end the groups were asked to formulate and prioritize five "grand challenges" and present these in a plenary discussion later that day.

The following sessions in the next days focused on the following issues.

- Folding of DNA/chromatin at different length scales: multiple nucleosomes, genes/functional loci, complete chromosomes, nucleus
- 1D and 3D genome structure and dynamics in relation to genome function
- Integrating ideas (last day)

In each case the participants were asked to formulate concrete research goals and experimental approaches, appropriate modeling techniques and define the interaction between the practical and theoretical strategies. Each breakout session was followed by an extensive plenary discussion. Part of the last day was also used to allow individual participants to briefly present their ongoing research.

Discussions were very lively and resulted in concrete research ideas, several of which will be tackled in the forthcoming year. Various aspects of the workshop will be captured in one or two review papers.

The meeting was greatly facilitated by the staff of the Lorentz Center, the facilities of the Center and the open and informal scientific atmosphere.

Dieter Heermann (University of Heidelberg, Germany)

Bela Mulder (AMOLF, Amsterdam, Netherlands)

Roel van Driel (Universiteit van Amsterdam, Netherlands)

DIAMANT meets GQT

October 27 – 31, 2008

Aim

This experimental workshop aimed at achieving three ambitious goals:

- + Joining the forces of mathematicians from the mathematics clusters DIAMANT and GQT, as well as from theoretical physics, to book progress on a number of pre-selected open problems in various fields of mathematics.
- + Widely publicising Wiskunde-D-modules developed by members of both clusters among mathematics teachers, and stimulating discussion between teachers and scientists.
- + Strengthening the bonds between the clusters in a symposium with excellent cross-cluster presentations.

Program

The schedule reflected the ambitious goals above:

- + Monday morning the twelve selected problems were presented, after which the participants formed groups, working on the problems until and including Wednesday.
- + Wednesday the mathematics teachers joined and four Wiskunde-D modules were dealt with in twice two parallel sessions.
- + Thursday and Friday were reserved for the symposium, in which time was allocated for presentations on the outcome of the problem sessions.

Success

On the whole, the week was very successful:

- + Progress was made on more than half of the twelve problems, resulting in six 15-minute presentations on Thursday. On the other hand, some of the problems were found too difficult to work on.
- + In particular, two problems coming from theoretical physics received much attention. One on renormalisation was solved and is already part of a preprint, and to the other, concerning the Witten index, a DIAMANT postdoc contributed significantly.
- + Like the Studygroup Mathematics with Industry, the problem session attracted many young, enthusiastic mathematicians. We noticed less participation from senior cluster members.
- + The Wiskunde-D day was very popular, and the meeting generated a lot of interaction between teachers and scientists.
- + The symposium saw a wide variety of talks: more and less senior, and covered many topics of interest to both clusters. There were a lot of participants at the symposium, but not so many at the conference dinner.

The week was such a successful experience that we see reason to try and repeat a similar format in a few years.

Sponsors

We gratefully acknowledge financial support from DIAMANT, GQT and the Lorentz Center.

Gunther Cornelissen (Universiteit Utrecht, Netherlands)

Jan Draisma (TU Eindhoven, Netherlands)

Theo van den Boogaart (Freudenthal Institute, Netherlands)

Long Term consequences of exposure to famine

November 3 – 6, 2008

This workshop was organized to provide an overview of current findings from human studies on long term consequences of famine. The meeting was the first of its kind and included over 35 researchers from seven countries, with 15 participants from the Netherlands.

Additional aims of the workshop were to provide a forum for the sharing of expertise, to raise awareness of available study cohorts, and to formulate how ongoing studies can be used to address fundamental questions of normal human development. These activities could have wide ranging implications for current health and public health policy.

On the first day, participants presented summaries of their ongoing long-term studies of the Ukrainian famine of 1932-1933, the siege of Leningrad of 1941-1944, the occupation of the Channel Islands during World War II, the Dutch famine of 1944-1945, and of the Chinese famine of 1959-1961. In addition, they reported on the long-term effects of famine across generations using 19th century records from Finland and Sweden.

On the second day, selected topics of high relevance to all participants were discussed in brief state-of-the-art reviews by invited experts. Topics included comparisons with animal studies, new epigenetic approaches and technologies, new developments in statistical methodology, and illustrations from large existing international networks as to how best to structure and foster collaborations. Participants then divided up into three working groups to formulate areas for further collaboration between studies and short-term and medium term research priorities.

On the third day, the reports of the working groups were discussed by all workshop participants in a plenary session and a consensus was reached on a program of future activities.

The workshop coordinator will now prepare a summary of the workshop for general dissemination. Participants agreed to organize themselves into a network, to review selected outcomes across studies, to create collaborative reports and analyses of similar outcomes or exposure categories across studies, and to thoroughly explore additional questions that may be addressed using available study cohorts, new techniques, and future data collections.

These activities will start soon. Summaries of the ongoing studies with key references and of the workshop presentations are available online at <http://www.lorentzcenter.nl/lc/web/2008/319/info.php3?wsid=319>.

The workshop was hosted by the Lorentz Center as an interdisciplinary activity with the NIAS (*Netherlands Institute for Advanced Study* in the Humanities and Social Sciences). The workshop was initiated and coordinated by Dr L.H.Lumey (Columbia University, New York) as part of his Lorentz fellowship at the NIAS in the Fall of 2008. The workshop was attended by investigators from a wide range of scientific disciplines, including epidemiology, demography, medicine, maternal and child nutrition, human development, biostatistics, genetics, molecular biology, and health policy.

We thank the Lorentz Center and the NIAS for their generous financial support of this activity. We want to express our special appreciation to Corrie Kuster, Dr Martje Kruk-de Bruin and the other staff of the Lorentz Center for their highly efficient management of the workshop and for their attention to all participants' needs. Their help greatly contributed to the success of the meeting.

L.H. Lumey (Columbia University, New York, NY, USA)

PDE Approximations in Fast reaction – Slow diffusion scenarios

November 10 – 14, 2008

Fast reaction-slow diffusion scenarios are encountered in a large number of applications such as combustion, corrosion of porous materials, phase transitions in shape-memory alloys, and aggregation of biological populations. Our aim was to bring together and create a framework for discussions between two different communities: people working on singular perturbation problems/singular limit analysis for reaction-diffusion systems and people directly working on the limit problems. These problems are often free and moving boundary problems, where typically a fast chemical reaction, intimately interplaying within a tiny boundary layer with a slow transport, concentrates on the singular object (called free boundary).

The workshop was very successful. The talks were of excellent quality and very well balanced from the technical point of view – we succeeded to have a nice mixture of rigorous analysis techniques (mostly developed for parabolic PDE systems), singular analysis techniques, variational calculus tools for patterns analysis, formal asymptotics, as well as numerical simulations. Various situations connected to phase transitions (e.g. very fast reactions, patterns in shape-memory alloys) were discussed within deterministic scenarios with the exception of a couple of cases such as studies of self-organized criticality which were presented in both a deterministic and a stochastic framework. The organizers were invited to edit a special volume of Discrete and Continuous Dynamical Systems (Series S) to publish some of the most significant workshop contributions.

On Monday, Tuesday and Thursday discussion groups spontaneously formed under the influence of the morning lectures. The discussions of Wednesday afternoon (after the poster session) took place during the boat trip. The extended lunch breaks and evenings offered plenty of opportunities to exchange ideas. We observed with pleasure the smooth way in which the 10 young researchers (2 diploma students, 6 PhD students and 2 post doctoral students) got into contact with the more experienced scientists. Many new ideas have come up out of these interactions and most of them will very probably lead to substantial scientific collaborations.

A very positive aspect of this workshop is the fact that indeed people have come together and been able to interact on a number of problems, such as:

- k -independent maximum bounds for RD systems, L^1 techniques (D. Bothe, A. Muntean, M.A. Peletier)
- Fast-reaction limits and complex patterns in reaction-diffusion systems (D. Hilhorst, S. Martin, K.-I Nakamura, H. Ninomya, M. Mimura, D. Ueyama): these researchers are part of the Japan-France CNRS virtual Laboratory ReaDiLab (www.math.u-psud.fr/~readilab). The Reaction-Diffusion Laboratory ReaDiLab, which was officially created in 2007, is very much indebted to Professor Wim van Saarloos and to the Lorentz Center who supported the organization of two Conferences with a large number of Japanese and European participants in March 2001 and in March 2003
- New open problems in fast-reaction limits (E.N. Dancer, D. Hilhorst, M. Mimura, and H. Ninomiya)
- Fast reaction limit and large time behavior for reaction-diffusion systems on unbounded domains (D. Hilhorst, S. Martin and P. Trevelyan)

Scientific Report

- Well-posedness for shape-memory alloys (T. Aiki, N. Kenmochi, I. Pawlow, S. Yoshikawa)
- Concentration jumps in reaction-diffusion systems (J.D. Evans, D. Hilhorst, S. Martin, M. Mimura, A. Muntean, D. Ueyama, M. Veneroni)
- Nonstandard phase-field approximations (C. Eck, T. van Noorden)
 - Self-organized criticality and phase transitions (V. Barbu, A. Muntean)

We very much appreciate the excellent facilities and essential financial support from the Lorentz Center. Special thanks are due to the supporting Lorentz center staff Mrs. H. Jensenius, Mrs. M. Kruk and Mrs. G. Filippo. Furthermore, we would like to thank the mathematics cluster Nonlinear Dynamics of Natural Systems (NDNS+) for putting at our disposal a supplement of 2500 Euro which allowed us to cover the accommodation costs of a larger number of young researchers.

We look forward for further opportunities that could enable us to set forth the scientific exchange started in Leiden. Surely a lot of the participants will keep meeting each other and interacting in the coming years.

T. Aiki (Gifu University, Japan)

D. Hilhorst ([Universite Paris-Sud XI](#), France)

M. Mimura (Meiji University, Japan)

A. Muntean (TU Eindhoven, Netherlands)

Fitting the spectral energy distributions of galaxies

November 17 – 21, 2008

The different physical processes occurring in galaxies all leave their imprint on the global and detailed shape of the spectrum, each dominating at different wavelengths. Detailed analysis of the spectral energy distribution (SED) of a galaxy should thus, in principle, allow us to fully understand its properties.

The aim of this workshop was to bring together the main players in the fields of modeling, multi-wavelength observations and SED fitting techniques, to provide an overview of the current limitations in the field and to define where improvements need to be made.

This aim was more than achieved we feel, with 46 attendees, covering a broad range of topics, from SED modelling (e.g. M. Dopita, S. Charlot), empirical SEDs (e.g. D. Dale), multi-wavelength observations (e.g. M. Franx, H. Aussel) and SED Fitting, including photometric redshifts (e.g. M. Brodwin, M. Wolf, R. Tojeiro, P. Ocvirk). As part of aims, we biased our invitation list to “early researchers”, that is, PhD students, Post-docs, and recent academics. We feel that this was one of the reasons for the energy of the workshop, with discussions and networking occurring constantly during the workshop. In addition there was also a strong attendance of non-registered local astronomers (from Leiden University), who also participated in the workshop.

Our program was arranged to such that there were formal talks in the morning and open discussion sessions in the late afternoon, with time set aside after lunch for smaller discussion groups and networking. The morning talks enabled all participants to talk (who wished to), and set up a useful background for the discussions in the afternoon. It also gave a chance for the PhD students to advertise their work and gain notoriety among their peers. The afternoon discussion sessions had one or two “discussion leaders” but in all sessions once the debate started, very little direction was required, quite often inspired by the morning talks. The “Working sessions” were also well utilized, with the coffee room always busy with people discussing science, and we personally also saw and participated in many smaller groups working together in the offices.

We also received a lot of positive feedback from the participants from the workshop, for both the location and setup as well as for the workshop itself and its format. Many appreciated the chance to meet, work and collaborate with fellow attendees, as well as several stating they felt they learnt something from the workshop, which we feel indicates more than anything that this workshop was successful.

We thus can confidently say that the main aim of the workshop was achieved, with participants gaining an overview of the current status of the field and being able to define directions of necessary development. A few directions that became clear were: publishing a public code for SED fitting (to get stellar masses), keep up efforts to synthesize the perfect prior, translate inversion techniques to photometric SEDs, and more.

As part of the results for the workshop, we are currently making the talks of the workshop available online for both participants and the general astronomical community through the Lorentz center website. Also, as stated in our original proposal, a “Conference Proceedings” shall be written, in the form of a review article in the peer-reviewed journal *Astrophysics &*

Scientific Report

Space Sciences, with 4 different sections written by the science organizing committee (minus Mike Blanton, who unfortunately could not attend at the last minute) as well as a conference summary. This review article should be published sometime late next year.

Personally we would also like to thank the Lorentz Center staff for their hard work and continuous enthusiasm before, during and after the workshop. Their effort made the organization and implementation of this workshop very smooth and enjoyable, and enabled us to participate in the science as well. The wine and cheese welcome and the conference dinner on the "bootrondvaart" were also extremely enjoyable and successful, with participants all enjoying themselves and chatting and drinking through the evening and enjoying both the meal and the (somewhat voyeuristic) view into Dutch life.

Finally, we would like to gratefully acknowledge the financial support of both the Lorentz Center and NOVA (Nederlandse Onderzoekschool Voor Astronomie) for this workshop, which enabled the attendance of several participants, including the SOC, as well as the enjoyable conference dinner and Wine & Cheese welcome.

Brent Groves (Leiden Observatory, Netherlands)

Carl Jakob Walcher (European Space Agency/ESTEC, Netherlands)

Electrocatalysis@nanoscale: techniques and applications

November 24 – 28, 2008

Electrocatalysis is a highly interdisciplinary discipline of science of great importance for our future energy economy (batteries, fuel cells, hydrogen production...). A good background in electrocatalysis, which would enable one to tackle all the important research problems in this area, requires knowledge of chemistry, physics, catalysis, materials science, electronics, nanotechnology, biochemistry, etc. This aspect is also reflected in the many different experimental techniques that are available to study electrocatalytic and electrochemical processes, which range from modifications of the classical spectroscopic techniques (Infrared, Raman, UV-VIS) to scanning probe microscopies (AFM, STM) to techniques based on electrical response (voltammetry, impedance spectroscopy, scanning electrochemical microscopy). The purpose of this Training School was to bring together junior scientists from our COSTD36 Action to learn about the principles and possible applications of the various experimental techniques applicable to the study of the electrocatalytic systems. The Training School was held in the framework of a "Lorentz Workshop" at the Lorentz Center of Leiden University. The format of the meeting was set up so as to actively involve participants in solving their own research questions. Student participants were asked to formulate a pertinent research question from their own research before the start of the Training School. After the specialist training lectures in the morning and early afternoon sessions, in the afternoon discussions, students presented their research questions in small groups of 6 students and two experts. Some of the research ideas generated in these sessions will hopefully lead to STSM (Short Term Scientific Missions) within the COSTD36 Action.

The special format of the meeting and the unique facilities of the Lorentz Center created an atmosphere of very lively discussions. The Training School provided a detailed background to some of the main techniques available to electrochemistry and surface science as well as an overview of some of the state-of-the-art research developments in electrochemical surface science. From the feedback provided by the students it is clear that the workshop was both educational and inspirational. We believe that most students will have gone home with many new ideas and insights. The Workshop/Training School was supported financially by the Lorentz Center, COST, and the International Society of Electrochemistry.

Marc Koper (Leiden University, Netherlands)
Alex Yanson (Leiden University, Netherlands)
David Fermin (Bristol University, United Kingdom)
Patrick Unwin (University Warwick, United Kingdom)

KAM Theory and its applications

December 1 – 5, 2008

Kolmogorov-Arnold-Moser Theory is a major part of Dynamical Systems Theory, dealing with the typical occurrence of quasi-periodicity in dynamical systems. Originally this research comes from Celestial Mechanics and is concerned with problems like the stability of the Solar System. From the beginning it was clear that the scope is more general, also involving the Ergodicity Hypothesis in Statistical Mechanics and many other things.

The interest of the workshop was with invariant tori of all the possible dimensions, carrying quasi-periodic motions, in Hamiltonian systems (the mainstream of KAM Theory). In fact there were several contributions on Celestial Mechanics. Also attention was given to volume preserving, reversible, and dissipative systems, where external parameters are usually needed to make quasi-periodic dynamics occurring in a robust way. Of increasing importance is quasi-periodicity in infinite dimensional systems like partial differential equations and a number of talks were given in this direction. In all cases transitions (or bifurcations) between qualitatively different kinds of dynamics were of great interest.

The aims of the workshop were:

- i) To bring together a large number of international experts in this broad field, both pure and applied, and to promote collaboration between the various subfields. At this point the workshop has been extremely successful.
- ii) In particular we also aimed to stimulate young researchers to participate. Out of the more than 40 participants, 6 were PhD students.
- iii) We aim to publish a number of valuable papers by participants of the workshop in a special volume of the journal "Discrete and Continuous Dynamical Systems - Series S". The deadline for submitting manuscripts is 31 March 2009.

We thank the organization of the Lorentz Center for their kind and efficient help throughout the workshop and its preparation.

H.W. Broer (University of Groningen, Netherlands)

H. Hanßmann (Universiteit Utrecht, Netherlands)

M.B. Sevryuk (The Russia Academy of Sciences, Russia)

Integrable systems in Quantum Theory

December 8 – 9, 2008

Physical theories such as quantum field theory and string theory exhibit important connections with integrable systems. We mention two instances. The first amazing connection form the Witten conjectures in two-dimensional theories, which relate the generating function of intersection numbers of Morita-Mumford classes, matrix models and classical integrable systems of Khadomtsev-Petviashvili type. The second striking relation arose in the context of mirror symmetry, a duality, where two seemingly different physical theories can be shown to be isomorphic by taking quantum corrections into account. A key element in Givental's proof of mirror symmetry for projective space formed another class of integrable systems, the so-called Toda hierarchies. Integrability can also be of great use, e.g., to verify connections between different theories such as the AdS/CFT- correspondence that states that a string theory on Anti-de Sitter space is equivalent to a Conformal Field Theory on its boundary.

This two-day conference brought together a group of 23 participants from 7 different countries. The aim of the conference was to discuss a number of aspects of the rich interaction between integrable systems and quantum theory. The topics of the talks were:

- 1) Real and algebraic integrability
- 2) Commutator identities on associative algebras and integrability of nonlinear partial and difference equations
- 3) Cyclic Monopoles, Toda and Ramanujan
- 4) Matrix models: string theory inspired constructions for topological theories
- 5) Towards the solution of the AdS/CFT spectral problem.
- 6) Manin's matrices and the elliptic Gaudin model
- 7) Aspects of defects in integrable field theory
- 8) First order string theory and the Kodaira-Spencer equations

Besides yielding a rich exchange of ideas around the new material presented, the conference also served as a platform to continue existing cooperations and it also initiated a number of new ones. As such plans were made for several joint projects, mutual visits and publications. In particular, the idea to bring out proceedings of the meeting in the journal *Theoretical and Mathematical Physics* was welcomed.

Acknowledgements

The conference was financially made possible by the support of the following institutions or organizations:

- 1) The Lorentz Center (NWO)
- 2) The Mathematical Research Institute (MRI)
- 3) The cluster "Geometry and Quantum Theory" (GQT)

Finally I like to thank the staff of the Lorentz Center, in particular Henriette Jensenius, Martje Kruk- de Bruin and Corrie Kusters for their guidance, help and support at the whole process of organizing this workshop. All participants were impressed by the pleasant ambiance at the Center and the excellent support from its staff.

Gerard Helminck (University of Amsterdam, Netherlands)

The first Science with LOFAR surveys

December 10 – 12, 2008

LOFAR, the Low Frequency Array, is a next-generation radio telescope that is being built in the Netherlands and neighboring countries and will be fully operational at the end of this decade. It will operate at frequencies from 15 to 240 MHz (corresponding to wavelengths of 20 to 1.2 m). Its superb sensitivity, high angular resolution, large field of view and flexible spectroscopic capabilities will represent a dramatic improvement over previous facilities at these wavelengths. As such, LOFAR will carry out a broad range of fundamental astrophysical studies and will be an important vehicle for astronomical research.

An important goal that has driven the development of LOFAR since its inception is to explore the low-frequency radio sky by means of a series of unique surveys. The plan is to exploit the unprecedented sensitivity and wide instantaneous field of view of LOFAR to conduct large-sky surveys at 15, 30, 60, 120 and 200 MHz. Four topics are driving the definition of the proposed surveys. These are:

- Formation of massive galaxies, clusters and black holes using $z > 6$ radio galaxies as probes,
- Intercluster magnetic fields using diffuse radio emission in galaxy clusters as probes,
- Star formation processes in the early Universe using starburst galaxies as probes, and
- Exploration of new parameter space for serendipitous discovery.

Besides their impact on these main drivers, LOFAR surveys will contribute substantially to our understanding a broad range of additional astrophysical topics.

Program

During the first day an overview was given of the exciting science that will be carried out with LOFAR. This day had a wide attendance from the Dutch astronomical community. Most of the second day was devoted to parallel session for each of the 9 science working groups. These groups were tasked to discuss in detail the main existing survey plan. The main question was whether these plans should be modified to cater even better for the needs of all the scientific investigations that the groups would like to carry out. Furthermore, these groups addressed a number of issues related to these surveys, including technical preparatory work, archiving needs, and special calibration issues. The final day was comprised of a long plenary session where the groups reported on their discussions. The very positive outcome was that there was general agreement on how the survey definition should be modified to optimise the science that the groups would like to pursue. With the combination of parallel and plenary sessions, and work that needed to be carried out in small teams, the Lorentz centre was ideally suited for hosting this workshop. The very efficient and friendly way with which the centre operates greatly contributed to the very positive atmosphere during the workshop.

Huib Röttgering (Leiden Observatory, Netherlands)

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Ignas Snellen (Leiden Observatory, Netherlands)

Funding Sources

General Lorentz Center Funding

The Lorentz Center funding, assigned to the workshops after consultation of the scientific boards, is provided by the following institutions:

OCW Ministerie van Onderwijs, Cultuur en Wetenschap		Workshops in Astronomy, Computer Science, Life Sciences, Mathematics, Physics, as well as Interdisciplinary workshops
FOM Stichting voor Fundamenteel Onderzoek der Materie		All workshops (partly) in Physics
NWO Nederlandse organisatie voor Wetenschappelijk Onderzoek		Workshops in Astronomy, Computer Science, Life Sciences, Mathematics

Other funding sources

Additional funding for specific workshops was provided by:

Sponsor	Workshop	Date
ASTRON 	<ul style="list-style-type: none"> Low-Frequency Pulsar Science 	23 - 27 June
Bruker 	<ul style="list-style-type: none"> New algorithms in macromolecular crystallography and electron microscopy 	12 - 18 May
Compositio Mathematica 	<ul style="list-style-type: none"> Algebraic Geometry The Geometric Langlands Program 	30 June - 4 July 7 - 11 July
COST 	<ul style="list-style-type: none"> Electrocatalysis@nanoscale: techniques and applications 	24 - 28 Nov
CWI research group MA S1 & MA S3 	<ul style="list-style-type: none"> Numerical Modelling of Complex Dynamical Systems 	6 - 9 May
Delft Center for Materials 	<ul style="list-style-type: none"> Crystallization and Jamming in Soft Matter under Driving-Colloidal Suspensions, Granular Media, Foams, and Complex Plasmas 	11 - 22 Feb
DFG STB TR6 	<ul style="list-style-type: none"> Crystallization and Jamming in Soft Matter under Driving - Colloidal Suspensions, Granular Media, Foams, and Complex Plasmas 	11 - 22 Feb
DIAMANT Cluster 	<ul style="list-style-type: none"> Algebraic Geometry DIAMANT meets GQT 	30 June - 4 July 27 - 31 Oct

Sponsor	Workshop	Date
DLR MP 	<ul style="list-style-type: none"> Crystallization and Jamming in Soft Matter under Driving - Colloidal Suspensions, Granular Media, Foams, and Complex Plasmas 	11 - 22 Feb
Dr. J. L. Dobberke Stichting	<ul style="list-style-type: none"> Keeping Track of the Seasons 	14 - 18 Jan
DUEL Network	<ul style="list-style-type: none"> The dark side of the universe through extragalactic gravitational lensing 	4 - 8 Feb
Ecrypt 	<ul style="list-style-type: none"> Hash functions in cryptology: theory and practice 	2 - 6 June
ESF 	<ul style="list-style-type: none"> Physics of Micro- and Nanofluids 	9 - 20 June
ESO 	<ul style="list-style-type: none"> UNAWE: Development of Educational Materials 	25 - 29 Feb
Fei 	<ul style="list-style-type: none"> New algorithms in macromolecular crystallography and electron microscopy 	12 - 18 May
GQT Cluster 	<ul style="list-style-type: none"> Algebraic Geometry The Geometric Langlands Program Operator Structures and Dynamical Systems DIAMANT meets GQT 	30 June - 4 July 7 - 11 July 21 - 25 July 27 - 31 Oct
International Society of Electrochemistry 	<ul style="list-style-type: none"> Electrocatalysis@nanoscale: techniques and applications 	24 - 28 Nov
KNAW 	<ul style="list-style-type: none"> Network Synchronization: from dynamical systems to neuroscience Operator Structures and Dynamical Systems Artificial Cold and International Cooperation in Science Quantum Decoherence and Quantum Information Science Logic and Information Security 	19 - 30 May 21 - 25 July 4 - 8 Aug 11 - 15 Aug 22 - 26 Sep
Leiden Observatory 	<ul style="list-style-type: none"> Interstellar Surfaces 	6 -10 Oct
Lorentz Fonds 	<ul style="list-style-type: none"> Dynamical heterogeneities in glasses, colloids and granular media 	25 Aug - 5 Sep
Marie Curie 	<ul style="list-style-type: none"> Quantum Decoherence and Quantum Information Science 	11 - 15 Aug
Mathematical Research Institute (MRI) 	<ul style="list-style-type: none"> The Geometric Langlands Program Operator Structures and Dynamical Systems 	7 - 11 July 21 - 25 July
MAX-INF2 	<ul style="list-style-type: none"> New algorithms in macromolecular crystallography and electron microscopy 	12 - 18 May

Sponsor	Workshop	Date
NDNS+ Cluster 	<ul style="list-style-type: none"> Numerical Modelling of Complex Dynamical Systems Operator Structures and Dynamical Systems PDE Approximations in Fast reaction - Slow diffusion scenarios KAM theory and its applications 	<p>6 - 9 May</p> <p>21 - 25 July</p> <p>10 - 14 Nov</p> <p>1 - 5 Dec</p>
NIAS 	<ul style="list-style-type: none"> Symmetry as a Modern Scientific Concept Qumran - a holistic view Logic and information security Artificial Cold and International Cooperation in Science Long Term consequences of exposure to famine 	<p>10 - 14 March</p> <p>21 - 25 April</p> <p>22 - 26 Sep</p> <p>4 - 8 Aug</p> <p>3 - 6 Nov</p>
NOVA 	<ul style="list-style-type: none"> Galaxy Evolution from Mass-selected samples Low-Frequency Pulsar Science Central Mass Concentrations in Galaxy Nuclei Galaxies in Real Life and Simulations Interstellar Surfaces Fitting the Spectral Energy Distributions of Galaxies The first Science with LOFAR surveys 	<p>28 Jan - 1 Feb</p> <p>23 - 27 June</p> <p>28 July - 1 Aug</p> <p>15 - 19 Sep</p> <p>6 - 10 Oct</p> <p>10 - 12 Dec</p> <p>17 - 21 Nov</p>
NWO (additional) 	<ul style="list-style-type: none"> Computer-based clinical guidelines and protocols The Geometric Langlands Program Operator Structures and Dynamical Systems I-science workshop on data mining, distributed computing and visualization for astronomy 	<p>9 - 11 Jan</p> <p>7 - 11 July</p> <p>21 - 25 July</p> <p>13 - 18 Oct</p>
SimBioMa 	<ul style="list-style-type: none"> Physics of Micro- and Nanofluids 	<p>9 - 20 June</p>
Swammerdam Institute 	<ul style="list-style-type: none"> Network Synchronization: from dynamical systems to neuroscience 	<p>19 - 30 May</p>
Thomas Stieltjes Institute for Mathematics 	<ul style="list-style-type: none"> The Geometric Langlands Program Operator Structures and Dynamical Systems 	<p>7 - 11 July</p> <p>21 - 25 July</p>
VICI Bas Edixhoven	<ul style="list-style-type: none"> Algebraic Geometry 	<p>30 June - 4 July</p>