ESI The Erwin Schrödinger International
Institute for Mathematical Physics

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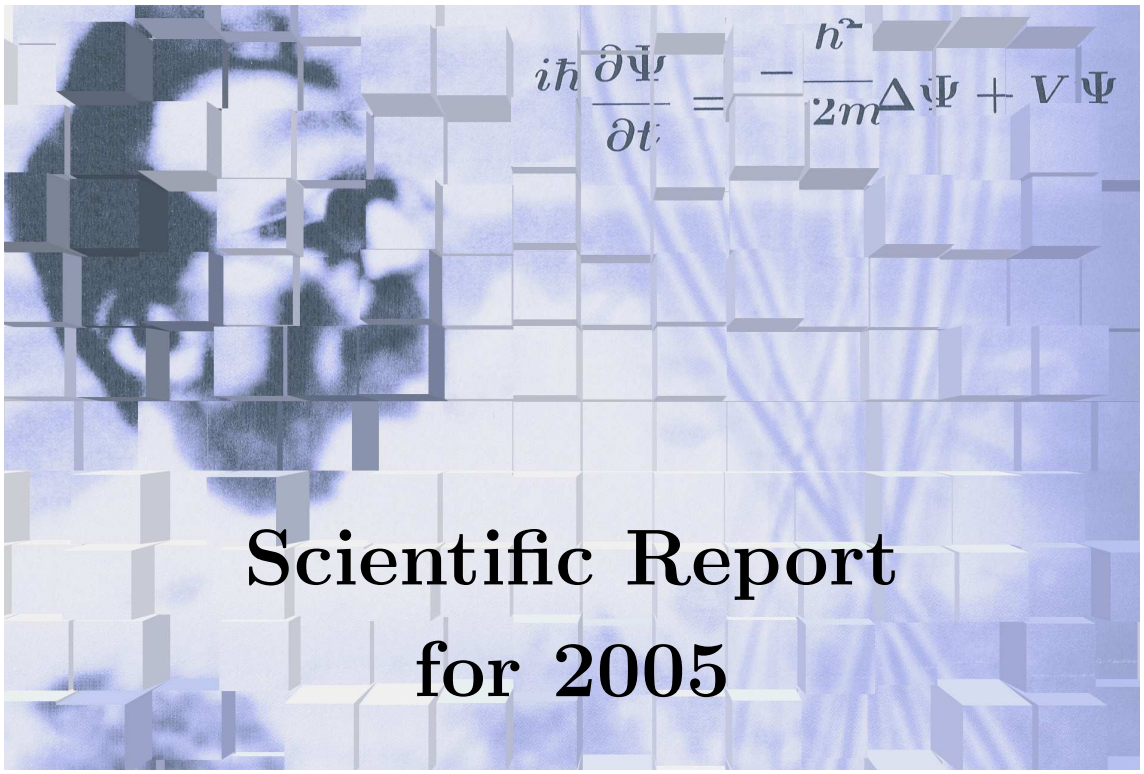
A-1090 Vienna, Austria



Scientific Report for 2005

Contents

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Preface

The year 2005 again saw some positive developments for the Erwin Schrödinger Institute. The *Junior Research Fellows Program*, which had started in 2004, was in its second year of operation with an undiminished number of excellent applicants. In recognition of this success the Austrian Ministry for Education, Science and Culture raised the funding of the program in 2005 from €150.000 to €200.000 per year with the specific aim to encourage women to enter research careers in mathematics or mathematical physics. Since this funding increase came late in 2005 its effect will be noticeable only from 2006. Another positive change was that the ESI now has a two-year budget, which makes the financial situation of the Institute a little more predictable, and which makes the planning of scientific activities somewhat easier.

The presence of the Junior Research Fellows had a very positive impact on the scientific atmosphere at the Institute through a series of *Junior Research Fellows Seminars* and through lively discussions and interaction with other post-docs and visitors at the Institute. A short overview of the program can be found on p. 33.

The Junior Research Fellows Program interacted strongly with the *Senior Research Fellows Program* of the Institute, which had started in 2003 in line with the long-term policy of vertical integration of research and scientific education at highest international levels. The latter program is funded jointly by the Austrian Ministry for Education, Science and Culture, the University of Vienna and the Technical University of Vienna and has the purpose of inviting senior scientists for extended periods of time to offer advanced lecture courses and longer-term scientific interaction with graduate students, post-docs and the local scientific community. This program is organized by Joachim Schwermer and is described in detail on p. 35ff.

Lecture notes of some of the courses of the ESI Senior Research Fellows are published in the series *ESI Lectures in Mathematics and Physics* by the European Mathematical Society, edited by Joachim Schwermer and Jakob Yngvason. The first volume in this series (*Lectures on Real Semisimple Lie Algebras and Their Representations* by Arkady Onishchik, 2004) will soon be joined by the volume *Kähler Geometry* by Werner Ballmann, and further manuscripts are in preparation.

The *Scientific Programs and Workshops* of the ESI during the year 2005 are described in detail on the pages 7ff.

There were changes to the composition of the *International Scientific Advisory Committee* of the ESI in 2005. At the end of 2004 Jean-Pierre Bourguignon (IHES) had left the Advisory Committee after nine years and Harald Niederreiter (Singapore) after six years. At the end of 2005 Victor Kac (MIT) retired from the Committee after six years of service. The Institute is extremely grateful to them for many years of valuable advice, suggestions and support. The new appointments to the committee were Nigel Hitchin, Oxford, and Michael Struwe, ETH Zürich, from January 2005, and Edward Frenkel, Berkeley, and Gerhard Huisken, Potsdam, from January 2006.

The administration of the ESI also changed in 2005: Maria Windhager, the administrative head of the ESI, went on maternity leave in the autumn of 2005 (and can now be congratulated on a little boy), and the office is now led by Isabella Miedl. As a temporary replacement for Maria Windhager (who has since come back on a part-time basis), Othmar Kastner took on a part time clerical position at the ESI during the latter half of 2005. In spite of these changes the administration continued to work with its customary efficiency and good humour towards our visitors, research fellows and scientific staff of the Institute.

Klaus Schmidt March, 2006
President

General remarks

Management of the Institute

Honorary President: Walter Thirring
President: Klaus Schmidt
Directors: Joachim Schwermer and Jakob Yngvason
Administration: Isabella Miedl, Maria Windhager, Ursula Sagmeister, Othmar Kastner
Computers: Andreas Čap, Gerald Teschl, Hermann Schichl

International Scientific Advisory Committee

until December 2005:

Giovanni Gallavotti (Roma)
Harald Grosse (Wien)
Nigel Hitchin (Oxford)
Viktor Kac (MIT)
Antti Kupiainen (Helsinki)
Elliott Lieb (Princeton)
Michael Struwe (ETH Zürich)

from January 2006:

Edward Frenkel (Berkeley)
Harald Grosse (Vienna)
Giovanni Gallavotti (Roma)
Nigel Hitchin (Oxford)
Gerhard Huisken (Potsdam)
Antti Kupiainen (Helsinki)
Elliott Lieb (Princeton)
Michael Struwe (ETH Zürich)

Budget and visitors: The budget of ESI for 2005 was €1.106.880,– from the Austrian Federal Ministry for Education, Science and Culture (incl. €94.000,– for the Senior Research Fellows Program, 150.000,– for the Junior Research Fellows Program 2004 and €150.000,– for 2005), €22.000,– from the University of Vienna for the Senior Research Fellows Program and €22.000,– from the Technical University of Vienna for the Senior Research Fellows Program. €516.566,20 were spent on scientific activities and €424.598,40 on administration and infrastructure.
The number of scientists visiting the Erwin Schrödinger Institute in 2005 was 520, and the number of preprints was 219.

Scientific Reports

Main Research Programs

Open Quantum Systems

Organizers: J. Derezinski, G.M. Graf, J. Yngvason (local organizer)

Dates: January 20 - March 31, 2005

Budget: ESI €56.260,–

Preprints contributed: [1607], [1637], [1673], [1680], [1708], [1716], [1717], [1719], [1741], [1742]

Report on the program

An open system is a physical system interacting with its surroundings. Rigorous study of open systems is an active branch of mathematical physics employing many techniques, such as dynamical system theory, stochastic processes, operator algebras, spectral theory and completely positive maps.

The aim of the program was to stimulate progress in the mathematical theory of open systems, both in conceptual foundations and in the analysis of paradigmatic models for particular systems; and to disseminate recent advances in the field. The emphasis was on quantum open systems, but work on rigorous results classical non-equilibrium physics were also included.

During the program about 55 researchers of different seniority and geographic origin visited the ESI and interacted effectively. The main periods of activity were during two workshops, the weeks Jan. 31 - Feb. 4 and March 14 - March 18. Further activities comprising scientific collaborations and additional talks took place also during most of the remaining time.

The workshops featured two types of lectures: mini-courses with the goal of a pedagogical exposition of a broader topic, and research seminars. The full program is available at the website www.fuw.edu.pl/ derezins/ESI-open-05.html.

The main topics discussed were

- Return to equilibrium,
- Non-equilibrium steady states and transport,
- Large open systems,
- Driven systems in equilibrium,

- Reduced or effective dynamics,
- Scattering in quantum field theory.

The mini-courses, each of about 5 hours, were given by David Ruelle (*An introduction to non-equilibrium statistical mechanics*) and Luigi Accardi (*The stochastic limit of quantum theory*) during the first workshop, and by Claude-Alain Pillet (*Transport properties of quasi-free fermions*) during the second. These courses were well received both by participants and people form the local community.

Ruelle's lecture series must be counted as a highlight of the program. With unfailing taste for the essentials he presented in depth both the motivating physical phenomena and some of the main recent results in field. They concerned both classical chaotic systems, including the Cohen-Gallavotti fluctuation theorem, and the linear response theory, as well as quantum system, including non-equilibrium steady states and positivity of entropy production in spin systems.

Pillet in his mini-course discussed in detail a class of models, which allow for a mathematically satisfactory derivation of various properties of nonequilibrium steady states.

The course of Accardi was a thorough introduction to his approach to open quantum systems via stochastic differential equations.

Nonequilibrium statistical physics and thermodynamics is still a poorly understood subject and some of the most interesting talks in the workshops were devoted to the progress in this domain. Jürg Fröhlich presented a review of his approach to the subject and G. Sewell discussed his quantum macrostatistical theory of nonequilibrium steady states. Jona Lasinio gave an interesting presentation on large deviations in states with broken time-reversal invariance, W. Abou Salem studied nonequilibrium steady states within the C*-algebraic formalism and Bellissard dissipative transport in aperiodic solid.

J.P. Solovej and C. Hainzl described their work on the vacuum polarization in the no-photon QED that can be understood as the interaction of the environment on a small system: the Dirac see on the individual electrons.

Effective dynamics of open quantum systems can be described by positive maps. Recent advances on this subject were discussed by Fagnola and Majewski, while H. Narnhofer reported on her work on effective quantum dynamics on the mesoscopic level.

An interesting approach to the decoherence based employing the formalism of von Neumann algebras was presented by R. Olkiewicz.

Pautrat, Accardi and de Roeck worked on the derivation of a non-reversible dynamics of a quantum system arising in certain low density limits.

During the program H. Araki spent two months as a guest of ESI. He worked on equilibrium states of quantum lattice gases with non-even interactions and presented his results at the second workshop.

The program overlapped with a semester long course by J. Dereziński, who in this period visited ESI as a Senior Research Fellow. His course "Operator algebras and their applications in physics" covered mathematical aspects of several the topic of the program. It was attended by a number of participants of the program. Derezinski's research during the program is described in the section on Senior Research Fellows.

The program was a great occasion to exchange ideas and start new collaborations and in accordance with the original goals.

Invited scientists: Walid Abou Salem, Luigi Accardi, Robert Alicki, Huzihiro Araki, Yosi Avron, Joao Barata, Jean Bellissard, Fabio Benatti, Philippe Blanchard, Jeremy Clark, Horia Cornean, Jan

Derezinski,Wojciech De Roeck, Alexander Elgart, Laszlo Erdős, Franco Fagnola, Roberto Floreanini, Jürg Fröhlich, Rafal Fruboes, Christian Gerard, Sylvain Golenia, Gian Michele Graf, Marcel Griesemer, Hendrik Grundling, Christian Hainzl, Mario Hellmich, Masao Hirokawa, Fumio Hiroshima, Keiichi Ito, Vojkan Jaksic, Christian Jaekel, Gianni Jona-Lasinio, Israel Klich, Andrzej Kossakowski, Jozsef Lorinczi, Christian Maes, Adam Majewski, Taku Matsui, Krzysztof Meissner, Marco Merkli, Hajime Moriya, Karel Netocny, Heide Narnhofer, Robert Olkiewicz, Gianluca Panati, Yan Pautrat, Alexander Pechen, Claude-Alain Pillet, Roman Roschin, David Ruelle, Jeffrey Schenker, Benjamin Schlein, Robert Seiringer, Geoffrey Sewell, Heinz Siedentop, Erik Skibsted, Jan P. Solovej, Marcos Travaglia, Heribert Zenk

Modern Methods of Time-Frequency Analysis

Organizers: J. J. Benedetto, H. G. Feichtinger, K. Gröchenig

Dates: April 4–July 8, 2005

Budget: ESI €67.500,–

Preprints contributed: [1598], [1648], [1649], [1654], [1665], [1667], [1671], [1677], [1678], [1679], [1685], [1690], [1691], [1696], [1699], [1704], [1709], [1710], [1711], [1728], [1729], [1732], [1739], [1740], [1745], [1759], [1768]

Report on the program

The special semester on "Modern Methods of Time-Frequency Analysis" was designed to bring together experts working in diverse fields of harmonic and applied analysis in order to explore connections between different directions and to facilitate interaction.

The program had a total of 95 visitors, 67 of these were supported by ESI. Many visitors came with their own funding. In the initial phase of the preparation the semester was co-organized with the NSF-funded Focused Research Group (FRG) on "Wavelets, Frames, and Operators" led by J. J. Benedetto. The visits of participating members of this FRG were partially funded by NSF. In addition, Ursula Molter was supported by the AlBAN program for six months (ca. 10.000 Euro).

Mathematical time-frequency analysis is a relatively young area of mathematics, therefore the ESI population during this semester was fairly young with many graduate students and researchers in an early stage of their career. In particular, ESI supported four young researchers through an ESI junior research fellowship (Elena Cordero, Kasso Okoudjou, Alex Powell, Nenad Teofanov). Joel Tropp was financed by Brain Power Austria.

Moreover, several post-docs were hosted by the Numerical Harmonic Analysis Group at the Faculty of Mathematics. Some of them were funded by the European network HASSIP (Harmonic Analysis and Statistical Signal and Image Processing) for up to two months (Pawel Bechler, Gerard Ascensi, Martin Ehlers). J. L. Abreu was supported by a Portuguese fellowship, Stephan Kunis by a DAAD fellowship, M. Fashandi was supported by the Iranian government.

A complete list of talks can be downloaded from the webpages
http://www.univie.ac.at/nuhag-php/program/talks_show.php?location=esi05 and
http://www.univie.ac.at/nuhag-php/program/select.php.

1. Main scientific activities:

The scientific activity was divided into four main directions and focused around four workshops. Each of these was devoted to a fundamental main topics in time-frequency analysis.

Altogether 91 talks were given, mostly during the workshops. So far 25 preprints have been contributed to the ESI preprint series. In addition, an international conference was organized in Strobl.

Since time-frequency analysis covers a wide range of topics from concrete applications in physics and communication theory to the abstract theory of operator algebras, the program hosted mathematicians from rather different fields. This diversity is characteristic of mathematical time-frequency analysis and runs as a common thread through all the workshops.

The first topic (with its main activity in April with a workshop from April 11 - 15) covered *"Group theoretical methods, operator theory, and non-orthogonal expansions"*. It investigated the connections between frame theory, group representations, sampling theorems, and operator theory. The failure of "overcomplete Gabor bases" on the Neumann lattice to produce stable expansions has spurred extensive research on non-orthogonal expansions. The common goal is the construction of generalized wavelet expansions with additional symmetries coming from a group representation. The close connection to generalized coherent states was highlighted in the lecture of John Klauder who provided significant inspiration and established the link to quantum mechanics. The construction of stable non-orthogonal expansions (frames) whose basis elements are taken from the orbit of a unitary group representation usually proceeds in two steps: (i) establish a continuous resolution of the identity (a continuous frame), and (ii) discretize the resolution of the identity. The first problem amounts to the construction of suitable group representations, and was addressed in the lectures of Klauder, Gazeau, Weber, and Taylor, the second problem, which has attracted less attention until recently, is equivalent to a sampling and reconstruction problem of representation coefficients. Some of the sampling aspects were treated in the lectures of Bruna and Führ. On the applied side, Olafsson and Antoine presented applications of non-orthogonal expansions to inverting the Radon transform and to image processing.

May was devoted to *"Time-frequency methods for pseudodifferential operators"* with a workshop held from May 2 - 6. Traditionally pseudodifferential operators are employed in the analysis of partial differential equations and quantization procedures. Recently a number of "hard analysis" results, for instance the classical theorems of Calderon-Vaillancourt on boundedness and of Hörmander and Daubechies on trace class, have been improved by means of methods from time-frequency analysis. New measures to quantify time-frequency localization, the so-called modulation spaces, have become a natural tool for the analysis of pseudodifferential operators and serve as a new class of symbols. The majority of the lectures concentrated on the time-frequency analysis approach to pseudodifferential operators. The topics of the lectures covered eigenvalue estimates through time-frequency analysis (Rochberg), boundedness of various types pseudodifferential operators on modulations spaces (Toft, Benyi, Okoudjou), and the almost diagonalization of pseudodifferential operators with Gabor frames (Gröchenig). The tradition of "hard analysis" was represented by M. Lacey and R. Torres. On the applied side, exciting new problems about pseudodifferential operators originate from geoexploration and seismology (de-Hoop, Lamoureux, Margrave) and from the modeling of communication channels (Hlawatsch, Pfander).

The third theme was *"Non-orthogonal expansions and greedy algorithms"* with its main activity in June and a workshop from June 2–6. This workshop centered on a "hot" topic in computational mathematics. Nonlinear approximation methods have led to sparse representations of functions in certain function spaces and to efficient adaptive algorithms for the numerical treatment of large systems of linear equations as they arise in PDE. In 2004/05 D. Donoho and

his collaborators, and E. Candes and T. Tao achieved a breakthrough in the understanding of sparse solutions of linear systems with deep methods from probability in Banach spaces. Candes presented the state-of-the-art in a colloquium lecture, and J. Tanner reported on his recent work with Donoho.

A particular method for the computation of sparse approximations to a functions consists of "greedy algorithms". For orthonormal bases in a Hilbert space this amounts to choosing the finite linear combination with the largest coefficients as the optimal sparse approximation. For frames and even more redundant dictionaries and approximation in Banach space norms, the behavior of greedy algorithms is largely unknown and leads to difficult problems in Banach space theory. A large part of the workshop was devoted to exchange recent results and new ideas (Gribonval, Livshitz, Temlyakov, Tropp, Wojtaszszyk). To our knowledge the interaction between the ESI participants has led to several new collaborations.

The final workshop from July 4 - 6 was devoted to *"Noncommutative computational harmonic analysis"*. The interaction with engineering sciences leads to a strong focus on the explicit numerical analysis. T. Strohmer's lecture pointed out that problems in wireless communications lead to completely new mathematical challenges in time-frequency analysis and that the increasing complexity requires the use of non-commutative methods. D. Rockmore explained new algorithms for fast Fourier transforms on orthogonal groups, and I. Dauchechies presented a mathematical problem arising from neurobiology.

2. Additional activities: The conference in Strobl from May 23 - 28, though not an official part of the semester at ESI, was an important part of the activity, because it provided opportunity for many researchers who could not come to the ESI semester to explore the state-of-the-art in time-frequency analysis. The conference was attended by 100 participants, several of the invited speakers were recruited from the long-term visitors of the ESI program. Separate funding was obtained from the Ministry of Science and Education (Euro 8.900) and through a modest registration fee (ca. 5.000 Euro).

From September 24 - 29 a small follow-up workshop on "Time-Frequency Analysis and Nonstationary Filtering" was held at the Banff International Research Station (BIRS), co-organized by H. Feichtinger, K. Gröchenig, M. Lamoureux, and G. Margrave. The majority of the participants had also attended the ESI semester.

Finally, we would like to thank Isabella Miedl, Ursula Sagmeister, and Maria Windhager for the excellent and priceless support during the program.

Invited Scientists: Twareque Ali, Jean-Pierre Antoine, Jonathan Arazy, Radu Balan, John J. Benedetto, Arpad Benyi, Paolo Boggiatto, Lasse Borup, Joaquim Bruna, Qui Bui, Carlos Cabrelli, Robert Calderbank, Emmanuel Candes, Pete Casazza, Ole Christensen, Albert Cohen, Elena Cordero, Wolfgang Dahmen, Ingrid Daubechies, Martijn De Hoop, Ron De Vore, Miroslav Englis, Hans Georg Feichtinger, Gerald Folland, Hartmut Führ, Jean-Pierre Gazeau, Peter Gibson, Remi Gribonval, Niklas Grip, Karlheinz Gröchenig, Philippe Jaming, Guido Janssen, Palle Jorgensen, Eberhard Kaniuth, John Klauder, Michael Lacey, Joseph Lakey, Mark Lammers, Michael Lamoureux, David R. Larson, Rupert Lasser, Michael Leinert, Shidong Li, Evgenij Livshitz, Yurii Lyubarskii, Wally Madych, Gary Margrave, Ursula Molter, Markus Neuhauser, Morten Nielsen, Gestur Olafsson, Darian Onchis, Michael Orrison, Peter Oswald, Judith Packer, Jaak Peetre, Guergana Petrova, Götz Pfander, Alexander Powell, Richard Rochberg, Luigi Rodino, Zuowei Shen, Darrin Speegle, Rob Stevenson, Thomas Strohmer, Wenchang Sun, Kazuya Tachizawa, Jared W. Tanner, Keith Taylor, Vladimir Temlyakov, Joachim Toft, Rodolfo Torres, Joel A. Tropp, Jacek Turski, Remi Vaillancourt, Pierre Vandergheynst, Yang Wang, Eric S. Weber, Przemyslaw

Wojtaszczyk, Peter Wood, Georg Zimmermann

Geometric Methods in Analysis and Probability

Organizers: James B. Cooper, Peter W. Jones, Vitali Milman, Paul F. X. Müller, Alain Pajor, David Preiss, Carsten Schütt, Charles P. Stegall

Dates: May 25 - August 5, 2005

Budget: ESI €78.750,– External funding: European Union €6.000,–, Conference on Convex Geometry and High Dimensional Phenomena €3.000,–, Johannes Kepler University of Linz €4.943,–, Foreign Office of the Johannes Kepler University €4.500,–.
Financial support of €2.900,– respectively €2.000,– for the Colloquium at Stift Schlägl was provided from the Linzer Hochschulfonds and the City Council of Linz.

Preprints contributed: [1668], [1669], [1670], [1672], [1675], [1682], [1686], [1688], [1692], [1693], [1700], [1733], [1734], [1749], [1755], [1756], [1771], [1772]

Report on the program

In organizing the Research Semester at the Erwin Schrödinger Institute we were guided by the following criteria:

1. It was our intention to choose three themes within the general framework of the mathematical contexts described by the titles which are at present areas of intensive, fruitful and deep research. We also chose topics for which we could be confident that the leading researchers could be attracted in their entirety to Vienna.

2. The themes were chosen to be such that despite their diversity, there was a sufficiency of common ground to allow for (and encourage) interaction and synergetic effects not only within the three groups but also between them.

3. The choice of themes and participants was very carefully arranged with the following aims. Firstly to allow existent joint international research groups (formal and informal) to continue their efforts, secondly to encourage the creation of new groups and thirdly to provide an opportunity for a new and brilliant generation of young mathematicians to participate in these projects. Thus the session on infinite dimensional differentiability should be seen in the context of a long-running series of joint conferences organized twice-annually by Linz and Prague, whereas the meeting on Conformal invariance, Probability and Singular Integrals at the Erwin Schrödinger Institute is part of a series that included the 1999 meeting there and the 2000/2001 research semester at the Mittag Leffler Institute in Djursholm. It will be continued by an International Congress of Mathematicians satellite conference (2006) in Barcelona, organized a.o. by J. Verdera. The section on Asymptotic theory is part of a long term project within the framework of the Euronet project *Phenomena in High Dimensions*.

One important aspect of our organizational work was to supplement the budget provided by the Erwin Schrödinger Institute in order to maximize the use of the available resources. In this we were very successful. The University of Linz and the local government authorities of Upper Austria supplied funds to cover most of the living expenses of the main organizers (thus

liberating a large segment of the budget from ESI for the visitors from abroad) plus those of many of the visitors from countries in the former Eastern Block. In addition, they financed the Colloquium at Stift Schlägl. Many of the participants used their own personal grants to prolong their stays in Vienna or to finance those of their students and associates.

An exceedingly important positive input was the parallel organization of the *Conference on Convex Geometry and High Dimensional Phenomena* which was subsidized by the European Union Research Training Network (Marie Curie RTN) program *Phenomena in High Dimensions*. The parallel organization of this conference with the Erwin Schrödinger Institute Semester enhanced the scientific input and output of both meetings enormously and helped to attract additional external funding amounting to 50 % of the support provided by ESI.

The Research Semester was designed to cover the following three themes:

1. GEOMETRIC ASPECTS OF INFINITE DIMENSIONAL BANACH SPACE THEORY, NONLINEAR METHODS IN LINEAR FUNCTIONAL ANALYSIS
   The main activities was concentrated in the period May 25^{th} — June 5^{th}.
   Organizers: James Cooper, Linz; David Preiss, London and Charles Stegall, Linz

2. CONFORMAL INVARIANCE, PROBABILITY AND SINGULAR INTEGRALS
   The main activities was concentrated in the period June 10^{th} — July 5^{th}.
   Organizers: Peter W. Jones, Yale and Paul F.X. Müller, Linz

3. ASYMPTOTIC THEORY OF THE GEOMETRY OF FINITE DIMENSIONAL SPACES
   The main activities was concentrated in the period July 10^{th} — August 5^{th}.
   Organizers: Vitali Milman, Tel-Aviv; Alain Pajor, Paris and Carsten Schütt, Kiel

   The main topics were concentration of measure phenomena, transportation of measure, asymptotic theory of convex bodies, geometry of high-dimensional normed spaces.

1. Geometric Aspects of Infinite Dimensional Banach Space Theory, Nonlinear Methods in Linear Functional Analysis

The conference under the scientific leadership of D. Preiss (University College London), James B. Cooper and Charles Stegall (Linz) was largely concerned with the development and interaction of the ideas of Preiss and Zajíček about porosity. The ideas concerning porosity have found application in a wide range of areas. In this sense, the conference was particularly fruitful. In particular there were lectures relating porosity to the study of differentiability (Lindenstrauss, Zajíček, Maleva, Duda), the Borel structure of metric spaces (Riss) and convexity (Reich). There were talks in related areas of topology, operator theory, and Banach space geometry. The number of formal lectures was deliberately kept small, so that there would be more opportunities for impromptu lectures and discussions. This was very successful.

We remark that since 1990 the Institute for Analysis in Linz in cooperation with various mathematical institutions in Prague, Bratislava and Salzburg have organized semi-annual regional meetings not only to discuss mathematics, but to improve communications in general, especially regarding students. We think this has been very successful, and this was the second meeting at the Erwin Schrödinger Institute where we extended these regional meetings to broader international congresses. This was an opportunity for workers from the Czech Republic not only to meet with colleagues from Austria but also to meet with colleagues from other parts of the world, particularly Israel and the USA.

Schlumprecht presented his joint work with Odell; there have long been questions related to "universal separable Banach spaces" and Schlumprecht and Odell have shown that there

exists a separable Banach space universal for all separable super-reflexive Banach spaces, which seems to be about the best possible result. Fonf and Lindenstrauss presented some of their work concerning James' theorem. Recently (November, 2005), Kalenda, who attended the conference at ESI, has shown that from a point of view of logic, it appears that Lindenstrauss' approach to James' theorem cannot be extended.

Invited Scientists: Giovanni Alberti, Miroslav Chlebik, James B. Cooper, Jan Duda, Marian Fabian, Vladimir Fonf, Petr Hájek, Petr Holický, Ondrej Kalenda, Hermann König, Joram Lindenstrauss, Olga Maleva, Jan Malý, Eva Matousková, Vladimir Müller, Edward Odell, David Preiss, Thomas Schlumprecht, Charles Stegall, Jaroslav Tišer, Michal Wojciechowski, Przemyslaw Wojtaszczyk, Peter Yuditskii, Luděk Zajicek, Miroslav Zelený

2. Conformal Invariance, Probability and Singular Integrals

The focus of the meeting organized by Peter W. Jones (Yale) and Paul F.X. Müller (Linz) was on the following topics and their interactions

1. Harmonic Measure, Random Fractals and SLE Processes;
2. The Cauchy Integral, Geometric Measure and Rectifyability;
3. Phase Plane Geometry, Multilinear Singular Integrals and Connections to Partial Differential Equations.

The talks of the meeting were given at the the Erwin Schrödinger Institute from Juni 10–July 5, 2005 and a Colloquium was organized at Stift Schägl from June 24–26, 2005.

Financial support was provided by the Erwin Schrödinger Institute, "Linzer Hochschulfonds" (2.900,– Euros) and the City Council of Linz "Magistrat der Landeshauptstadt Linz" (2.000,– Euros).

The majority of participants devoted their research activities and talks to the topic

1. Harmonic Measure, Random Fractals and SLE Processes.

These were grouped around the talks and extended problem sessions held by G. Lawler and W. Werner. The talk by G. Lawler was an introduction to SLE (by one of its inventors) while that of W. Werner treated Conformal loop ensembles–an advanced topic in this area. Both problem sessions were aimed at stimulating research activities by younger researchers and graduate students present at the meeting.

The talks by St. Rohde, N. Makarov and N.G Kang covered the relation of SLE processes to random quasi conformal maps (the harmonic explorer and SLE_4) Riemann surfaces and Schwarzian Derivatives controlling the boundary behavior of the conformal maps associated to the SLE processes.

The talks by I. Binder, I. Uriarte and D. Beliaev formed a group discussing Harmonic Measure, random fractals associated to SLE and the multifractal formalism in general.

Peter W. Jones's talk on *Random Shapes in Nature and Mathematics* formed the bracket that held these subjects together and discussed new random phenomena in astrophysics with relations to Harmonic measure, SLE, rectifiability and high dimensional data analysis.

2. The Cauchy Integral, Geometric Measure and Rectifiability

The topics of the Cauchy Integral, Geometric Measure and Rectifiability were centered around one singular integral of particular interest: The Cauchy Integral Operator, its boundedness estimated by the Menger curvature of the underlying measure (X. Tolsa ' s talk) and its pointwise

behavior expressed through the singular support of the underlying measure (talks by J. Verdera, A. Poltoratski and M. Sodin). The talks by K. Astala and M. Gonzalez discussed the relation to the Beltrami Operator and estimates using the geometry of the curves supporting its singular measure. Also motivated by the Beltrami Operator, T. Iwaniec dealt with pointwise products of H^1 and BMO functions. The connection to extension theorems was the topic of the talks by P. Koskela and L. Rogers (the latter giving simultaneous improvements on both the extension theorem of E.M. Stein and that of P.W. Jones.) A. Nikolau's talk was concerned with interpolation problems of harmonic functions in $\mathbb{R}^n$.

Bergman spaces—the topic of H. Hedenmalm's contribution—provide the frame for the functional analytic approach to conformal maps and Cauchy Integrals. They also give the links to Inverse scattering problems (talk by A. Volberg) and Jacobi matrices (talk of P. Yudytskyi).

3. Phase Plane Geometry, Multilinear Singular Integrals and Connections to Partial Differential Equations

The presentation by Ch. Thiele—who together with Lacey—invented Phase Plane Geometry in its current complexity—covered trilinear operators, their connection to the Kakeya Problem, group theory and edge detection in image analysis. C. Muscalu—a former student of Ch. Thiele—discussed generalizations of the Carleson Hunt theorem. Phase Plane Geometry and non linear Partial Differential Equations were the topics of the talks by A. Nachmod (non linear Schrödinger operators) and W. Schlag (Stable Manifolds for non linear Partial Differential Equations).

The talks by S. Kislyakov gave simultaneous estimates for Singular Integral Operators under Calderon-Zygmund decompositions. D. Anisimov discussed product forms of Calderon-Zygmund operators and interpolation estimates for square functions. The talks by V. Pillwein and St. Geiss covered rearrangement operators respectively martingale transforms and singular integral operators.

Invited Scientists: Denis Anisimov, Kari Astala, Imre Barany, Dimitri Beliaev, Ilia Binder, Alexander Bufetov, Chris Burdzy, Stefan Geiss, Maria Gonzales, Hakan Hedenmalm, Tadeusz Iwaniec, Peter W. Jones, Man-Gyu Kang, Sergiu Kisliakov, Pekka Koskela, Gregory F. Lawler, Nikolai Makarov, Mark Melnikov, Paul Müller, Camil Muscalu, Andrea Nahmod, Artur Nicolau, Vladimir Peller, Alexei Poltoratski, Luke Rogers, Steffen Rohde, Wilhelm Schlag, Raanan Schul, Misha Sodin, Christoph Thiele, Xavier Tolsa, Ignacio Uriarte-Tuero, Joan Verdera, Alex Volberg, Wendelin Werner

3. Asymptotic Theory of the Geometry of Finite Dimensional Spaces

The main topics were concentration of measure phenomena, transportation of measure, asymptotic theory of convex bodies and the geometry of high-dimensional normed spaces. This part of the workshop took place from July 11, 2005 till August 5, 2005.

The workshop was structured in the following way. The first 10 days took place at the Schrödinger Institute, after which a conference of 8 days followed which was organized at the Technical University, Vienna. The last 10 days of the workshop took place at the Schrödinger Institute.

The organizers V. Milman, A. Pajor and C. Schütt are part of the Research Training Network (Marie Curie RTN) program *Phenomena in High Dimensions* (PHD) funded by the European Union. The topics of the workshop were also topics of PHD. The European Union supported the workshop through RTN to the sum of 6 000,– Euros.

Our colleagues at the Technische Universität P. Gruber, M. Ludwig and M. Reitzner are also part of RTN and the conference which we organized jointly with them received 3 000,– Euros support from RTN. There were 115 participants at the conference.

During the first and last 10 days of the workshops usually we had 2 or 3 introductory talks with two functions: firstly, as it had been important to us to invite young people (out of the 65 people who participated at the workshop there were 20 young researchers or post docs), they were directed toward those colleagues. Secondly, these talks were intended to draw attention to problems and ideas that have not been explored sufficiently in the past. During the conference, a number of scientific talks in which the leading researchers in this field presented their latest results were organized. Some time was made available for young researchers.

Many of the participants of the workshop used grants from their home institutions or their national science foundations to support a longer stay at the Schrödinger Institute or to support their students.

Concerning new research let us mention here some of the progress. A basic open problem in asymptotic convex geometry is the so-called slicing problem. One of its many interesting formulations is the following question: What is the minimal number L_n, such that any n-dimensional convex set of volume one contains a hyperplane section of volume larger than $1/L_n$? This problem has attracted a large amount of attention in recent decades. Until recently, the best estimate has been that of Bourgain (1984): $L_n < cn^{1/4}\log n$. A participant of the workshop, Klartag, has succeeded in improving this long-standing estimate. His result is that $L_n < cn^{1/4}$. Furthermore, he was able to show that convex bodies with a bounded isotropic constant constitute an ϵ-net in the Banach Mazur compactum, in the following sense: For any n-dimensional convex set K, and $\epsilon > 0$, there is another convex body T whose distance from K is at most ϵ and the isotropic constant of T is bounded by a function that depends solely on epsilon, and not on the dimension. This provides a solution to a weak version of the slicing problem, which is known as the isomorphic slicing problem.

In the course the workshop discussions were held that led to the following joint work of Milman and Artstein-Avidan: The authors show how to decrease the amount of randomness needed to achieve some of the basic geometric constructions in asymptotic convex geometry. For example, it was shown how an $n/2$-dimensional section of the ℓ_1^n ball which is isomorphic to the euclidean ball, well known to exist probabilistically, when choosing the subspace as a kernel of $n/2$ random independent sign vectors, can be constructed by choosing only $\log n$ random sign vectors. Similar results on randomness reduction were shown by the authors to hold true (QS theorems, low M^* estimates, ZigZag bodies and global Dvoretzky's theorem). In most examples a derandomization technique from computer science is exploited, imposing an expander on the set of sign vectors with a relatively small degree and taking a random walk on this expander (this tool was first used by Ajtai Komlos and Szemeredi). Some more delicate tools were developed since the theory did not exactly fit the needs of the geometric proofs. In particular a derandomized version of Bernstein's inequality which allows one to disregard a small amount of the vectors was proved by the authors.

The participant Paouris obtained the following result. A convex body K in $\mathbb{R}^n$, with volume equal to 1 and center of mass at the origin, is called isotropic if its inertia matrix is a multiple of the identity. Equivalently, if there exists a positive constant L_K such that $\int_K \langle x,\theta\rangle^2 dx = L_K^2$ for every $\theta \in S^{n-1}$. The starting point of this paper is the following concentration estimate of Alesker: If K is an isotropic convex body in $\mathbb{R}^n$ then, for every $t \geq 1$ we have

$$\mathrm{Prob}\left(\left\{x \in K : \|x\|_2 \geq c\sqrt{n}L_K t\right\}\right) \leq 2\exp(-t^2).$$

Bobkov and Nazarov have obtained an unexpected strengthening of Alesker's estimate for the class of 1-unconditional isotropic convex bodies: in this case,

$$\mathrm{Prob}\left(\left\{x \in K : \|x\|_2 \geq c\sqrt{n} L_K t\right\}\right) \leq \exp\left(-\sqrt{n}t\right)$$

for every $t \geq 1$. Paouris proved the striking result that the "Bobkov-Nazarov estimate" holds true in full generality.

An application of this result concerns a question of Kannan, Lovász and Simonovits which has its origin in the problem of finding a fast algorithm for the computation of the volume of a given convex body. Let $\varepsilon \in (0,1)$ and consider N independent random points $x_1, \ldots, x_N$ uniformly distributed in an isotropic convex body K in $\mathbb{R}^n$. The question is to find N_0, as small as possible, for which the following holds true: if $N \geq N_0$ then with probability greater than $1-\varepsilon$ one has $\left\|I - \frac{1}{NL_K^2}\sum_{i=1}^N x_i \otimes x_i\right\| \leq \varepsilon$. Bourgain proved that one can choose $N_0 \simeq c(\varepsilon)n(\log n)^3$; this was improved to $N_0 \simeq c(\varepsilon)n(\log n)^2$ by Rudelson. The previous result allows Paouris to remove one more logarithmic term.

Both results remain valid if one replaces the Lebesgue measure on an isotropic convex body by an arbitrary isotropic log-concave measure.

Invited Scientists: Siri Artstein, Imre Barany, Franck Barthe, Jesus Bastero, Karoly Boroczky, Christian Buchta, Alon Dmitryuk, Omer Friedland, Dimitris Gatzouras, Apostolos Giannopoulos, Efim Gluskin, Yehoram Gordon, Olivier Guedon, Aicke Hinrichs, Daniel Hug, Gil Kalai, Boaz Klartag, Hermann Koenig, Alexander Koldobsky, Michael Krivelevich, Rafal Latala, Piotr Mankiewicz, Mathieu Meyer, Emanuel Milman, Vitali Milman, Krzysztof Oleszkiewicz, Alexander Olevskii, Alain Pajor, Aleksander Pelczynski, Peter Pivovarov, Shlomo Reisner, Mark Rudelson, Dmitry Ryabogin, Irina Ryzhkova, Michael Sass, Michael Schmitz, Michael Schmuckenschläger, Rolf Schneider, Carsten Schütt, Mariya Shcherbina, Alexei Shcherbina, Misha Sodin, Alina Stancu, Nicole Tomczak-Jaegermann, Antonis Tsolomitis, Roman Vershynin, Rick Vitale, Roy Wagner, Wolfgang Weil, Elisabeth Werner, Vladyslav Yaskin

Complex Analysis, Operator Theory and Application to Mathematical Physics

Organizers: Friedrich Haslinger, Emil Straube and Harald Upmeier

Budget: ESI €56.250,–

Dates: September 5 - November 11, 2005

Preprints contributed: [1676], [1698], [1701], [1705], [1706], [1707], [1715], [1718], [1720], [1721], [1731], [1735], [1736], [1737], [1738], [1743], [1754], [1762], [1763], [1765]

Report on the program

The ESI Senior Fellow Lectures "The L^2-Sobolev theory of the $\overline{\partial}$-Neumann problem" by Emil Straube started in May 2005. A group of 5-10 students from the Department of Mathematics of the University of Vienna attended the lectures taking the opportunity to be prepared for the activities in the fall. The Senior Lectures were continued in October and November 2005 and found lively response by participants of our program and of other parallel-running programs.

Two Junior Research Fellows (A. Herbig (University of Michigan) and M. Pevzner (Université Reims)) stayed at ESI for the whole time of the program giving several interesting talks at ESI and at the Department of Mathematics of the University of Vienna. H. Samuelsson

(Chalmers University) attended our program on his own costs; he had recently finished his PhD and reported about his thesis on residue currents.

The project started in the first week of September with the lecture of A. Sergeev (Steklov Institute, Moscow) "Adiabatic paths and pseudoholomorphic curves", where a correspondence between solutions of the Seiberg–Witten equations on a compact 4-dimensional symplectic manifold and pseudoholomorphic curves on this manifold was considered. The work on this subject started when A. Sergeev first visited the ESI in 1999. In the talk a summary was given of what had been done during the past years in this direction.

The next activities concentrated on the spectrum of Schrödinger and Dirac operators with interesting connections to complex analysis and combinatorics (B. Mityagin and P. Djakov). These topics met with a lively response from junior fellows and participants from parallel-running projects.

G. Raikov gave a lecture on "Toeplitz operators in the spectral and scattering theory of magnetic quantum Hamiltonians," where the role of Toeplitz operators in the spectral and scattering theory of some magnetic quantum Hamiltonians like the Schrödinger and the Pauli operators was discussed. It turned out that this theme was of great importance for later investigations during the program, especially for the $\overline{\partial}$-Neumann operator and the canonical solution operator to $\overline{\partial}$.

In the second half of September a first group of specialists in Complex Analysis (A. Herbig, I. Lieb, N. Nikolov, T. Ohsawa) attended the program giving reports on Levi-flats, compactness and subellipticity of the $\overline{\partial}$-Neumann operator, and symmetrized polydiscs.

H. Upmeier organized the Mini-Workshop "Quantization, Complex and Harmonic Analysis" on Sept. 22 and 23 with 9 lectures. The aim of the workshop was to address the recent interactions between complex analysis on hermitian symmetric spaces, the associated harmonic analysis (discrete series representations) of the holomorphic automorphism group, and quantization procedures in modern mathematical physics. The talks by M. Schlichenmaier "Berezin-Toeplitz quantization of the moduli space of flat SU(n)-connections" and C. Fleischhack "Quantization restrictions for diffeomorphism invariant gauge theories" were directly related to current research in physics. The interplay with harmonic analysis was emphasized in the talks by M. Pevzner "Kontsevich quantization and the Duflo isomorphism", K.H. Neeb "Orbits of triples in the Shilov boundaries of bounded symmetric domains", G. Zhang "Hua operators and Poisson transform for non-tube type symmetric domains" and H. Ishi "Unitarizability of holomorphically induced representations of a split solvable Lie group". The two talks by G. Marinescu/Y. Ma on "Asymptotic expansions of generalized Bergman kernels" generated a lot of interest because of the wide range of applications and the importance of the "spectral gap" property. The talks by T. Nomura "On a certain 8-dimensional non-symmetric homogeneous convex cone", C. Kai "A characterization of symmetric tube domains by convexity of Cayley transform images" and A. Alldridge "Index theory for Wiener-Hopf operators on convex cones" addressed challenging problems in complex and convex analysis related to tube type domains.

In the first half of October there was another "mini-morkshop: "Complex Analysis and Operator Theory on Symmetric Spaces" with 5 lectures again organized by H. Upmeier. This workshop concentrated on recent progress combining complex analysis on symmetric domains with problems in functional analysis (Hilbert spaces of holomorphic functions) and operator theory (Toeplitz operators on Bergman spaces). J. Arazy reported on "Moebius invariant Banach spaces of holomorphic functions", M. Englis talked on "Qp-spaces on bounded symmetric domains", Y. Neretin presented a highly original application of "fermionic" analysis to "Har-

monic analysis and Berezin transform for anti-commuting variables", and N. Vasilevski talked about "Commutative C*-algebras of Toeplitz operators on the unit disk". The ESI Junior Fellow M. Pevzner gave a second talk on "Berezin quantization for automorphic functions and Cohen-Rankin brackets".

In both workshops the close interaction between the participants coming from diverse areas related to complex and harmonic analysis was very encouraging and led to several new research projects and collaborations.

Lee Stout gave an interesting report on approximation on real-analytic sets and K.-T. Kim on analytic polyhedra in $\mathbb{C}^2$ with non-compact automorphism group.

Between October 24 and November 10 the main activities on Complex Analysis took place, starting with the workshop "Complex Analysis and PDE's", October 24 - October 28, organized by F. Haslinger and E. Straube. There were 15 lectures and about 30 participants.

The first talks were devoted to regularity questions of $\overline{\partial}$, to the $\overline{\partial}$- Neumann problem on product domains, to non-compactness of the $\overline{\partial}$- Neumann operator and to Cauchy-Fantappie integrals. On the following day J.J. Kohn presented his lecture on PDE's with loss of derivatives which found a large audience and was of great interest also for participants of other projects. These $\mathcal{C}^\infty$-hypoelliptic operators are singular sums of squares of complex vector fields on the complex Heisenberg group. D. Tartakoff continued showing that these operators are even analytic hypoelliptic.

This lecture was followed by a talk of J. D'Angelo on "Monotonicity Results for Volumes of Holomorphic Images of Balls and Eggs".

E. Straube and F.Haslinger reported on ""Global regularity and compactness properties of the $\overline{\partial}$-Neumann operator".

On the following days the themes were "Deformations of Stein Structures and Extensions of Holomorphic Mappings" (F. Forstneric), "A new disc formula for the Siciak-Zahariuta extremal function" (Ragnar Sigurdsson), "Estimates of Heat Kernels in $\mathbb{R}\times\mathbb{C}$" (A. Raich), "Certain properties of the Bergman kernel" (W. Zwonek and Z. Blocki), "Local equivalence and symmetries of Levi degenerate hypersurfaces in $\mathbb{C}^2$" (M. Kolar), "The finite jet parametrization problem" (B. Lamel), "Regularizations of residue currents (H. Samuelsson)", "Subelliptic estimates for some systems of complex vector fields" (M. Derridj).

In November Mei-Chi Shaw ("Estimates for tangential Cauchy-Riemann equations with minimal smoothness"), A. Laptev ("Complex analysis and Hardy's inequalities for many particles"), Ph. Harrington ("Compactness and the $\overline{\partial}_b$ problem"), K. Diederich ("Non-isotropic analysis on lineally convex domains"), Evgeny Korotyaev ("Inverse problem for harmonic oscillator perturbed by potential on the half-line"), R. Dwilewicz ("Holomorphic extensions in fiber bundles and applications to complex tori"), and G. Francsics ("Spectral analysis on complex hyperbolic spaces") were the last speakers of the program.

The complete program together with a list of all participants and abstracts of all lectures can be found under http://www.mat.univie.ac.at/ has/prog05.html

It turned out that the participants found new and interesting insights in their own work by comments and remarks by other colleagues leading to a considerable output of preprints (16 so far). In this connection it was very important that B. Helffer gave his Senior Lectures "Introduction to the spectral theory for Schrödinger operators with magnetic fields and applications" at the same time. His lectures were attended by many participants of our program and led to several new and far-reaching results by applying methods for Schrödinger operators to problems in Complex Analysis.

Invited Scientists: Alexander Alldridge, Jonathan Arazy, Zbigniew Blocki, Antonio Bove, John P.

D'Angelo, Makhlouf Derridj, Klas Diederich, Plamen Djakov, Roman Dwilewicz, Armen Edigarian, Dariush Ehsani, Miroslav Englis, Christian Fleischhack, John E. Fornaess, Franc Forstneric, Gabor Francsics, Friedrich Haslinger, Phillip Harrington, Anne-Katrin Herbig, Andrei Iordan, Hideyuki Ishi, Chifune Kai, Joe Kamimoto, Kant-Tae Kim, Kenneth Koenig, Joseph Kohn, Martin Kolar, Evgeny Korotyaev, Bernhard Lamel, Loredana Lanzani, Ari Laptev, Christine Laurent-Thiebaut, Jürgen Leiterer, Ingo Lieb, Xiaonan Ma, George Marinescu, Jeffery McNeal, Boris Mityagin, Karl-Hermann Neeb, Yuri Neretin, Andrea Nicoara, Nikolai Nikolov, Takaaki Nomura, Takeo Ohsawa, Michel Pevzner, Andy Raich, Georgi Raykov, Sonmez Sahutoglu, Hakan Samuelsson, Martin Schlichenmaier, Armen Sergeev, Mei-Chi Shaw, Ragnar Sigurdsson, Thomas Skill, Lee Stout, Emil Straube, David Tartakoff, Harald Upmeier, Nikolai Vasilevski, Genkai Zhang, Wlodzimierz Zwonek

Geometry of Pseudo-Riemannian Manifolds with Application to Physics

Organizers: D. Alekseevsky, H. Baum, (J. Konderak † Sep. 2005)

Budget: ESI €45.000,–

Dates: September 1 – December 31, 2005

Preprints contributed: [1695], [1702], [1713], [1723], [1724], [1725], [1726], [1727], [1730], [1748], [1757], [1761], [1764], 1766], [1778], [1779], [1780], [1782]

Report on the program

The Special Semester brought together highly qualified researchers working on different aspects of the geometry of manifolds with indefinite metrics. Whereas in Riemannian geometry in the last 30 years essential progress was achieved in understanding relations between the local and global structure of Riemannian manifolds and many classification results for different classes of Riemannian manifolds were obtained (e.g. manifolds with additional geometric structures, manifolds with conditions on curvature, homogeneous Riemannian spaces), similar results for pseudo-Riemannian manifolds are rare and many problems are still open. For a long time the main source of problems in pseudo-Riemannian geometry was General Relativity which deals with 4-dimensional Lorentzian manifolds (spacetimes). However, the developments in Theoretical Physics (Supergravity, String theory) require a deeper understanding of the geometric structure of higher dimensional manifolds with indefinite metrics of different signature. Moreover, pseudo-Riemannian metrics naturally appear in different geometric problems (e.g. in CR geometry and in the geometry of lines in the Euclidean 3-space). Sometimes, one can use special *Ansätze* or "Wick-rotations" to transform the problems of pseudo-Riemannian geometry into Riemannian ones. But in many aspects pseudo-Riemannian geometry essentially differs from Riemannian one and many specific, highly nontrivial and interesting questions appear. In recent times different groups started to focus their attention to geometric problems arising by indefinite metrics. During the program we discussed results of different groups working in pseudo-Riemannian geometry, which will lead to closer cooperation of many participating scientists in the future.

The main topics of the program were:

- Classification of holonomy representations of pseudo-Riemannian manifolds and study of global models of pseudo-Riemannian manifolds with special holonomy

- Symmetries of pseudo-Riemannian manifolds, symmetric and homogeneous spaces, pseudo-Riemannian G-manifolds
- Special classes of pseudo-Riemannian manifolds and interaction of pseudo-Riemannian structures with other geometric structures
- Einstein equation and other equations for a pseudo-Riemannian metric and relations with integrable systems
- Spin geometry in indefinite signature
- Conformal geometry in indefinite signature (Kleinian spaces, conformal invariants, conformal completions)
- Global structure of Lorentzian manifolds. Causality properties of space-times and behavior of geodesics
- Applications in General Relativity, Supergravity and String theory

In the following we describe some of the main subjects of the program

1. Holonomy groups of pseudo-Riemannian manifolds

Whereas the connected holonomy groups of Riemannian manifolds are well understood and the corresponding special geometries are intensively studied, the same question for indefinite metrics is widely open and much more difficult due to the appearance of indecomposable but non-irreducible holonomy representations. During the program we had several discussions and extended talks about recent achievements in the field (complete classification of connected holonomy groups of Lorentzian manifolds (talk by Th. Leistner), complete classification of holonomy groups of pseudo-Kähler manifolds of index 2 (talk by A. Galaev) classification of weakly-irreducible and totally reducible holonomy representations) (talk by L.Berard-Bergery). The scientific work during the program concentrated on the study and construction of global models for pseudo-Riemannian manifolds with special holonomy. In particular, progress was made in the description of indefinite homogeneous manifolds with special holonomy (Alekseevski, Galaev, Neukirchner), the description of the holonomy of pseudo-Riemannian cones (Alekseevski, Galaev) and in the construction of global hyperbolic Lorentzian manifolds with special holonomy (Baum, Mueller).

2. Symmetries of pseudo-Riemannian manifolds, symmetric and homogeneous spaces, pseudo-Riemannian G-manifolds

Whereas pseudo-Riemannian symmetric spaces with semi-simple transvection group are classified, the classification of pseudo-Riemannian symmetric spaces with non-semisimple transvection group was a long time open problem. In 2003-2005 I. Kath and M. Olbrich developed a certain cohomology theory which can be used to describe the moduli space of pseudo-Riemannian symmetric spaces and yield a method for the classification of pseudo-Riemannian symmetric spaces with additional geometric properties. These results and its applications were presented in extended talks and discussed between the participants. For a Riemannian manifold M with an isometry group G, the local description of the action of G on M and the local structure of the orbit space M/G are well known. Some generalizations of these results to the pseudo-Riemannian case are done during the program by Alekseevsky and Szenthe. In several talks of participants of the program group actions, homogeneous or symmetric structures were used to construct

manifolds with special geometric structures (CR-, para-CR, hyper-Kähler, para-quaternionic, hypersymplectic and so on). The cooperation during the ESI program on this subject will be continued with a workshop at the MPI in Leipzig in June 2006.
Another subject was the study of manifolds with special symmetries. During the program several participants started to write resp. finished papers on the classification of 4-dimensional pseudo-Riemannian spaces with conformal Killing fields or Killing leaves and with anti-self-dual metrics (see for example the preprints of Dunajski, Kamada, Vilasi). W. Goldman spook about the classification of proper actions of discrete groups on Minkowski space and hyperbolic surfaces, which gave new inside in that branch of Lorentzian geometry for most of the participants.

3. Special classes of pseudo-Riemannian manifolds and an interaction of pseudo-Riemannian structures with other geometric structures

A pseudo-Riemannian metric naturally arises in different contexts. In talks by Guiloyle and Klingenberg, a pseudo-Riemannian metric in the space of lines in the Euclidean 3-space was constructed and its role in the geometry of caustics was discussed. Different aspects of CR geometries and associated geometric structures (in particular, Fefferman metrics) were discussed in talks by G. Schmalz, F. Leitner, S. Dagomir. Para-CR manifolds was studied by F. Belgun. A topological classification of low dimensional metric contact structures was discussed by Ch. Galicki. A construction of Bochner-flat pseudo-Kaehler manifolds was given by Kamishima and some classes of self-dual pseudo-Kaehler metrics were described by Kamada. Special metrics of split signature which appear in superstring theory were discussed by F. Witt.

4. Einstein equation and other equations for a pseudo-Riemannian metric and relations with integrable systems

Einstein metrics and (anti)self-dual metrics appeared in many talks. A survey of results about Einstein metrics in General Relativity with two Killing fields was given by Vilasi. Geometric structures associated with the self-duality equation and its relation with integrable systems were discussed by Strachan and Grant. Yamabe's problem for indefinite signature and the problem of existence of a pseudo-Riemannian metric with prescribed scalar curvature were presented in a talk by M. Nardmann.

5. Spinors in indefinite signature

Besides Papadopoulos talks about application of spinor geometry to supergravity, some talks were devoted to the investigation of different types of spinor fields in a pseudo-Riemannian manifold. A. Ikemakhen discussed parallel spinors on $Spin^{\mathbb{C}}$-manifolds, H.-B. Rademacher dealt with twistor spinors on orbifolds and F. Finster discussed Witten spinors in asymptotically Schwarzschild manifolds.

6. Conformal geometry in indefinite signature

During the ESI program several new developments in conformal (in particular Lorentzian) geometry were presented in lectures and discussed between the participants. Among them: The description of Lorentzian Kleinian spaces and of essential conformal Lorentzian structures (talk by Ch. Frances), new results on conformal and projective holonomy (talks by Baum, Armstrong, Leistner), conformal geometry of Fefferman spaces and there generalizations (Leitner, Dragomir), structure of zeros of conformal vector fields (W. Kühnel, Ch. Frances). This led to

new joint projects between participants (for example Leistner/Armstrong on conformal holonomy and ambient space connections; Alekseevski/Baum on conformal symmetric spaces and their conformal holonomy).

7. Global structure of Lorentzian manifolds. Causality properties of space-times and behavior of geodesics

Recently M. Sanchez and coworkers and others made progress in detailed study of global structure of spacetimes, in particular its causality properties and different types of boundaries. For example, some "folk problems" were solved like the smoothability of time functions, the smooth splitting theorem for globally hyperbolic spacetimes or the equivalence of two classical definitions of causal stability. Furthermore, new (infinite-dimensional) variational methods were developed to study geodesics in pseudo-Riemannian manifolds. These results were presented in talks of Sanchez, Candela and Flores and led to new projects between these scientists.

8. Applications in Supergravity, String Theory and Quantum Field Theory

During the program several talks were given on application of geometric methods of pseudo-Riemannian geometry in Supergravity and Superstring Theory. A mathematical introduction to different theories of supergravity was given by Papadopoulos, the role of homogeneous models in supergravity was discussed by Figueroa O'Farrill, generalized geometric structures in superstring theory were presented by Witt, McConamhan gave a survey of his results on the classification of supersymmetric spacetimes in supergravity in the framework of G-structures. The aim of these talks was to support the communication between mathematicians and physicists.
The special workshop "Hyperbolic operators on Lorentzian manifolds and quantization" from Nov 10 - Nov 12 during the program (organized by Chr. Bär, H. Baum, K. Fredenhagen) brought together mathematicians interested in geometric and analytic aspects of hyperbolic operators on Lorentzian manifolds and physicists working in quantum field theory on curved spacetimes. This workshop included a series of introductory lectures for PhD students and younger scientists on fundamental solutions of normally hyperbolic operators on globally hyperbolic Lorentzian manifolds, C^*-algebras and quantization given by Chr. Bär, N. Ginoux and F. Pfäffle (Potsdam) as well as research talks on recent results in quantum field theory on curved spacetimes by physicists.

Invited scientists: Adrian Andrada, Dmitri Alekseevsky, Jesse Alt, Bernd Ammann, Stuart Armstrong, Christian Bär, Oliver Baues, Helga Baum, Florin Belgun, Charles Boubel, Lionel Berard-Beregry, Romeo Brunetti, Anna Maria Candela, Vincente Cortes, Matthias Dahl, Claudio Dappiaggi, Johann Davidov, Antonio J. Di Scala, Sorin Dragomir, Maciej Dunajski, David Eelbode, Vladimir Ezhov, Charles Frances, Chris Fewster, Felix Finster, Jose Luis Flores, Klaus Fredenhagen, Kris Galicki, Eduardo Garcia-Rio, Nicolas Ginoux, Bill Goldman, Brendan Guilfoyle, Rafael Herrera, Stefan Hollands, Aziz Ikemakhen, Wolfgang Junker, Hiroyuki Kamada, Yoshinobu Kamishima, Ines Kath, Wilhelm Klingenberg, Wolfgang Kühnel, Matthias Lampe, Thomas Leistner, Fernando Lledo, Oisin MacConamhna, Vladimir Matveev, Yasuo Matsushita, Olaf Müller, Paul-Andi Nagy, Oleg Mushkarov, Marc Nardmann, Jose F. O'Farrill, Lutz Osterbrink, George Papadopoulos, Franf Pfäffle, Nicola Pinamonti, Hans-Bert Rademacher, Hannu Rajaniemi, Marcos Salvai, Miguel Sanchez Caja, Gerd Schmalz, Elmar Schrohe, Andrea Spiro, Uwe Semmelmann, Calvin Smith, Michael Steller, Ianus Stere, Ian Strachan, Alexander Strohmeier, Andrew Swann, Janos Szenthe, Rainer Verch, Gaetano Vilasi, Frederik Witt, Robert Wolak, Agdelghani Zeghib

Workshops organized outside the main programs

Winter school in geometry and physics, Srni (Czech Republic)

Organizers: P. Michor, J. Slovak, V. Souček

Budget: Budget contribution by the ESI €1.000,–

Dates: January 15 - January 22, 2005

Report on the program

This traditional conference has taken place each January since 1980 for one week in a picturesque village in the Czech part of the Bohemian mountains. Since 1994 it has been a joint enterprise of the Czech Society of Mathematicians and Physicists and the Erwin Schrödinger Institute for Mathematical Physics. The meeting this year centered around questions in Lie theory proper and relations with geometry and harmonic analysis. The proceedings of this meeting will be published as a supplement of the 'Rendiconti Matematici di Palermo'.

Singularity Formation in Non-linear Evolution Equations

Organizers: Piotr Bizoń, Peter C. Aichelburg

Budget: ESI €10.000,–

Dates: May 9 – May 22, 2005

Report on the program

This was a follow-up workshop on the topics of the program with the same title in 2004. The idea was to discuss the progress of some projects that have been initiated during the first meeting in summer 2004. The following projects were discussed:

1. **Convergence towards a self-similar attractor** (Aichelburg, Bizoń, Martin-Garcia). Various approaches to this problem were compared. The related spectral problems were solved both numerically (via orthogonalization) and analytically (via continued fractions)

2. **Critical behavior in the gravitational collapse** (Aichelburg, Bizoń, Martin-Garcia, Tabor). The transition between continuous and discrete self-similarity in the critical gravitational collapse in the Einstein-sigma model has been actively discussed. A consistent dynamical systems interpretation of the numerically observed fine structure was proposed. The result is written up and will be published soon.

3. **Self-similar solutions of semilinear wave equations** $u_{tt} - \Delta u = u^p$ (Bizoń, Maison, Wasserman). Under the assumption of self-similarity and spherical symmetry this problem reduces to a 3-dimensional dynamical system. Bizoń, Maison, and Wasserman found a way to prove the existence of a countable family of solutions in the supercritical case $p = 7$. The proof will be published soon. The corresponding proof for the subcritical case $p = 3$ has also been completed.

Invited scientists: Piotr Bizoń, Dieter Maison, José M. Martin-Garcia, Istvan Racz

Summer School 'Vertex Algebras and Related Topics'

Organizers: Edward Frenkel, Victor Kac, Joachim Schwermer

Budget: ESI €35.901,20

Dates: June 12 – July 2, 2005

Preprints contributed: [1664]

Report on the program

In June 2005, the Erwin-Schroedinger Institute hosted a summer school entitled "Vertex Algebras and Related Topics". The program organizers were Edward Frenkel (UC Berkeley), Victor Kac (MIT) and Joachim Schwermer (University of Vienna). This three-week program reflected some of the major developments of the past years in the subject. It attracted leading experts in the field as well as more than 25 graduate students or post-doctoral fellows from all over the world.

The theory of vertex algebras is a rapidly growing field of mathematics, involving the collaboration of a large number of physicists and mathematicians. Vertex algebras are a class of algebras underlying a number of recent constructions in mathematics and physics. A vertex algebra is an algebra of vertex operators, or equivalently, an algebra whose operations are given by vertex operators. These operators were first studied in the 1970s by physicists in dual resonance theory, one of the sources of string theory. Examples of vertex operators came up as well in the theory of representations of affine Lie algebras. In the mid 1980's a more axiomatized approach emerged and paved the way towards a number of striking applications in a wide range of branches of mathematics. Meanwhile, in physics, studying the underlying algebraic structures of two-dimensional conformal field theory, physicists arrived at the concept of a chiral algebra, a notion essentially equivalent to the notion of a vertex algebra. However, by now, a vertex algebra is a purely algebraic notion. Roughly speaking, it is a vector space V, endowed with a distinguished vector, the vacuum vector, and the vertex operator map from V to the space of formal Laurent series with linear operators on V as coefficients. These data satisfy a number of axioms and have some fundamental properties as, for example, an analogue of the Jacobi identity, locality and associativity. These properties have deep geometric substance. They reflect the the conformal-field-theoretic interpretation of vertex operator algebras.

The connections of this topic area with other branches of mathematics and physics include algebraic geometry (mirror symmetry, chiral de Rham complex), algebraic topology, representation theory (geometric Langlands correspondence, superconformal algebras), the theory of operator algebras, two dimensional conformal field theory and string theory. It was one of the main aims of this workshop to explore related higher dimensional quantum field theories as well.

The program comprised the following three-lecture mini-courses:

Victor Kac: *Introduction to vertex algebras and their representations*, Robert Longo: *Operator algebras and quantum field theory*, David Ben-Zvi: *Factorization and chiral algebras*, Andrei Okounkov: *Instanton counting*, Fedor Malikov: *Algebras of chiral differential operators*, Alberto DeSole: *Finite and infinite W-algebras*, Tomoyuki Arakawa: *Representation theory of W-algebras*, Edward Frenkel: *Vertex algebras of geometric origin.*

These introductory short courses were designed for graduate students and postdoctoral fellows. The audience was quite eclectic, ranging from physicists to algebraists to geometers. There were many fruitful discussions across boundaries, and these led to some additional more specialized lectures by other participants. Thus, in three very intensive weeks, the program

succeeded in tying together most of the new developments in this field. At the same time, this summer school served as a launch pad for a variety of new research projects.

Invited scientists: Tomoyuki Arakawa, Bojko Bakalov, David Ben-Zvi, Gergely Berczi, Alexander Braverman, Alessandro D'Andrea, Alberto De Sole, Luca Forte, Edward Frenkel, Hans Gmasz, Maria Gorelik, Gerald Gotsbacher, Vincent Graziano, Reimundo Heluani, Victor Kac, Ysuyuki Kawahigashi, Roberto Longo, Fedor Malikov, Kiyokazu Nagatomo, Nikolay Nikolov, Boris Noyvert, Andrei Okounkov, Alexander Retakh, Florian Schaetz, Joachim Schwermer, Matthew, Szczesny, Andras Szenes, Valerio Toledano Laredo, Andrew Tolland, Ognjen Vukadin, Minoru Wakimoto, Mihaly Weiner, Feng Xu, Yongchang Zhu

The Interaction of Mathematics and Physics at the Turn of the Twentieth Century

Organizers: Della D. Fenster, Joachim Schwermer

Budget: ESI €1.425,–

Dates: February 10 - June 30, 2005

Report on the program

The emergence of mathematical physics as an independent discipline at the end of the 19th century brought with it profound discussions of the foundations of both mathematics and physics as well as a fruitful cooperation between these two fields. In this period far-reaching concepts of modern physics and new, fundamental mathematical structures were constructed. Mathematicians such as Henri Poincaré, David Hilbert and Hermann Minkowski contributed to this development. The reception of their work by physicists like Hendrik A. Lorentz or Albert Einstein, and the exchange of views on space and time, lie at the core of the revolutionary physical theories created at the beginning of the 20th century. There is need of closer examination of the interaction between mathematics and mathematical physics, its particular formulation in Vienna at the hands of Ludwig Boltzmann and others, and the reception of Einstein's theories of special and general relativity in Austria, for example among the theorists of the Vienna circle.

In the summer 2005, Senior Research Fellow Della Dumbaugh Fenster from the University of Richmond and Joachim Schwermer (ESI) drew attention to this topic area by organizing a series of lectures at the ESI. The talks found broad interest among researchers and students and initiated a new awareness of the historical context that goes along with the sciences in question.

In February 2005, Leo Corry, Director of the Cohn Institute for History and Philosophy of Science at Tel-Aviv University, talked on *David Hilbert and the Axiomatization of Physics*. Among the contributions to physics Hilbert made, one finds his solution of the Boltzmann equation and his involvement with the formulation of the field equations of general relativity. It is also known that the sixth of Hilbert's famous 1900 list of problems was a call for the 'axiomatization of physics'. Still, until relatively recently, one considered all these contributions as no more than sporadic incursions into a totally foreign field. Based on recent historical research, Corry brought to light a very different picture whereby physics appears as a fundamental pillar of Hilbert's scientific world-view and as an organic component of his research and teaching activities at Göttingen throughout his career. In particular, the axiomatization of physics appears as the connecting thread among all of his activities in this field, as well as the link to much of his work in pure mathematics.

Drawing on a wide range of archival material, including the correspondence between the young American algebraist Adrian A. Albert and the German number theorist Helmut Hasse, Della D. Fenster discussed in her talk *A Delicate Collaboration: Adrian Albert and Helmut Hasse and the Principal Theorem in Division Algebras in the Early 1930's* the emergence of the theory of normal simple algebras over algebraic number fields and their final classification. Traditionally this result is associated with the celebrated German trio of mathematicians Richard Brauer, H. Hasse and Emmy Noether. Indeed, they formed one of the collaborative efforts that led to the proof of the principal theorem in linear algebras in the 1930's. This talk, however, highlighted the other joint work linked with the proof of this result, namely that of Albert and Hasse.

Henri Poincaré was widely regarded as being one of the leading mathematicians of his day, as well as one of the leading theoretical physicists and a successful popular philosopher. The contributions he felt that he could make to theoretical physics drew upon his mastery of mathematics as well as his philosophy of science. In his talk *Poincaré's electro-magnetic Theory: Philosophy and Physics around 1900*, Jeremy Gray addressed these issues in detail. His discussion, in particular, shed light on the complicated question of the similarities and differences between Poincaré's ideas and Einstein's special theory of relativity.

Geometric Aspects of Spectral Theory, Matrei, East-Tyrol

Organizers: M. van den Berg, L. Friedlander, T. Hoffmann-Ostenhof

Budget: Entirely financed by the ESF

Dates: July 2 – July 12, 2005

Report on the program

Summary: The workshop might be considered as a follow-up of a workshop with the same title in 1999 that also took place in Matrei at the Hotel Outside.

There were 24 talks and many discussions including a problem session. 25 scientists participated in this workshop. The participants originated from about 12 different countries.

The scientific focus was on all kinds of spectral questions in connection with elliptic operators. Most of the talks had some geometric flavor. The participants presented their recent papers or/and work in progress. Since all participants stayed at the same hotel where also the talks were given, there were many interesting discussions during the days, in particular also during breakfast and dinner.

A list of the participants, the titles of the talks, most of them with abstracts, some contributions to the problem section and further information about this workshop can be found on the webpage of the ESF program SPECT:

http://www.math.kth.se/ laptev/ESF/05/Matrei/FrPage.html

Scientific Content: Many problems of spectral theory are intimately connected with questions of geometrical nature. This workshop was mostly dedicated to questions of this nature.

Some of the central problems can be described as follows: there is a self-adjoint elliptic operator

$$H = -\Delta + V$$

defined on a domain $\Omega \subset \mathbb{R}^d$ or on a manifold with suitable boundary conditions. Thereby the Laplacian can be replaced by more general operators, for instance with a magnetic field or one

considers operators (now not self adjoint) with a drift term. $V : \Omega \mapsto \mathbb{R}$, the "potential", is a real valued function satisfying suitable regularity conditions. Usually one studies the spectrum of H, i.e. the eigenvalues, and also the associated eigenfunctions. For the essential spectrum one can investigate questions from scattering theory.

Together with these problems also inverse problems arise for which some data, (eigenvalues, scattering data, etc.) are given and informations on the potential or on boundary conditions are sought.

Here we just mention a few keywords concerning the talks. The relation between the geometric nature of the eigenfunctions, in particular the nodal sets of eigenfunction, and eigenvalues, has been discussed in the talks of Pedro Freitas, Bernard Helffer and Uzy Smilansky; nodal lines, but now in connection with the wave equation were discussed in the talk of Peter Kuchment. Inverse problems have been addressed by Yves Colin de Verdiere, Ari Laptev and Gerald Teschl. Quantum chaos questions were addressed in the talks of John Toth and Steve Zelditch. General spectral problems in connection with fractal boundary conditions were addressed in the talk of Krysztof Burdzy, while in the talk of David Krejciric the spectrum of Schrödinger operators in tubes were investigated. Neumann Laplacians were studied in the talks of Brian Davies and David S. Jerison. Mixed boundary conditions were also addressed in the talk of Nikolai Nadirashvili together with a surprising generalization of the classical Faber Krahn inequality. Some optimal eigenvalue bounds were presented in the talks of Antoine Henrot, Evans Harrell and for the magnetic case by Lazlo Erdős. Also with a magnetic flavor was the talk of Søren Fournais concerning some problems related to the Ginsburg Landau equation. Michiel van den Berg gave an impressive survey of results concerning the heat content in relation with the heat kernel for elliptic operators on manifolds. Lennie Fiedlander gave a survey about determinants of elliptic operators and presented recent results. Thomas Kappeler gave an interesting insight concerning the KDV equation and its relations with diffeomorphism groups. Rainer Hempel considered scattering problems on manifolds with horns. Maria Hoffmann-Ostenhof presented results about the regularity of eigenfunctions of many-particle Coulombic systems near the singularities of the potential while Thomas Østergaard Sørensen considered some relativistic models for atoms in view of extensions of the Scott correction to these models.

This survey show that the topics addressed were manifold; but there was a lot more overlap between the talks than can be seen from this list. For instance the nodal sets occurred not only in the talks mentioned above, but also in the talk of Zelditch and Toth. And some of the techniques useful for one problem turned up also in different context. This made the discussions fruitful and probably all the participants also profited scientifically therefrom.

For instance in the talk of Burdzy there were some diagrams where hexagons occurred in a specific spectral context. This was found interesting by Michiel van den Berg and he then found out about related work that Susanna Terracini had coauthored and told Bernard Helffer about it. Her work turned out to be related to the problems of Bernard Helffer and Thomas Hoffmann-Ostenhof had been working for some time. There is now a collaboration of Helffer, Hoffmann-Ostenhof and Terracini which should produce soon a preprint about the relation of nodal domains and the spectrum. Without the conference this would not have happened. This little "anecdote" shows the merits of such conferences.

Finally there was a problem section which is also documented on the webpage mentioned above.

It is to be hoped that in the not so distant future some of the problems addressed there will be solved. But of course some might turn out to be very difficult. It is important to document those problems for motivation and inspiration.

Assessment of the results and impact of the event on the future direction of the field: Scientifically the presentation of many talks of researchers who share many scientific interests is profitable since it usually leads to collaborations. If there are already collaborations between participants then such a conference is an optimal occasion to push the joint efforts further. For instance Yves Colin de Verdiere (Grenoble) and David Jerison (MIT) used the time at Matrei also to continue their already existing collaboration.

The participants were from sufficiently many different subcommunities so that everybody was personally confronted with new mathematics, new problems and also with different approaches to problems. This led in particular to a lot of deep discussions and probably will on the long run have an impact on the field of research. Also quite a few participants had never met before and in this fairly small hotel the contacts were much easier than during big conferences with many more participants. There were a few rather young colleagues for which this work shop was one of the first ones they had ever participated in. For them the Matrei workshop was in particular important.

It will be seen in the future which collaborations and works have been initiated at this workshop. One such collaboration was mentioned above. But this can be fully assessed only a few years later. One should also remark that the participants expressed unanimously the wish that this conference should take place in a few year again. A conference with about 25 participants every, say, four years, in Matrei in this hotel could serve the community very well, both documenting the state of arts and pushing into new directions.

String Theory in Curved backgrounds and Boundary Conformal Field Theory

Organizers: Harald Grosse, A. Recknagel, V. Schomerus

Budget: ESI €5.000,–

Dates: November 3 – November 10, 2005

Preprints contributed: [1568], [1569], [1570], [1571], [1572], [1573], [1574], [1575], [1576], [1577], [1578], [1579], [1580], [1583], [1584], [1585], [1586], [1589], [1590], [1591], [1592], [1594], [1595], [1596], [1597], [1599], [1604], [1605], [1618], [1633], [1646], [1781]

Report on the program

This one week workshop was a follow-up activity to the program with the same title in 2005. It was attended by 12 participants and the main purpose was to discuss some of the progress that had been made in addressing the two central themes of the main program of the year before. Seminars of about two hours each were held in an informal style, allowing ample time for discussions.

Contributions concerning the description of strings and branes in Calabi-Yau backgrounds focused partly on novel techniques for constructing and classifying branes in Gepner models (e.g. Quella, Recknagel). In addition, the relation between branes in Gepner models and their geometric counterparts at large volume was addressed in a very inspiring seminar by Manfred Herbst.

On the context of non-compact and/or time-dependent backgrounds, too, several new developments were presented. These included an interesting relation between Liouville theory and AdS_3 (Ribault), novel constructions of strings on a simple supergroup (Schomerus) and a study of exactly solvable plane-wave backgrounds (D'Appollonio).

A few seminars dealt with new aspects that had not been addressed during the main workshop, ranging from general methods in integrable systems (Teschner) to applications of the AdS/CFT correspondence for the construction of charges in gravitational theories (Papadimitriou).

The overall quality of most seminars was very high and they triggered lively discussions among the participants. In this sense, we consider this short follow-up program very successful. We are convinced that it also helped to strengthen the mutual interaction between the participants. We are grateful to ESI for their support and the organization that was just as smooth as we had experienced it a year before.

Invited Scientists: Marco Baumgartl, Giuseppe D'Appollonio, Harald Grosse, Manfred Herbst, Ioannis papadimitriou, Andreas Recknagel, Sylvain Ribault, Thomas Quella, Voker Schomerus, Jörg Teschner, Gerard Watts

Vienna Central European Seminar on Particle Physics and Quantum Field Theory: Frontiers in Astroparticle Physics

Organizer: H. Hüffel

Budget: ESI €2.250,–, also supported by the Austrian Federal Ministry for Education, Science and Culture, by the Institute for High Energy Physics of the Austrian Academy of Sciences and by the Vienna Convention Buro.

Dates: November 25 – November 27, 2005

Preprints contributed: [1760], [1788], [1789], [1790]

Report on the program

Advisory Board: A. Bartl (Vienna), W. Grimus (Vienna), W. Majerotto (Vienna), A. Rebhan (Vienna), H. Rumpf (Vienna), D. Schwarz (Bielefeld).

The "Vienna Central European Seminar on Particle Physics and Quantum Field Theory" is a platform for junior scientists, as well as a unique forum for coordinating conferences, schools and doctoral courses in the Central European Region.

The topic this time was astroparticle physics. Spectacular observational progress leads to surprising conclusions about the nature of the Universe. Cosmic concordance, a consistent picture of the Universe where the very small meets the very large, seems to emerge. In the seminar recent developments, both experimental and theoretical, were addressed. There were 114 registered participants.

Webpage: http://www.univie.ac.at/vienna.seminar/index05.html

Invited Speakers:

L. Bergstrom (Stockholm): Candidates and Prospects of Detection for Particle Dark Matter
W. Buchmüller (DESY): Leptogenesis and the Gravitino Problem
M. Camenzind (Heidelberg): Black Holes in the Universe
L. Covi (CERN): Inflationary Models and a Running Spectral Index
E. Kolb (FERMILAB): Thoughts on Dark Matter, Dark Energy, and Inflation
B. Leibundgut (ESO): Supernova Cosmology
S. Masi (Rome): CMB Polarization: Status and Perspectives
W. Porod (Valencia): SUSY Dark Matter at Future Collider Experiments

G. Raffelt (Munich): Neutrino Physics in Heaven
A. Ringwald (DESY): The High Energy Universe: Observations and Implications
D. Schwarz (Bielefeld): Low-l Anomalies of the Microwave Sky

Supported Junior Scientists:

H. Culetu (Constanta): On the Hawking Wormhole Horizon Entropy
T. Herpay (Budapest): First Order Finite Temperature Restoration of Chiral Symmetry
H. Nikolic (Zagreb): Holographic Dark Energy and IR Scale of the Universe
T. Schwetz (Trieste): Neutrino Oscillations: Present Status and Outlook
D. Sexty (Budapest): Baryon Generation in Non-Equilibrium Electroweak Phase Transition
S. Shinkevich (Moscow): Relativistic Theory of Inverse Beta-Decay of Polarized Neutron in Strong Magnetic Fields
M. Sidorova (Moscow): Rare Meson Decays in Theories beyond the Standard Model
F. Takahashi (DESY): MeV-scale Reheating and Neutrino Thermalization

Further speakers:

M. Ahlers (DESY): Strongly Interacting Neutrinos at Ultra High Energies
I. Arefeva (Moscow): D-brane Decay and Cosmological Dark Energy
M. Biesiada (Katowice): Pulsating White Dwarfs as a Tool for Astroparticle Physics
M.-H.Genest (Montreal): Extended LHC Reach in Focus Point Region of MSSM
A. Villanova (Valencia): Predicting Neutrinoless Double Beta Decay in the A4 Family Symmetry Model

Poster Session:

R. Bertlmann, K. Durstberger, W. Grimus and B.C. Hiesmayr (Vienna): Bell Inequalities for the Neutral Kaon System
E. Dorfi (Vienna): Particle Acceleration in Supernova Remnants
S. Fajfer (Ljubljana): Impact of Charm Meson Resonances in D Meson Semileptonic Decays
Z. Li, W. Lucha and
F. Schöberl (Vienna): Exact- Propagator Instantaneous Bethe-Salpeter Equation for Quar-Antiquark Bound States
Z. Li, J. Liu, W. Lucha, W. Ma and F. Schöberl (Vienna): Relativistic Harmonic Oscillator
M. Martinis (Zagreb): Space-Time Non-Commutativity near Horizon of a Black Hole
V. Mikuta-Martinis (Zagreb): Charge and Isospin Fluctuations in High Energy pp-Collisions

Public Lecture:

E. Kolb (FERMILAB): Einstein's Cosmic Legacy

Discussion Sessions:

Two sessions, chaired by S. Schindler (Innsbruck) und H. Eberl (Vienna), respectively.

Bose-Einstein Condensation and Quantum Information

Organizers: Harald Grosse, Elliott H. Lieb, Walter Thirring, Peter Zoller

Budget: ESI €12.000,–

Dates: December 17 – December 20, 2005

Report on the program

This four day workshop was devoted to recent theoretical and experimental advances in the physics of ultra-cold atomic gases and of Quantum Information. These are presently among the most active research areas in physics and the workshop brought together leading experts in the field, several of whom come from Austria. Bose-Einstein condensation, theoretically predicted by Einstein in 1924 and experimentally realized 70 years later, as well as the phenomena behind Quantum Information bring out the quantum nature of matter in a dramatic way. Common to both areas is the importance of quantum *correlations* and *entanglement* where microscopic particles loose their individuality and reveal surprising properties that can only be understood by considering a many-particle system as a whole. What made this workshop rather unique was the blend of topics and the different approaches presented, including rigorous mathematical analysis, new theoretical ideas and experimental work.

Invited Speakers:

L.P. Pitaevskii: Is 1D Bose Gas Superfluid at $T = 0$?
C. Pethick: Ultra-cold Atomic Gases under Rotation
G. Shlyapnikov: Molecular and Unitarity Regimes in Degenerate Fermi Gases
A. Zeilinger: Quantum Communication and Quantum Computation with Entangled Photons
W. Zwerger: From Bose-Einstein Condensation to Quantum-Antiferromagnetism: Variations on Goldstone's Theorem
A. Aftalion: Vortices in Rotating Condensates
J.P. Solovej: Dyson's Formula for the Charged Bose Gas
R. Seiringer: Derivation of the Gross-Pitaevskii Equation for Rotating Bose Gases
E.H. Lieb: The Thermodynamic Limit for Matter and the Quantized Radiation Field
P. Zoller: Cold Atoms and Molecules in Optical Lattices
H.J. Briegel: Entanglement and Decoherence in Spin gases
F. Benatti: Brudno's Theorem and Algorithmic Complexity in Quantum Information
M. Arndt: Fundamental or Practical Limits of Matter Wave Coherence?
J. Fröhlich: Boson Stars
J.I. Cirac: Simulating Quantum Many-Body Systems
R. Grimm: Experiments with Strongly Interacting Quantum Gases
D. Petz: Quantum Entropy

Junior Research Fellows Program

Established in 2004 and funded by the Austrian government, the Junior Research Fellows Program provides support for PhD students and young post-docs to participate in the scientific activities of the Institute and to collaborate with its visitors and members of the local scientific community.

Due to its international reputation and to its membership in the European Post-Doc Institute the ESI received many applications from highly qualified post-docs for funding of extended visits (ranging from two to six months) only some of which could be covered by the Junior Fellows Program. In view of the close and well-established links between the ESI and many leading Eastern European academic institutions this program was particularly beneficial to young researchers from Eastern Europe and Russia. The presence of the Junior Research Fellows contributed significantly to the positive and dynamic atmosphere at the ESI.

A new component in this program was the three week *Summer School on Vertex Algebras and Related Topics* that was organized by Edward Frenkel (UC Berkeley), Victor Kac (MIT) and Joachim Schwermer (ESI). For a detailed report we refer to page 25. At the School 25 young mathematicians and mathematical physicists were introduced to the current status of research in this field through lectures given by leading experts. Some of the young participants also reported on their own research. For this school there were 33 applications of which 19 were granted. For the other applications the status was as follows:

1st deadline: 15.06.2005
Number of applications: 36
Number of accepted applicants: 9
Number of months granted: 5 for 2005, 25 for 2006

2nd deadline: 15.10.2005
Number of applications: 34
Number of accepted applicants: 11
Number of months granted: 36 for 2006

Junior Research Fellows in 2005

Name	Gender	Duration	Nationality
Sarah Bailey	female	02/06 - 31/07	United States
Christian Böhmer	male	01/02 - 31/05	Germany
Jessica Barrett	female	01/01 - 31/03	Great Britain
Matthias Birkner	male	01/03 - 31/03	Germany
Elena Cordero	female	01/05 - 30/06	Italy
Anton Galaev	male	01/09 - 31/01/06	Russia
Sebastian Guttenberg	male	01/05 - 31/07	Germany
Marcela Hanzer	female	01/01 - 31/01	Croatia
Anne-Katrin Herbig	female	04/09 - 10/12	Germany
Felipe Leitner	male	01/09 - 31/12	Germany
Thomas Neukirchner	male	01/10 - 31/12	Germany
Kasso Okoudjou	male	01/06 - 31/07	Benin
Alexander Powell	male	01/05 - 30/06	United States
Mikhail Pevzner	male	15/09 - 15/01/06	Russia
Nenad Teofanov	male	11/04 - 31/05	Serbia
Jan Tichavsky	male	01/10 - 30/11	Czech Republic
Alexandre Stefanov	male	01/01 - 31/01	Bulgaria
Stefan Wenger	male	01/06 - 31/08	Switzerland
Marcin Wiesniak	male	01/03 - 30/06	Poland
Michael Wohlgenannt	male	01/10 - 31/12	Austria
Vojtěch Zádník	male	01/01 - 15/02	Czech Republic
Roland Zweimüller	male	30/05 - 31/05	Austria

Preprints contributed: [1582], [1598], [1602], [1647], [1654], [1661], [1673], [1685], [1690], [1697], [1703], [1704], [1711], [1712], [1730], [1731], [1744], [1745], [1752], [1764], [1769], [1774], [1778]

Senior Research Fellows Program

To stimulate the interaction with the local scientific community the ESI offers lecture courses on an advanced graduate level. These courses are taught by Senior Research Fellows of the ESI whose stays in Vienna are financed by the Austrian Ministry of Education, Science and Culture and the University of Vienna. The coordinator of this program was Joachim Schwermer.

This year's program concentrated on the following lecture courses:
Werner Ballmann (Universität Bonn), Summer 2005, on: Kähler Geometry.
Jan Derezinski (Warsaw University), Summer 2005, on: Operator Algebras and their Applications in Physics.
Anatoly Vershik (Steklov Institute St. Petersburg), Summer 2005, on: Representation Theory of Symmetric Groups, Graphs, Universality.
Emil Straube (Texas A&M University), Summer 2005, on: The L^2-Sobolev Theory of the $\bar{\partial}$-Neumann Problem.
Bernard Helffer (University de Paris Sud, Orsay), Winter 2005, on: Introduction to the spectral theory for Schrödinger operators with magnetic fields and applications.
Della D. Fenster (University of Richmond), January–June 2005: Co-organization (with J. Schwermer) of a lecture series on *The Interaction of Mathematics and Physics at the Turn of the Twentieth Century.*

Werner Ballmann: Kähler Geometry

Course: After a short introduction into complex manifolds I discussed holomorphic vector bundles, Dolbeault cohomology with coefficients in holomorphic vector bundles, Serre duality, Hermitian metrics and Chern connection, Laplace operators and Weitzenböck formulae. After that I turned to Kähler geometry with the definition of Kähler manifolds and their basic characterizations in terms of Kähler form, complex structure, Kähler potential and special coordinates. I explained the basic relation of the Kähler form to volume and cohomology. I defined the Lefschetz map, computed commutator relations of the Lefschetz map with various differential operators, and discussed applications to harmonic forms and cohomology. The final lecture was devoted to work of Deligne, Griffiths, Morgan, and Sullivan. I proved the dd_c-Lemma and discussed their proof that closed Kähler manifolds are formal over the real numbers.

Research: Most of the time was consumed by my work on the manuscript for the lecture on Kähler geometry. In the course of this work I found some improvements of formulae related to commutator relations of the Lefschetz maps and their applications to harmonic forms. In 2006 the notes of this course will appear in the ESI Lecture Series in Mathematics and Physics published by the European Mathematical Society.

In addition I worked on a problem related to a theorem of Gromov, which asserts the existence of normal free subgroups for certain groups. This is an old project which has not come to an end yet. I worked on this also during my last stay at the ESI. I think that I made some real progress this time, motivated by a talk which I gave in the seminar of Professor Klaus Schmidt.

Jan Derezinski: Operator Algebras and their Applications in Physics

My stay at the Erwin Schrödinger Institute covered the period 29 Jan. -30 May 2005. Its first two months overlapped with ESI's program "Open Quantum Systems" organized by J. Yngvason

(Vienna), G. M. Graf (Zürich) and myself. During the program two workshops were organized and 3 minicourses were given, devoted to various mathematical aspects of nonequilibrium quantum physics.

Course: 18 two-hour lectures and seminars were given. They were concentrated in the first 2 weeks of March, April and May. Topics included:

1. General introduction to associative algebras, Banach algebras and C^*-algebras.
2. Spectrum of an operator and functional calculus
3. The Calkin algebra, Fredholm operators.
4. UHF (quasilocal) algebras.
5. The GNS representation.
6. Introduction to locally convex topologies.
7. The von Neumann Bicommutant Theorem and W^*-algebras.
8. Envelopping W^*-algebras and the quasiequivalence of representation.
9. The Tomita-Takesaki theory.
10. Standard form of W^*–algebras.
11. Infinite tensor product of Hilbert spaces and examples of W^*-algebras constructed from quasilocal algebras.

Research:

1. Bogolubov approach to the superfluidity of the Bose gas. It is conjectured that the shape of the infimum of the joint energy momentum spectrum for the homogeneos Bose gas at positive density has a cusp at the bottom, which is responsible for its superfluidity. An upper bound on this infimum has been studied, which can be viewed as a rigorous version of the Bogoliubov method. Collaboration with H. Cornean (Aalborg, Denmark), guest of ESI in March and P. Ziń (Warsaw) (ESI preprint [1741]).
2. Lecture notes on the canonical commutation and anticommutation relations. These lectures give a systematic exposition of the CCR and CAR with the emphasis on quasi-free states and the structure of W^* algebras generated by quasi-free representations. I took advantage of the presence of a famous specialist on this subject, H. Araki (Tokyo), guest of ESI in February in March, who discussed with me some of these topics (ESI preprint [1742]).
3. Stochastic limit. Inspired by the minicourse in the program Open Quantum Systems given by L. Accardi (Rome), guest of ESI in February, we started to study a vesion of the weak coupling limit, which does not restrict to the reduced dynamics but involves a study of asymptotic behavior of the full system. First we study a class of toy models – the so-called Friedrichs Hamiltonians. Next we consider physically more interesting Pauli-Fierz systems, which describe a small quantum system interacting with a reservoir. The results

illustrate the emergence of irreversibility in Hamiltonian systems. Collaboration with W. de Roeck (Leuven, Belgium), guest of ESI in February, March and May (J. Dereziński and W. de Roeck: Stochastic limit in the Friedrichs Model, in preparation, and Stochastic limit for Pauli-Fierz Hamiltonian, in preparation).

4. Scattering at low energies for long range potentials satisfying a certain virial condition, both in the classical and quantum case. The aim is to describe the asymptotics of the wave and scattering operator up to the zero energy. Collaboration with E. Skibsted (Aarhus, Denmark), guest of ESI in March (J.Dereziński and E. Skibsted: Classical scattering at low energies, in preparation, and Scattering at low energies for a class of slowly decaying potentials).

5. Massless limit of the "massive QED" and the Meissner effect. Collaboration with K. Meissner (Warsaw), guest of ESI in April and May.

Preprints contributed: [1741], [1742]

Anatoly Vershik: Representation Theory of Symmetric Groups, Graphs, Universality

Course: I gave a course for graduate students on modern theory of representations of the finite and infinite groups (10 lectures, 20 hours). The course was based on the new approach to the representation theory of symmetric groups and contained a general introduction to the theory of representations of finite groups. The second part of the course included the main facts of the theory of infinite symmetric group, its characters and constructions of important representations.

Research: During my stay I worked with U. Haebock on the text of lecture notes (based on lectures delivered at ESI and the Technical University of Vienna in 2002). The preliminary plan is to finish the lecture notes in the end of this year and publish them in the ESI Lecture Notes Series under the title "Classification of measurable functions and universality". This book will include the problem of classification of measurable functions, metric spaces with measure, and ergodic methods for counting of invariant measures for some groups.

Articles and work in preparation: "Toward to metric hyperbolicity", Paper "Algebraic polymorphisms" (with Prof. K.Schmidt), "Construction of the irreducible representations";

With Professor K.Schmidt we started to study the new subject in the theory of dynamical systems-algebraic many-valued maps (algebraic polymorphisms). The first paper on the topic is in preparation now.

Discussions and consultations took place with Professors K.Schmidt, Yu.Neretin, S.Longo, A.Okoun'kov, M.Lin, V.Kac etc.

During this period I participated in two conferences: "Random matrices and its application" - (Bielefeld, May 26-28) where I gave a talks on "Random matrices with symmetries", and the Conference "Dynamical systems: W.Schlenk memorial"(June, 6-12. Warsaw) where I talked about "Polymorphisms and quasi-similarity".

In the seminar of Professor K.Schmidt on Dynamical Systems I gave the lecture "Toward to the notion of the metric hyperbolicity", in the Colloquium of the Mathematic Department of University of Vienna on "Universality in geometry and combinatorics", and in the seminar of Professor Tichy (Graz) on "Pseudo-uniform distribution of the sequences in the metric spaces."

Preprints contributed: [1650], [1659], [1750]

Emil Straube: The L^2-Sobolev Theory of the $\bar{\partial}$-Neumann Problem

Course: A group of five to ten students from the Department of Mathematics of the University of Vienna attended regularly, as did one of the Junior Research Fellows (A. Herbig, fall term only). Participants in the program on Complex Analysis also attended some of the lectures. The format of the lecture series, with fully half of the lectures in the spring semester, worked well for the participating students. It allowed them to become prepared for the activities in the fall of the above mentioned program in Complex Analysis, Operator Theory, and Applications to Mathematical Physics.

The course treated the L^2-Sobolev regularity theory of the d-bar-Neumann problem on bounded pseudoconvex domains in complex Euclidean space, with an emphasis on global regularity (in L^2-Sobolev spaces) and compactness. Starting with some classical results from the sixties which form the bedrock of the theory, the course lead to current developments in the area. It is planned to publish the lecture notes, possibly in the ESI Lecture Series. A list of topics covered is as follows:

The L^2-theory: Hörmander's density lemma, the twisted Kohn-Morrey-Hörmander formula, Hörmander's basic L^2-estimate, the complex Laplacian, the $\overline{\partial}$-Neumann operator, the canonical solution operators to $\overline{\partial}$ and $\overline{\partial}^*$.

Strictly pseudoconvex domains: the subelliptic 1/2-estimate, the boundary is non-characteristic for $\overline{\partial} \oplus \overline{\partial}^*$, estimates for operators related to the $\overline{\partial}$-Neumann operator, Kohn's theorem, solution of the Levi problem.

Compactness: compactness estimates, compactness implies global regularity, locality of compactness, Catlin's and McNeal's sufficient conditions for compactness.

Regularity in Sobolev spaces: equivalence of estimates for the $\overline{\partial}$-Neumann problem with estimates for the Bergman projection, the vector field method of Boas and Straube, plurisubharmonic defining functions, failure of regularity on the worm domains.

Preprints contributed: [1718], [1720]

Bernard Helffer: Introduction to the spectral theory for Schrödinger operators with magnetic fields and applications

Course: After recalling some elements of perturbation theory concerning the links between approximate eigenvectors or eigenvalues and exact eigenvectors or eigenvalues, we have presented the main properties of the Schrödinger operators with magnetic fields. We then gave some elements in semi-classical analysis : harmonic approximation, WKB constructions and analysis of the decay of eigenfunctions. We then analyze specific models occurring in the theory of Super conductivity theory. We conclude by the application to the analysis of the bottom of the spectrum of the Neumann realization of the Schrödinger operator with magnetic fields in connection with the superconductivity.

The audience was between 6 and 15, depending on the period. This included Professors of the Department of Mathematics in the University of Vienna, Members or Visitors of the Institute, Post-Docs and a few students. The first part was presented during a period where a program in Complex Analysis was running. We have used this opportunity for presenting the links between the Theory of Schrödinger Operators with magnetic fields and d-bar problems in weighted space.

In the second part, I emphasized the applications to superconductivity. This problem is quite close to the Bose-Einstein condensation theory (which is one of the research areas in the group of J. Yngvason).

Written notes of the course are available on my Web Page:
http://www.math.u-psud.fr/∼helffer/

Research: I was mainly working with Professor T. Hoffmann-Ostenhof in the field Spectral Theory and nodal Domains. We have made quite significant progress in understanding the links between optimal partitions and nodal domains. Because this subject is at the intersection of many fields, we invited a specialist in variational calculus, S. Terracini of the University of Milano. This visit was very fruitful and has led to one article in preparation.

Although unexpected before I arrived at the Institute, common interests appeared with F. Haslinger, one of the organizers of the program in Complex analysis. The fruitful discussions will lead to a common paper in the near future.

Finally, other visitors were F. Nier (ESF financed, invitation together with J. Yngvason), A. Laptev (invited by T. Hoffmann-Ostenhof), and the PHD Students A. Kachmar (ESF financed) and E. Rosenberger (ESI financed)).

Della D. Fenster: The Interaction of Mathematics and Physics at the Turn of the Twentieth Century

Letter to ESI:

Dear Professor Dr. Schwermer,

I would like to thank the ESI for a memorable and productive six-month stay as a Senior Research Fellow from January-June, 2005.

Thank you for creating a physical setting at the ESI that encourages the reflective atmosphere so essential to academic scholarship, particularly in mathematics. That the ESI occupies the top floor of an Abbey is a crucial factor in creating an ideal Institute for Mathematical Physics. Some of the most successful Mathematics Institutes in the World, such as the Mathematisches Forschungsinstitut in Oberwolfach, Germany and the Mathematical Sciences Research Institute in Berkeley, California, are located in isolated areas where stillness is the order of the day. It is simply remarkable that the ESI can create a similar type of space for its visitors in the heart of Vienna. And it is essential that the ESI is located in a rich and vibrant city like Vienna. When a scholar is at an impasse in their research, a creative piece of art at one of the museums or palaces will refine and/or redirect their focus in a precise and helpful way. The reflective spirit of the ESI is complemented by the art and culture of Vienna in a way not typically found at mathematics institutes.

While a Senior Research Fellow, I worked with Professor Joachim Schwermer on our second paper, "Beyond Class Field Theory: Helmut Hasse's Arithmetic in the Theory of Algebras in early 1931." The Senior Research Fellowship at the ESI made this important research project a reality. The nearly fifty-page paper that resulted from this work required learning the subtle details of class field theory in the 1930's. In particular, we devoted especial attention to how and why mathematicians used the theory of hypercomplex number systems to address outstanding questions in non-abelian class field theory—and beyond. This work hinged on hand-written archival materials written primarily in German. Translating these works in a German-speaking setting not only allowed for a more thorough understanding of the material on my part but also improved the overall insights necessary for a paper of this caliber.

Professor Schwermer and I also began work on our third collaborative paper, "Composition of Forms over Rings." This work grew out of initial discussions in Oberwolfach, 2001. At that time, we both attended a conference celebrating the 200th anniversary of Gauss's Disquistiones Arithmeticae. This paper highlights Gauss's work on the composition of forms, as presented by A. Hurwitz in his personal (mathematical) diaries and taken up (much later) by Martin Kneser in his work on Clifford algebras.

Professor Schwermer and I also hosted a Lecture Series on "Mathematics and Physics in the 19th Century." This brought the distinguished scholars Leo Corry and Jeremy Gray to Vienna for talks on various aspects of the work of David Hilbert and Henri Poincare. These talks were not only well attended, but they also served as an opportunity to bring physicists, mathematicians, and historians together in a single audience. In recent years, the Schrödinger Institute has played a leading role in promoting the history of mathematics and physics. In particular, the Schrödinger audience often includes young scholars who will take a broad, positive view of the history of mathematics with them throughout their careers. Through the efforts of the Schrödinger Institute, these young scholars have seen that the history of mathematics is not a retired mathematician recounting the advancements in his/her research area, but, rather a vibrant, scholarly field that pursues technical questions within a broad framework that addresses issues related to biography, institutional settings, and political dynamics among others.

Outside of these collaborative efforts, I made significant progress on a book-length biography of Leonard Dickson. Dickson was an influential American mathematician in the early twentieth-century. This biography serves as the culmination of a decade of research on Dickson and his work in algebra and number theory. The Senior Research Fellowship allowed uninterrupted time to pursue this work in an inspiring setting. In particular, while at the Schrödinger, I worked on the chapters of the book that make use of the Carnegie Institution Archives, the largest existent collection of letters in Dickson's hand. Since Dickson burned his papers when he retired, these letters form the core of the primary sources available for this biography. I would like to add that discussions with Jeremy Gray during his visit to the Schrödinger contributed to the advancement of this biography. He provided invaluable insight into the issue related to the lack of primary sources. A single sentence summarizes what I took away from these discussions: "Don't focus on the Dickson you don't have. Focus on the Dickson you do have."

The six months in Vienna provided ample time to get to know the city. This, combined with my research in biography, allowed me to introduce a new course in the University of Richmond curriculum that will be offered in the Spring of 2007. This course, "What moves us? A Biographical Excursion in the City of Vienna" recently received a large grant to bring 10 students and one faculty member to Vienna for a week for further study. While this is not a direct mathematical result, it is a direct result of an opportunity provided by the ESI.

Finally, I must credit the ESI for their willingness to bring a scholar with three children to Vienna for six months. Joachim Schwermer and Isabella Miedl, in particular, took on extra work to settle my three children in schools and to help coach me through ordinary life in Vienna. It is a credit to the ESI that they would take on this extra challenge. The more institutions are willing to take on this extra effort, the more women will be able to participate fully at all levels of scholarship.

Thank you very much for this opportunity.

Sincerely yours,
Della Fenster
Associate Professor of Mathematics

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Seminars and colloquia outside of conferences

2005 01 13, G. Cohen: “On random almost periodic trigonometric polynomials and applications to ergodic theory”
2005 01 17, P. van Nieuwenhuizen: “The geometry of ordinary and harmonic superspace”
2005 01 20, D. Damjanovic: “Periodic cycle functionals and Cocycle rigidity for Weyl chamber flows”
2005 01 20, J. Barrett: “Braney Physics”
2005 01 26, P. Pfaffelhuber: “The evolution of genealogical trees”
2005 01 26, R. Seiringer: “The Thermodynamic Pressure of a Dilute Fermi Gas”
2005 01 27, E. Shmileva: “From Levy processes to Λ-coalescent”
2005 01 31, P. van Nieuwenhuizen: “The geometry of ordinary and harmonic superspace”
2005 02 03, P. van Nieuwenhuizen: “The geometry of ordinary and harmonic superspace”
2005 02 03, Y. Moshe: “The distribution of binomial coefficients according to arithmetical properties”
2005 02 07, A. Majewski: “Positive quantum maps, states and entanglement”
2005 02 08, J. Barata: “Some stability results for quasi-periodically perturbed Hill’s equations”
2005 02 09, L. Accardi: “Quadratic commutation relations, Meixner classes and quadratic KMS states”
2005 02 09, R. Olkiewicz: “Decoherence in infinite quantum spin systems”
2005 02 10, L. Accardi: “The emergence of the non crossing diagrams and of the QED. Hilbert module in the stochastic limit of non-relativistic QED”
2005 02 10, L. Corry: “David Hilbert and the Axiomatization of Physics “
2005 03 07, W. Ballmann: “Geometry and Fundamental Group”
2005 03 09, H. Grundling: “Superselection in the presence of constraints”
2005 03 09, J. Lörinczi: “Nelson’s model: Ground state properties and infrared behaviour”
2005 03 10, B. Krön: “Group actions on ends of graphs “
2005 03 10, R. Roschin: “Renormalized powers of boson fields”
2005 03 11, E. Skibsted: “Scattering for long-range magnetic fields”
2005 03 11, H. Cornean: “The Faraday effect revisited”
2005 03 14, d. Program: “2nd Workshop Open quantum Systems”
2005 03 14, G. Greschonig: “Ergodicity of Weyl sums”
2005 03 18, J. Fröhlich: “Nonequilibrium statistical mechanics and thermodynamics”
2005 03 18, V. Kac: “What is a vertex algebra and why?”
2005 03 24, C. Vizman: “Coadjoint orbits of (central extensions of) groups of symplectomorphisms”
2005 03 29, M. Takesaki: “Where to find operator algebras”
2005 04 06, S. Mueller-Stach: “Higgskohomologie auf Picardmodulflächen”
2005 04 07, D. Fenster: “Adrian Albert and Helmut Hasse and the Principal Theorem in Division Algebras in the early 1930’s”
2005 04 07, G. Zimmermann: “Polynomial Reproduction in Vector Subdivision”

2005 04 18, O. Christensen: “Generalized shift-invariant systems”
2005 04 18, R. Lasser: “Hypergroups and Banach algebras”
2005 04 18, Y. Neretin: “Zak transform and integral operators with theta-kernels”
2005 04 21, Y. Moshe: “On Subword Decompositions and Balanced Polynomials”
2005 04 25, H. Rauhut: “Time-Frequency Analysis of Radial Functions and Compact Embeddings of Radial Modulation Spaces”
2005 04 25, P. Wojdyllo: “Direct Integrals in Problems of Gabor Frames”
2005 04 28, J. Gray: “Poincaré’s electro-magnetic theory philosophy and physics around 1900”
2005 04 28, R. Zweimüller: “Distributional limit theorems in infinite ergodic theory ”
2005 05 04, G. Gotsbacher: “Shimura varieties of orthogonal type”
2005 05 12, G. Cohen: “On Billard’s theorem for random Fourier series”
2005 05 17, J. Martin-Garcia: “Hyperbolicity of second-order in space systems of evolution equations”
2005 05 18, I. Rácz: “Time Evolution of Massive Fields”
2005 05 25, G. Muic: “On Steinberg Type Representations for reductive p-adic groups”
2005 05 25, K. Gansberger: “Zur Funktionalanalysis von Differentialoperatoren”
2005 05 27, E. Riss: “On the generation of Borel sets by balls”
2005 05 27, J. Lindenstrauss: “Differentiability of Lipschitz functions in Banach spaces and Porus sets ”
2005 05 27, V. Müller: “Growth conditions and invertible extensions of operators”
2005 05 30, M. Wojciechowski: “Bounded approximation property of the functions of bounded variation of higher order”
2005 05 30, T. Schlumprecht: “A separable reflexive Banach space which is universal for all separable uniformly convex spaces”
2005 05 30, Y. Pesin: “New developments in thermodynamics of nonuniformly hyperbolic systems”
2005 05 31, J. Duda: “Curves in Banach spaces”
2005 05 31, L. Zajicek: “Sets of non-differentiability and related sigma-porous sets”
2005 05 31, O. Maleva: “Curves in l_1 -trees and porosity”
2005 06 01, J. Maly: “When difference quotients converge in measure”
2005 06 01, M. Fabian: “Epsilon-Asplund sets and epsilon-weakly compact sets”
2005 06 01, O. Kalenda: “Abstract Dirichlet problem for Baire-one functions”
2005 06 01, S. Reich: “Extension theorems, convex functions, and descent methods”
2005 06 02, M. Zeleny: “A note on Buczolich’s solution of the Weil problem”
2005 06 02, Y. Pesin: “Bernoulli diffeomorphisms with nonzero exponents on any manifolds”
2005 06 03, V. Fonf: “Around James’s theorem”
2005 06 06, M. Lin: “The central limit theorem for Markov chains ”
2005 06 06, M. of: “Workshop on: Non-Orthogonal Expansions and Greedy Algorithms”
2005 06 09, M. Lin: “Ergodic characterizations of reflexive Banach spaces”
2005 06 10, S. Kislyakov: “Stability of approximation under singular integral operators, and Calderon-Zygmund type decomposition”
2005 06 13, J. Verdera: “May the Cauchy-transform of a non-trivial finite measure vanish a.e. on its support ?”
2005 06 13, P. Wojtaszczyk: “1- Greedy Bases”
2005 06 14, G. Lawler : “Introduction to SLE Processes”
2005 06 14, G. Lawler: “Problem session on SLE Processes”
2005 06 15, M. Gonzalez: “Geometry of curves and Beltrami-type Operators”
2005 06 15, X. Tolsa: “Cauchy integrals of measures and rectifiability”
2005 06 16, A. Nicolau: “An interpolation problem for positive harmonic functions”
2005 06 17, K. Astala: “Improved Painleve removability for K-quasiregular mappings”

2005 06 17, P. Koskela: “Sobolev extension theorems”
2005 06 20, A. Vershik: “Towards metric hyperbolicity: quasisimilarity of K-automorphisms and nonmixing Markov operators”
2005 06 20, i. Probability: “Conformal Invariance, Probability and Singular Integrals”
2005 06 20, R. Schul: “A characterization of subsets of finite length curves in Hilbert spaces”
2005 06 21, I. Binder: “Multifractal Analysis of harmonic measure”
2005 06 21, L. Rogers: “Degree independent Sobolev Extension”
2005 06 21, N. Kang: “Boundary behaviour for SLE”
2005 06 22, D. Anisimov: “An Interpolation problem involving double singular integrals”
2005 06 22, D. Beliaev: “Harmonic measure on random fractals”
2005 06 23, A. Poltoratski: “Extensions and Applications of Beurling-Malliavin theory”
2005 06 23, E. Cordero: “Symbolic calculus for localization operators”
2005 06 23, I. Uriarte-Tuero: “On Marcinkiewicz integrals and harmonic measure”
2005 06 23, S. Bailey: “Dynamical Properties of the Euler Adic”
2005 06 27, R. Calderbank: “Sparse representations and learning in groups”
2005 06 28, W. Werner: “Conformal Loop Ensembles”
2005 06 28, W. Werner: “Problem Session on SLE Processes ”
2005 06 29, C. Thiele: “Trilinear Maximal Function”
2005 06 29, P. Wood: “Hilbert Modules and Wavelets”
2005 06 29, V. Pillwein: “Extrapolation of Rearrangement Operators”
2005 06 30, A. Volberg: “Inverse scattering and matrix A2”
2005 07 01, H. Hedenmalm: “Introduction to Bergman Spaces with applications to conformal maps”
2005 07 04, A. Nahmod: “Schroedinger maps on hermitian symmetric spaces and their associated frame systems”
2005 07 04, K. Petersen: “The Euler adic, random walks, random permutations”
2005 07 04, M. Time-Frequency Analysis: “Noncommutative Computational Harmonic Analysis July 4th to July 7th, 2005”
2005 07 05, W. Schlag: “On stable manifolds for certain non-linear PDE”
2005 07 07, D. Lind: “Adelic Dynamics”
2005 07 12, C. Deninger: “Entropy and noncommutative determinants”
2005 07 12, P. Gruber: “Principles of classical discrete geometry”
2005 07 12, S. July 12 to August 5, 2005 : “Asymptotic Theory of the Geometry of Finite Dimensional Spaces”
2005 08 02, Y. Moshe: “An application of the subadditive ergodic theorem to linear cellular automata”
2005 08 04, A. Stancu: “Floating Bodies”
2005 08 04, G. Cohen: “On random Fourier-Stieltjes coefficients”
2005 09 08, A. Sergeev: “Adiabatic Paths and Pseudoholomorphic Curves”
2005 09 12, B. Mityagin: “Spectral Gaps of Periodic Schroedinger and Dirac Operators”
2005 09 12, J. Figueroa-O’Farrill: “Homogenous structures and plane wave limits”
2005 09 12, W. Kühnel: “Conformal geometry of gravitational plane waves”
2005 09 13, H. Rademacher: “Twistor spinors with zeros”
2005 09 13, P. Djakov: “Trace Formula and Spectral Riemann Surfaces for a Class of Tri-Diagonal Matrices”
2005 09 13, V. Matveev: “Geodesically equivalent metrics”
2005 09 14, F. Witt: “Special metrics of split signature”
2005 09 14, M. Dunajski:
2005 09 15, B. Guilfoyle: “The indefinite metric on the space of oriented lines”

2005 09 15, W. Klingenberg: "The geometry of caustics"
2005 09 16, H. Baum: "Holonomy of conformal structures"
2005 09 16, S. Dragomir: "Fefferman metrics: recent applications"
2005 09 20, G. Raikov: "Toeplitz operators in the spectral and scattering theory of magnetic quantum Hamiltonians"
2005 09 20, H. Ishi: "Matrix realizations of homogeneous Siegel domains"
2005 09 21, A. Herbig: "A sufficient condition for subellipticity of the d-bar-Neumann operator"
2005 09 21, I. Lieb: "On the Compactness of the Neumann Operator"
2005 09 21, J. and Oleg Mushkarov: "Hyperbolic Twistor Spaces"
2005 09 21, N. Nikolov: "The Symmetrized Polydisc cannot be exhausted by Domains biholomorphic to Convex Domains"
2005 09 21, T. Ohsawa: "Recent Results on Levi-Flats by solving the Cauchy-Riemann Equations with L2-Estimates"
2005 09 27, H. Kamada: "Existence and non-existence of selbstdual (indefinite) Kähler metrics"
2005 09 27, R. Wolak:
2005 09 28, F. Finster: "A weighted L2-estimate of the Witten spinor in asymptotically Schwarzschild manifolds"
2005 09 28, S. Armstrong: "Projective and conformal holonomy"
2005 09 29, A. Ikemakhen: "Parallel spinors on pseudo-Riemannian spin C-manifolds"
2005 09 29, F. Finster: "A variational principal in discrete space times (informal discussion)"
2005 10 04, O. Mac Conamhna: "G-structures and the classification of supersymmetric space-times in supergravity"
2005 10 04, T. Leistner: "Lorentzian holonomy groups"
2005 10 05, W. Goldmann: "Flat Lorentz3-manifolds and hyperbolic geometry on surfaces"
2005 10 06, J. Arazy: "Maximal and minimal invariant Banach spaces of holomorphic functions on bounded symmetric domains"
2005 10 06, M. Englis: "Moebius invariant interpolation spaces on bounded symmetric domains"
2005 10 06, M. Pevzner: "Para-Hermitian symmetric spaces and Rankin-Cohen bracket"
2005 10 06, N. Vasilevski: "Commutative algebras of Toeplitz operators and Berezin quantization"
2005 10 06, Y. Neretin: "Fermionic Gaussian integral operators"
2005 10 07, E. Stout: "Approximation on Real-Analytic Sets"
2005 10 10, E. Garcia-Rio: "Geometric consequences of algebraic properties of the Jacobi operator"
2005 10 11, A. Swann: "Hypersymplectic manifolds with torus action"
2005 10 12, A. Di Scala: "Kähler maps from bounded domains in 12(C) and other thinks"
2005 10 13, I. Kath: "On the structure of indefinite symmetric spaces"
2005 10 13, U. Haboeck: "On the congruence group of measurable functions in two variables"
2005 10 20, G. Vilasi: "Einstein metrics with 2-dimensional Killing leaves and their physical interpretation"
2005 10 20, K. Kim: "Generic analytic polyhedra in C2 with non-compact automorphism group"
2005 10 21, G. Papadopoulos: "Spinorial Geometry and Supersymmetry I"
2005 10 21, I. Strachan: "Deformations of Self-duality"
2005 10 24, A. PDE's: "October 24 until October 28, 2005"
2005 10 24, G. Papadopoulos: "Spinorial Geometry and Supersymmetry II"
2005 10 25, F. Leitner: "Complex structures in conformal tractor culculus and generalized Fefferman spaces"
2005 11 01, C. Galicki: "Seifert bundles and contact structures "
2005 11 02, Y. Kamishima: "Bochner-flat pseudo-Kähler metrics on $\mathbb{C}^{p,q}$ and quaterionic analog"

2005 11 04, A. Galaev: “Classification of holonomy groups of pseudo-Kählerian manifolds of index 2”
2005 11 05, U. Workshop: “String Theory in Curved Backgrounds and Boundary Conformal Field Theory”
2005 11 07, J. Teschner: “Introduction to separation of variables”
2005 11 07, L. Berard-Bergery: “Non-irreducible pseudo-Riemannian holonomy (informal discussion)”
2005 11 07, M. Herbst: “D-branes in gauged linear sigma-models”
2005 11 07, M. Nardmann : “Pseudo-Riemannian metrics with prescribed scalar curvature”
2005 11 08, A. Laptev: “Complex Analysis and Hardy’s Inequalities for many Particles”
2005 11 08, I. Kath: “Lorentzian symmetric submanifolds (informal discussion)”
2005 11 08, P. Harrington: “Compactness and the d-bar b Problem”
2005 11 09, G. Schmalz: “Cartan connections for Engel CR-manifolds”
2005 11 10, K. Diederich: “Non-Isotropic Analysis on lineally convex Domains”
2005 11 10, M. Shaw: “Estimates for tangential Cauchy-Riemann Equations with minimal Smoothness”
2005 11 10, P. Workshop: “Hyperbolic operators on Lorentzian manifolds and quantization”
2005 11 16, C. Frances: “Dynamics of causal conformal vectorfields”
2005 11 17, E. Korotyaev: “Inverse problem for harmonic oscillator perturbed by potential on the half-line”
2005 11 17, R. Dwilewicz: “Holomorphic Extensions in Fiber Bundles and Applications to Complex Tori”
2005 11 24, G. Francsics: “Spectral analysis on complex hyperbolic spaces”
2005 11 28, K. Simon: “The difference of random Cantor-sets”
2005 11 30, S. Terracini: “Optimal partition problems related to the Fucik spectrum and the monotonicity formulae”
2005 12 06, E. Ovrum: “Geometry of entanglement; finding bound entangled states using algorithm for finding the closest separable state”
2005 12 06, J. Grant: “Geometric structures on solution spaces of integrable systems”
2005 12 07, A. Candela: “Variational Tools applied to General Relativity”
2005 12 07, F. Nier: “Landau low level states and Bargman Spaces”
2005 12 12, J. Aaronson: “Exchangeable and Gibbs measures for subshifts”
2005 12 12, J. Flores: “Causal Boundary for Mp-wave spacetimes”
2005 12 13, M. Sanchez: “Causal hierarchy of space-times”
2005 12 19, F. Belgun: “Weyl structures on para-CR manifolds”
2005 12 21, R. Zweimüller: “Asymptotic orbit complexity of infinite measure preserving transformations”

ESI Preprints

ESI Preprints in 2005

1564. Janusz Karkowski, Edward Malec: *The General Penrose Inequality: Lessons from Numerical Evidence*, 9 pp.;
1565. Jürgen Fuchs, Ingo Runkel, Christoph Schweigert: *TFT Construction of RCFT Correlators IV: Structure Constants and Correlation Functions*, 98 pp.;
1566. Edwin Langmann: *Conformal Field Theory and the Solution of the (Quantum) Elliptic Calogero–Sutherland System*, 18 pp.;
1567. William J. Ugalde: *A Construction of Critical GJMS Operators using Wodzicki's Residue*, 19 pp.;
1568. Joakim Arnlind, Jens Hoppe, Stefan Theisen: *Spinning Membranes*, 15 pp.;
1569. M. Bañados, A. Schwimmer, S. Theisen: *Chern–Simons Gravity and Holographic Anomalies*, 21 pp.;
1570. José Figueroa-O'Farrill, Owen Madden, Simon F. Ross, Joan Simón: *Quotients of $AdS_{p+1}\times S^q$: Causally Well–Behaved Spaces*, Phys. Rev. D **69** (2004) 124026;
1571. Alan L. Carey, Stuart Johnson, Michael K. Murray, Danny Stevenson, Bai-Ling Wang: *Bundle Gerbes for Chern–Simons and Wess–Zumino–Witten Theories*, to appear in Commun. Math. Phys.;
1572. David Kutasov, Adam Schwimmer: *Lagrange Multipliers and Couplings in Supersymmetric Field Theory*, 13 pp.;
1573. V. Caudrelier, M. Mintchev, E. Ragoucy, P. Sorba: *Reflection–Transmission Quantum Yang–Baxter Equations*, 15 pp.;
1574. M. Mintchev, P. Sorba: *Finite Temperature Quantum Field Theory with Impurities*, J. Stat. Mech. Theory Exp. **47** (2004) 001;
1575. Andrea Cappelli, Mauro Riccardi: *Matrix Model Description of Laughlin Hall States*, 32 pp.;
1576. Constantin Bachas, Matthias R. Gaberdiel: *Loop Operators and the Kondo Problem*, J. High Energy Phys. **0411** (2004) 065;
1577. Matthias R. Gaberdiel, Michael Gutperle: *Remarks on the Rolling Tachyon BCFT*, 20 pp.;
1578. Matthias R. Gaberdiel, Terry Gannon, Daniel Roggenkamp: *The Coset D–Branes of SU(n)*, J. High Energy Phys. **0410** (2004) 047;
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1783. Klaus Schmidt: *Algebra, Arithmetic and Multi–Parameter Ergodic Theory*, 15 pp..

List of all visitors in 2005

The following codes indicate the association of visitors with particular programs:

ABK = Singularity Formation in Nonlinear Evolution Equations
ACM = Advisory Comittee Meeting
ABK = Singularity Formation in Non-linear Evolution Equations
ALB = Geometry of pseudo-Riemannian manifolds with application to Physics
BEC = Bose-Einstein Condensation and Quantum Information
CAP = Guest of Prof. Čap
CJS = Geometric Methods in Analysis and Probability
DGY = Open Quantum Systems
FGB = Methods of Time-Frequency Analysis
GRS = String Theory in Curved Backgrounds and Boundary Conformal Field Theory
HSU = Complex Analysis, Operator Theory and Application to Mathematical Physics
JF = Junior Fellow
SCH = Guest of Prof. Schmidt
SCHW = Guest of Prof. Schwermer
SF = Senior Research Fellow
SFS = Senior Research Fellow Share
SUS = Summer School "Vertex Algebras and Related Topics"
THI = Guest of Prof. Thirring
YNG = Guest of Prof. Yngvason

Adams Stefan, Max-Planck-Institut für Mathematik in den Naturwissenschaften; 17.12.2005 - 21.12.2005, BEC;
Aftalion Amandine, Labo J.L. Lions, Université Paris VI; 16.12.2005 - 20.12.2005, BEC;
Alberti Giovanni, University of Pisa; 25.05.2005 - 05.06.2005, CJS;
Alekseevsky Dmitri, Masaryk University; 16.10.2005 - 06.11.2005, ALB;
Ali Syed Twareque, Concordia University; 30.04.2005 - 13.05.2005, FGB;
Alicki Robert, University of Gdansk, Institute for Theoretical Physics; 30.01.2005 - 18.02.2005, DGY;
Alldridge Alexander, Universität Paderborn, Institut für Mathematik; 18.09.2005 - 29.09.2005, HSU;
Alt Jesse, Humboldt Universität Wien; 08.11.2005 - 12.11.2005, ALB;
Ammann Berndt, Université Nancy 1; 09.11.2005 - 13.11.2005, ALB;
Andrada Adrián, The Abdus Salam International Centre for Theoretical Physics; 24.10.2005 - 29.10.2005, ALB;
Anisimov Denis, University of St. Petersburg; 14.06.2005 - 24.06.2005, CJS;
Antoine Jean-Pierre, Institute for Theoretical Physics; 05.04.2005 - 14.04.2005, FGB;
Arakawa Tomoyuki, Nara Women's University; 09.06.2005 - 04.07.2005, SUS;
Araki Huzihiro, Prof. Emeritus; 30.01.2005 - 31.03.2005, DGY;

Arazy Jonathan, University of Haifa, Mathematics Department; 07.04.2005 - 16.04.2005, FGB; 22.09.2005 - 08.10.2005, HSU;
Armstrong Stuart, Oxford University, Mathematics Department; 25.09.2005 - 30.09.2005, ALB;
Arndt Markus, Institut für Experimentalphysik, Universität Wien; 17.12.2005 - 20.12.2005, BEC;
Artstein Shiri, Princeton University; 11.07.2005 - 30.07.2005, CJS;
Astala Kari, University of Helsinki; 13.06.2005 - 23.06.2005, CJS;
Aubrun Guillaume, Université Pierre & Marie Curie; 11.07.2005 - 31.07.2005, CJS;
Avron Joseph, Technion, Dept. of Physics; 30.01.2005 - 05.02.2005, DGY;
Bär Christian, Univ. Potsdam; 09.11.2005 - 13.11.2005, ALB;
Bailey Sarah E., University of North Carolina; 01.06.2005 - 29.07.2005, JF;
Bakalov Bojko, North Carolina State University; 12.06.2005 - 03.07.2005, SUS;
Balan Radu, Siemens Corporate Research; 06.05.2005 - 27.05.2005, FGB;
Ballmann Werner, Math. Institut Uni Bonn; 22.02.2005 - 18.03.2005, SF;
Barany Imre, Re Nyi Institut; 12.07.2005 - 27.07.2005, CJS;
Barata Joao Carlos Alves, Universidade de Sao Paulo; 30.01.2005 - 12.02.2005, DGY;
Barrett Jessica, University of Durham, Dept. of Mathematical Sciences; 04.10.2004 - 31.03.2005, JF;
Barthe Franck, Université Paul Sabatier; 13.07.2005 - 27.07.2005, CJS;
Bastero Jesus, University of Zaragoza; 11.07.2005 - 27.07.2005, CJS;
Baues Oliver, Universität Karlsruhe; 26.10.2005 - 31.10.2005, ALB;
Baum Helga, Humboldt Universität Berlin, Institut für Mathematik; 01.09.2005 - 20.12.2005, ALB;
Baumgartl Marcus, Arnold Sommerfeld Zentrum für Theoretische Physik; 04.11.2005 - 08.11.2005, GRS;
Belgun Florin, Universität Leipzig; 20.09.2005 - 01.10.2005, ALB; 19.12.2005 - 23.12.2005, ALB;
Beliaev Dmitri, Princeton University; 18.06.2005 - 28.06.2005, CJS;
Bellissard Jean, Georgia Institute of Technology; 28.01.2005 - 07.02.2005, DGY;
Benatti Fabio, University of Trieste, Department of Theoretical Physics; 01.02.2005 - 05.02.2005, DGY;
Benedetto John J., University of Maryland; 15.05.2005 - 30.05.2005, FGB;
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Ben-Zvi David, University of Texas; 11.06.2005 - 18.06.2005, SUS;
Berard Bergery Lionel, Institut Elie Cartan; 02.11.2005 - 16.11.2005, ALB;
Berczi Gergely, Technical University Budapest; 12.06.2005 - 02.07.2005, SUS;
Binder Ilya, University of Toronto; 12.06.2005 - 09.07.2005, CJS;
Bizoń Piotr, Jagiellonian University, Institute of Physics; 16.05.2005 - 22.05.2005, ABK; 08.12.2005 - 11.12.2005, ABK;
Blanchard Philippe, Universität Bielefeld; 06.02.2005 - 13.02.2005, DGY;
Blocki Zbigniew, Jagiellonian University; 22.10.2005 - 29.10.2005, HSU;
Böröczky Károly, Rényi Institute of Mathematics; 11.07.2005 - 15.07.2005, CJS;
Boggiatto Paolo, University of Torino; 30.04.2005 - 05.05.2005, FGB;
Böhmer Christian, TU Wien, Institut f. Theoretische Physik; 01.02.2005 - 31.05.2005, JF;
Borchers Hans-Jürgen, Universität Göttingen, Inst. für Theoretische Physik; 18.12.2005 - 20.12.2005, BEC;
Borup Lasse, Department of Mathematics; 02.06.2005 - 10.06.2005, FGB;
Boubel Charles, ENS, Lyon; 31.10.2005 - 05.11.2005, ALB;
Bove Antonio, Universita di Bologna, Dipartimento di Matematica; 22.10.2005 - 29.10.2005, HSU;
Braverman Alexander, Hebrew University Jerusalem; 21.06.2005 - 29.06.2005, SUS;
Briegel Hans, Institut für Theoretische Physik, Universität Innsbruck; 17.12.2005 - 20.12.2005, BEC;
Bru Jean-Bernard, Gutenberg Universität; 17.12.2005 - 21.12.2005, BEC;
Bruna Joaquim, Univ. Autonoma Barcelona; 10.04.2005 - 15.04.2005, FGB;

Brunetti Romeo, II. Institut fuer Theoretische Physik, Universität Hamburg; 09.11.2005 - 13.11.2005, ALB;
Buchholz Detlev, Universität Göttingen, Institut für Theoretische Physik II; 05.09.2005 - 06.09.2005, YNG;
Buchta Christian, Universität Salzburg; 12.07.2005 - 19.07.2005, CJS;
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Burdzy Krzystof, University of Washington; 16.06.2005 - 02.07.2005, CJS;
Cabrelli Carlos, University of Buenos Aires; 15.03.2005 - 13.08.2005, FGB;
Calderbank Robert, Princeton University; 18.06.2005 - 04.07.2005, FGB;
Candela Anna Maria, Universita degli Studi Di Bari; 03.12.2005 - 18.12.2005, ALB;
Candes Emmanuel, California Institute of Technology; 14.06.2005 - 24.06.2005, FGB;
Carey Alan L., Australian National University; 14.03.2005 - 20.03.2005, YNG;
Chlebik Miroslav, Max Planck Institute, for Mathematics; 25.05.2005 - 04.06.2005, CJS;
Christensen Ole, Technical Univ. of Denmark; 14.04.2005 - 26.04.2005, FGB;
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Clark Jeremy, University California, Davis; 30.01.2005 - 06.02.2005, DGY;
Cohen Albert, Univ. P.& M. Curie; 03.06.2005 - 12.06.2005, FGB;
Cohen Guy, BenGurion University of the Negev; 01.10.2004 - 30.09.2005, SCH;
Cooper James Bell, Johannes-Keppler-Universität, Linz; 23.05.2005 - 31.08.2005, CJS;
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Cordero-Erausquin Dario, Université de Marne la Vallée; 17.07.2005 - 31.07.2005, CJS;
Cornean Horia, Aalborg University; 10.03.2005 - 20.03.2005, DGY;
Corry Leo, Cohn Institute for History of Science; 09.02.2005 - 13.02.2005, SCHW;
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Dahmen Wolfgang, RWTH Aachen; 04.06.2005 - 11.06.2005, FGB;
Damjanovic Danijela; 06.10.2004 - 31.03.2005, SCH;
D'Andrea Alessandro, Universita di Roma - "La Sapienza"; 12.06.2005 - 03.07.2005, SUS;
D'Angelo John P., University of Illinois; 23.10.2005 - 29.10.2005, HSU;
Dappiaggi Claudio, Dipartimento di fisica nucleare e teorica; 10.11.2005 - 12.11.2005, ALB;
D'Appollonio Giuseppe, King's College London; 06.11.2005 - 10.11.2005, GRS;
Daubechies Ingrid, Princeton University; 18.06.2005 - 04.07.2005, FGB;
Davidov Johann, Bulgarian Academy of Sciences, Institute of Mathematics and Sciences; 16.09.2005 - 23.09.2005, ALB;
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Deninger Christopher, University of Münster; 11.07.2005 - 15.07.2005, CJS;
Derezinski Jan, University of Warsawa, Department of Mathematical Methods in Physics; 30.01.2005 - 28.05.2005, SF;
De Roeck Wojciech, K. U. Leuven; 31.01.2005 - 09.02.2005, DGY; 06.03.2005 - 19.03.2005, DGY; 02.05.2005 - 20.05.2005, SFS;
Derridj Makhlouf, Université de Rouen; 23.10.2005 - 30.10.2005, HSU;
De Sole Alberto, Harvard University; 12.06.2005 - 02.07.2005, SUS;
Devchand Chand, Universität Bonn, Mathematisches Institut; 02.10.2005 - 09.10.2005, ALB;
DeVore Ronald, Dept. of Mathematics; 05.06.2005 - 11.06.2005, FGB;

Diederich Klas, Universität Wuppertal, Fachbereich Mathematik; 26.10.2005 - 21.11.2005, HSU;
Di Scala Antonio José, Politecnico di Torino; 05.10.2005 - 18.10.2005, ALB;
Djakov Plamen Borissov, Sofia University; 04.09.2005 - 18.09.2005, HSU;
Dmitriyuk Alon, Technion, Math. Department; 10.07.2005 - 07.08.2005, CJS;
Dobrescu Mihaela, Louisiana State University; 12.05.2005 - 10.06.2005, FGB;
Duda Jakub, Weizmann Institute of Science; 25.05.2005 - 05.06.2005, CJS;
Dunajski Maciej, DAMTP; 06.09.2005 - 15.09.2005, ALB;
Dwilewicz Roman, University of Missouri, Department of Mathematics; 12.11.2005 - 22.11.2005, HSU;
Edigarian Armen, Jagiellonian University, Institute of Mathematics; 22.10.2005 - 29.10.2005, HSU;
Eelbode David, Ghent University, Department of Mathematicsl Analysis; 10.11.2005 - 12.11.2005, ALB;
Egorova Iryna, Vezkin Institute for Low Temperature Physics, and Engineering; 05.06.2005 - 15.06.2005, FGB;
Ehsani Dariush, Pennsylvania State University, Department of Mathematics; 19.10.2005 - 29.10.2005, HSU;
Eisert Jens, Imperial College London; 21.05.2005 - 27.05.2005, YNG;
Elgart Alexander, Stanford University; 20.01.2005 - 03.02.2005, DGY;
Engliš Miroslav, Academy of Sciences, Mathematic Institute; 13.04.2005 - 23.04.2005, FGB; 03.10.2005 - 14.10.2005, HSU;
Ezhov Vladimir, University of South Australia, Department of Mathematics and Statistics; 06.11.2005 - 12.11.2005, ALB;
Fabian Marian, Mathematical Institute, Czech Academy of Sciences; 25.05.2005 - 03.06.2005, CJS;
Fagnola Franco, Politecnico di Milano; 30.01.2005 - 06.02.2005, DGY;
Farrell Brendon, University of California; 02.05.2005 - 21.05.2005, FGB;
Feichtinger Hans G., Inst. f. Mathematik; 04.04.2005 - 31.07.2005, FGB;
Fenster Della Dumbaugh, Univ. of Richmond; 03.01.2005 - 30.06.2005, SF;
Fewster Christopher, University of York, Department of Mathematics; 10.11.2005 - 13.11.2005, ALB;
Figueroa-O'Farrill José M., School of Mathematics; 02.09.2005 - 18.09.2005, ALB; 13.12.2005 - 18.12.2005, ALB;
Finster Felix, Naturwiss. Fakultät I - Mathematik, Universität Regensburg; 16.09.2005 - 02.10.2005, ALB; 10.11.2005 - 13.11.2005, ALB;
Fleischhack Christian, Max-Planck-Institut für Mathematik in den Naturwissenschaften; 13.09.2005 - 28.09.2005, HSU;
Floreanini Roberto, INFN; 29.01.2005 - 04.02.2005, DGY;
Flores Jose, Universidad de Malaga, Facultad de Ciencias; 04.12.2005 - 19.12.2005, ALB;
Folland Gerald B., University of Washington; 09.04.2005 - 23.04.2005, FGB;
Fonf Vladimir, Ben-Gurion University of the Negev; 24.05.2005 - 05.06.2005, CJS;
Fornaess John Erik, University at Michigan, Department of Mathematics; 06.11.2005 - 13.11.2005, HSU;
Forstneric Franc, University of Lubljana, FMF; 23.10.2005 - 30.10.2005, HSU;
Forte Luca Antonio, Universita "Federico II"; 12.06.2005 - 02.07.2005, SUS;
Fournais Soeren, CNRS, Université Paris-Sud; 21.05.2005 - 24.05.2005, YNG;
Frances Charles, Université Paris-Sud; 14.11.2005 - 20.11.2005, ALB;
Francsics Gábor, Michigan State University; 22.11.2005 - 27.11.2005, HSU;
Fredenhagen Klaus, Universität Hamburg, II. Institut fuï Theoretische Physik; 09.11.2005 - 12.11.2005, ALB;
Frenkel Edward, University of California,Berkeley, Dept. of Mathematics; 21.06.2005 - 04.07.2005, SUS;
Friedland Omer, Tel Aviv University; 11.07.2005 - 05.08.2005, CJS;
Fröhlich Jürg, ETH Zürich, Institut für Theoretische Physik; 14.03.2005 - 18.03.2005, DGY; 19.12.2005

- 20.12.2005, BEC;
Früboes Rafal, Department of Math., Warsaw University.; 13.03.2005 - 18.03.2005, DGY;
Führ Hartmut, GSF Forschungszentrum f.; 10.04.2005 - 23.04.2005, FGB;
Galicki Krzysztof, University of New Mexico, Department of Mathematics; 19.10.2005 - 02.11.2005, ALB;
Gallavotti Giovanni, Universitá di Roma 1, Dipartimento di Fisica; 18.03.2005 - 21.03.2005, ACM;
Garcia-Rio Eduardo, Universidade de Santiago de Compostela; 03.10.2005 - 17.10.2005, ALB;
Gatzouras Dimitris, Agricultural University of Athens; 18.07.2005 - 27.07.2005, CJS;
Gazeau Jean Pierre, University Paris 7; 07.04.2005 - 15.04.2005, FGB;
Geiss Stefan, University of Jyvaeskylae; 20.06.2005 - 01.07.2005, CJS;
Giannopoulos Apostolos, University of Athens, Department of Mathematics; 18.07.2005 - 27.07.2005, CJS;
Gibson Peter, York University; 02.05.2005 - 12.05.2005, FGB;
Ginoux Nicolas, Universität Potsdam, Institut für Mathematik; 10.11.2005 - 12.11.2005, ALB;
Gluskin Efim, Tel Aviv University; 12.07.2005 - 28.07.2005, CJS;
Gmasz Hans, Universität Wien; 12.06.2005 - 02.07.2005, SUS;
Goldman William, University of Maryland, Department of Mathematics; 03.10.2005 - 09.10.2005, ALB;
Golenia Sylvain, Institut of the, Romanian Academy, Simion Storlov; 13.04.2005 - 16.04.2005, SFS;
Gonzales Fuentes Maria Jose, Universidad de Cadiz; 12.06.2005 - 18.06.2005, CJS;
Gordon Yehoram, Technion, Dept. of Mathematics; 10.07.2005 - 05.08.2005, CJS;
Gorelik Maria, Weizmann Institute of Science; 13.06.2005 - 01.07.2005, SUS;
Gotsbacher Gerald, Universität Wien; 13.06.2005 - 03.07.2005, SUS;
Graf Gian Michele, ETH Zürich, Theoretische Physik; 27.01.2005 - 10.02.2005, DGY; 07.03.2005 - 18.03.2005, DGY;
Gray Jeremy John, Open University, Milton Keynes; 26.04.2005 - 03.05.2005, SCHW;
Graziano Vincent, SUNY at Stony Brook; 10.06.2005 - 04.07.2005, SUS;
Gribonval Remi, IRISA-INRIA; 01.06.2005 - 11.06.2005, FGB;
Griesemer Marcel, University of Alabama at Birmingham; 07.03.2005 - 19.03.2005, DGY;
Grimm Rudolf, Institut für Experimentalphysik, Universität Innsbruck; 17.12.2005 - 19.12.2005, BEC;
Grip Niklas, School of Engineering, and Science, International Univ. of Bremen; 02.05.2005 - 06.05.2005, FGB;
Gröchenig Karlheinz, GSF-National Research Center; 04.04.2005 - 08.07.2005, FGB;
Guédon O, Université Pierre et Marie Curie; 09.07.2005 - 31.07.2005, CJS;
Guilfoyle Brendan, Institute of Technology; 02.09.2005 - 17.09.2005, ALB;
Greenberger Daniel, City College of New York, Department of Physics; 20.05.2005 - 11.06.2005, YNG;
Grundling Hendrik, University of New South Wales, Dept. Pure Mathematics; 02.03.2005 - 10.03.2005, DGY;
Hainzl Christian, Univ. Kopenhagen; 02.03.2005 - 20.03.2005, DGY; 05.07.2005 - 06.07.2005, YNG;
Hajek Petr, Academy of Science, of Czech Republic; 25.05.2005 - 03.06.2005, CJS;
Hanzer Marcela, Univ. of Zagreb, Department of Mathematics; 01.10.2004 - 31.01.2005, JF;
Harrington Phillip, University of South Dakota; 06.11.2005 - 12.11.2005, HSU;
Hedenmalm Hakan, KTH Stockholm; 27.06.2005 - 05.07.2005, CJS;
Helffer Bernard, Université Paris-Sud, Department de Mathematiqués; 01.03.2005 - 07.03.2005, YNG; 10.10.2005 - 09.12.2005, SF;
Hellmich Mario, Universität Bielefeld; 07.02.2005 - 11.02.2005, DGY;
Heluani Reimundo, Massachusetts Institute of Technology; 11.06.2005 - 29.06.2005, SUS;
Herbig Anne-Katrin, University of Michigan; 01.09.2005 - 30.11.2005, JF;
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Hinrichs Aicke, Friedrich Schiller Universität Jena; 11.07.2005 - 29.07.2005, CJS;
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Holický Petr, Univerzita Karlova, Katedra matematické analýzy; 27.05.2005 - 03.06.2005, CJS;
Hollands Stefan, Universität Göttingen; 10.11.2005 - 13.11.2005, ALB;
Hug Daniel, Universität Freiburg, Mathematisches Institut; 24.07.2005 - 02.08.2005, CJS;
Ianus Stere, University of Bucharest, Department of Mathematics; 06.11.2005 - 13.11.2005, ALB;
Ikemakhen Aziz, Cadi-Aggad-Université; 20.09.2005 - 04.10.2005, ALB;
Ilieva-Litova Nevena Petrovas, Bulgarian Academy of Sciences, Institute for Nuclear Research and Nuclear Energy; 24.05.2005 - 29.05.2005, THI;
Iordan Andrei, Université Pierre et Marie Curie, Institut de Mathématique; 23.10.2005 - 01.11.2005, HSU;
Ishi Hideyuki, Yokohama City University; 16.09.2005 - 25.09.2005, HSU;
Ito Keiichi, Setsunan University; 07.03.2005 - 17.03.2005, DGY;
Iwaniec Tadeusz, Syracuse University; 23.06.2005 - 30.06.2005, CJS;
Jäkel Christian, Instituto de Fisica, Matematica, Universidade de Sao Paulo; 27.02.2005 - 19.03.2005, DGY;
Jaksic Vojkan, McGil University; 13.03.2005 - 19.03.2005, DGY;
Jaming Philippe, MAPMO, Université d'Orleans; 31.05.2005 - 10.06.2005, FGB;
Janssen A.J.E.M. Guido, Philips Research Laboratories; 09.04.2005 - 15.04.2005, FGB; 02.07.2005 - 08.07.2005, FGB;
Jona-Lasinio Giovanni, Universitá " La Sapienza "; 13.03.2005 - 23.03.2005, DGY;
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Junker Wolfgang, Universität Hannover, Institut für Mathematik; 09.11.2005 - 13.11.2005, ALB;
Kachmar Ayman, Université Paris-Sud; 10.11.2005 - 24.11.2005, SFS;
Kac Victor, MIT; 18.03.2005 - 22.03.2005, ACM; 11.06.2005 - 02.07.2005, SUS;
Kai Chifune, Kyoto University, Department of Mathematics; 16.09.2005 - 26.09.2005, HSU;
Kalai Gil, Hebrew University Jerusalem; 14.07.2005 - 29.07.2005, CJS;
Kalenda Ondrej, Univerzita Karlova, Katedra matematické analýzy; 27.05.2005 - 03.06.2005, CJS;
Kamada Hiroyuki, Miyagi University of Education; 13.09.2005 - 04.10.2005, ALB;
Kamishima Yoshinobu, Tokyo Metropolitan University; 12.10.2005 - 04.11.2005, ALB;
Kang Nam-Gyu, Massachusetts Institute of Technology; 09.06.2005 - 05.07.2005, CJS;
Kaniuth Eberhard, Universität Paderborn; 13.04.2005 - 24.04.2005, FGB;
Katayama Yoshikazu, Osaka Kyoiku University; 10.03.2005 - 01.04.2005, SCH;
Kath Ines, Max Planck Institut fuer Mathematik in den Naturwissenschaften; 09.10.2005 - 12.11.2005, ALB;
Kawahigashi Yasuyuki, University of Tokyo; 14.06.2005 - 02.07.2005, SUS;
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Kislyakov] Sergey, St. Petersburg branch of V.A. Steklov Institute; 09.06.2005 - 18.06.2005, CJS;
Kitakdado Shinsaku, Meijo University; 19.12.2005 - 20.12.2005, BEC;
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Kodama Hiroki, University of Tokyo; 01.10.2005 - 01.10.2005, SCHW;
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Koenig Kenneth, Ohio State University, Department of Mathematics; 22.10.2005 - 31.10.2005, HSU;
Kohn Joseph J., Princeton University; 23.10.2005 - 28.10.2005, HSU;
Kolar Martin, Masaryk University; 23.10.2005 - 31.10.2005, HSU;
Koldobsky Alexander, University of Missouri; 11.07.2005 - 04.08.2005, CJS;
Kopecka' Eva, Johannes Kepler Universität, Linz; 24.05.2005 - 02.06.2005, CJS;
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Koskela Pekka, University of Jyvaskyla; 13.06.2005 - 17.06.2005, CJS;
Kossakowski Andrej, Nicholas Kopernicus University; 12.03.2005 - 18.03.2005, DGY;
Krivelevich Michael, Tel Aviv University; 21.07.2005 - 29.07.2005, CJS;
Kuehnel Wolfgang, Universität Stuttgart, Institut fuer Geometrie und Topologie; 01.09.2005 - 19.09.2005, ALB;
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Larson David R., Texas A& M University; 09.04.2005 - 16.04.2005, FGB;
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Latala Rafal, Warsaw University; 19.07.2005 - 03.08.2005, CJS;
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Lledó Fernando, Universität Aachen, Inst. für Reine und Angewandte Mathematik; 10.11.2005 - 13.11.2005, ALB;
Lieb Elliott, University of Princeton; 11.03.2005 - 20.03.2005, ACM; 17.12.2005 - 21.12.2005, BEC;
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Linshaw Andrew, Brandeis University; 11.06.2005 - 03.07.2005, SUS;
Livshitz Evgeny, Moscow State University; 05.06.2005 - 11.06.2005, FGB;
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Losik+ Mark V., Saratov State University, Department of Mathematics; 17.10.2005 - 25.12.2005, MI;
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Maass Peter, Universität Bremen; 06.06.2005 - 07.06.2005, FGB;
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Majewski Wladyslaw Adam, University of Gdansk; 28.01.2005 - 12.02.2005, DGY;
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Malikov Fedor, University of Southern California; 12.06.2005 - 02.07.2005, SUS;
Malý Jan, Univerzita Karlova, Katedramtematické analýzy; 27.05.2005 - 04.06.2005, CJS;
Mankiewicz Piotr, Polish Academy of Sciences, Institute of Mathematics; 16.07.2005 - 31.07.2005, CJS;
Margrave Gary F., Dept. of Geology and Geophysics; 24.04.2005 - 06.05.2005, FGB;
Marinescu George, Johann-Wolfgang-Goethe-Universität; 21.09.2005 - 02.10.2005, HSU;
Martin-Garcia Jose M., Instituto de Matematicas y Fisica Fundamental; 09.05.2005 - 22.05.2005, ABK;
Matsui Tako, Graduate School of Mathematics, Kyushu University; 10.03.2005 - 19.03.2005, DGY;
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Matveev Vladimir, Universität Freiburg; 01.09.2005 - 22.09.2005, ALB;
McNeal Jeffery D., Ohio State University; 22.10.2005 - 27.10.2005, HSU;
Meissner Krzysztof, University of Warsaw, Inst. of Theoretical Physics; 14.04.2005 - 24.04.2005, DGY; 26.05.2005 - 31.05.2005, SFS;
Melnikov Mark, Universitat Autonoma de Barcelona; 12.06.2005 - 18.06.2005, CJS;
Merkli Marco, McGill University; 04.03.2005 - 25.03.2005, DGY;
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Michelangeli Alessandro, SISSA; 17.12.2005 - 20.12.2005, BEC;
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Molter Ursula, Universidad de Buenos Aires; 14.03.2005 - 13.08.2005, FGB;
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Mushkarov Oleg, Bulgarian Academy of Sciences, Institute of Mathematics and Informatics; 16.09.2005 - 23.09.2005, ALB;
Nadirashvilli Nikolai, University of Provence; 01.07.2005 - 02.07.2005, YNG;
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Nagy Paul-Andi, Humboldt-Universität Berlin; 26.09.2005 - 01.10.2005, ALB;
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Nardmann Marc, Universität Regensburg; 31.10.2005 - 13.11.2005, ALB;
Neeb Karl-Hermann, Technische Universität Darmstadt, Fachbereich Mathematik; 21.09.2005 - 29.09.2005, HSU;
Netocny Karel, Czech Academy of Sciences; 06.03.2005 - 18.03.2005, DGY;
Neukirchner Thomas, Humboldt Universität zu Berlin; 01.10.2005 - 31.12.2005, JF;

Neuhauser Markus, Institut f. Mathematik; 11.04.2005 - 22.04.2005, FGB;
Nicoara Andreea, Harvard University, Departmenf of Mathematics; 22.10.2005 - 30.10.2005, HSU;
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Noyvert Boris, Universita di Roma I/II; 12.06.2005 - 02.07.2005, SUS;
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Ohsawa Takeo, Nagoya University, Graduate School of Mathematics; 16.09.2005 - 25.09.2005, HSU;
Okoudjou Kasso A., Cornell University; 05.01.2005 - 26.07.2005, JF;
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Olafsson Gestur, Louisiana State University, Department of Mathematics; 06.04.2005 - 16.04.2005, FGB;
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Onchis-Moaca Darian, University of Resita; 30.06.2005 - 08.07.2005, FGB;
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Osterbrink Lutz, University of York, Department of Mathematics; 10.11.2005 - 12.11.2005, ALB;
Ostergaard-Sorensen Thomas, Alborg University; 05.12.2005 - 08.12.2005, HO;
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Packer Judith, University of Colorado; 11.04.2005 - 16.04.2005, FGB;
Pajor Alain, Université de Marne-la-Vallée; 12.07.2005 - 28.07.2005, CJS;
Panati Gianluca, Technische Universität München; 30.01.2005 - 09.02.2005, DGY;
Paouris Grigorios, Université de Marne-La-Vallee; 14.07.2005 - 05.08.2005, CJS;
Papadimitriou Ioannis, Desy Theory; 02.11.2005 - 09.11.2005, GRS;
Papadopoulos Athanase, Universite Louis Pasteur; 27.12.2005 - 01.01.2005, SCH;
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Pastur Leonid, Academy of Sciences, Ukraine; 19.07.2005 - 31.07.2005, CJS;
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Peetre Jaak, Lund University; 11.04.2005 - 20.04.2005, FGB;
Pelczynski Aleksander, Polish Academy of Science, Institute of Mathematics; 16.07.2005 - 31.07.2005, CJS;
Peller Vladimir, Michigan State University; 14.06.2005 - 29.06.2005, CJS;
Pesin Yakov, Pennsylvania State University, Dept. of Mathematics; 15.05.2005 - 03.06.2005, SCH;
Petersen Karl, University of North Carolina, Dept. of Math.; 25.06.2005 - 10.07.2005, SCH;
Pethick Christopher, Nordita; 17.12.2005 - 21.12.2005, BEC;
Petrova Guergana, Texas A&M University; 05.06.2005 - 11.06.2005, FGB;
Petz Dénes, Technical University of Budapest, Mathematical Department; 17.12.2005 - 20.12.2005, BEC;
Pfäffle Frank, Universität Potsdam; 10.11.2005 - 13.11.2005, ALB;
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Pillet Claude-Alain, CPT-CNRS; 13.03.2005 - 18.03.2005, DGY;

Pinamonti Nicola, Universita di Trento, Dipartimento di Matematica; 09.11.2005 - 12.11.2005, ALB;
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Pitaevskyi Lev Petrovich, Dipartimento di Fisica, Universita di Trento; 16.12.2005 - 23.12.2005, BEC;
Pivovarov Peter, University of Alberta; 11.07.2005 - 05.08.2005, CJS;
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Powell Alexander, Princeton University; 04.05.2005 - 30.06.2005, JF;
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Rácz István, MTA-KFKI, Research Institute for Particle and Nuclear Physics; 11.05.2005 - 19.05.2005, ABK;
Rademacher Hans-Bert, Univ. Leipzig; 04.09.2005 - 17.09.2005, ALB;
Raich Andrew, Texas A&M University; 25.10.2005 - 04.11.2005, HSU;
Raikov Gueorgui D., Universidad de Chile, Facultad de Ciencias; 16.09.2005 - 25.09.2005, HSU;
Rajaniemi Hannu, University of Edinburgh; 13.12.2005 - 18.12.2005, ALB;
Recknagel Andreas, King's College, Department of Mathematics; 03.11.2005 - 11.11.2005, GRS;
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Reisner Shlomo, University of Haifa; 11.07.2005 - 29.07.2005, CJS;
Retakh Alexander, MIT; 13.06.2005 - 02.07.2005, SUS;
Riss Elena, Russian State Pedagogical University; 25.05.2005 - 05.06.2005, CJS;
Ribault Sylvain, Desytheorie; 03.11.2005 - 09.11.2005, GRS;
Rochberg Richard, Washington University; 25.04.2005 - 07.05.2005, FGB;
Rockmore Daniel, Dartmouth College; 03.07.2005 - 08.07.2005, FGB;
Rodino Luigi, Universita di Torino; 13.06.2005 - 15.06.2005, SUS;
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Roschin Roman, Steklov, Mathematical Institute; 01.03.2005 - 31.03.2005, DGY;
Rudelson Mark, University of Missouri; 12.07.2005 - 28.07.2005, CJS;
Ruelle David, IHES; 30.01.2005 - 07.02.2005, DGY;
Ryabogin Dmitry, Kansas State University; 28.07.2005 - 04.08.2005, CJS;
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Sanchez Miguel, Universidad de Granada, Facultad de Ciencias; 09.11.2005 - 13.11.2005, ALB; 03.12.2005 - 18.12.2005, ALB;
Sass Michael, Christian Albrechts Universität Kiel; 11.07.2005 - 19.07.2005, CJS;
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Schenker Jeffrey, ETH Zürich; 31.01.2005 - 05.02.2005, DGY; 14.03.2005 - 18.03.2005, DGY;
Schlumprecht Thomas, Texas A & M University, Deptarture of Mathematics; 25.05.2005 - 10.06.2005, CJS;
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Schmitz Michael, Christian Albrechts Universität Kiel; 11.07.2005 - 15.07.2005, CJS;

Schmuckenschlaeger Michael, Universität Linz, Institut fuer Mathematik; 11.07.2005 - 27.07.2005, CJS;
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Schomerus Volker, DESY Theoriegruppe; 03.11.2005 - 09.11.2005, GRS;
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Sergeev Armen, Steklov Mathematical Institute; 03.09.2005 - 10.09.2005, HSU;
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Tachizawa Kazuya, Hokkaido University, Department of Mathematics; 29.05.2005 - 25.06.2005, FGB;
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Teschner Jörg, Desy Theorie; 03.11.2005 - 09.11.2005, GRS;
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Tichavský Jan, Sile Zian University in Opava, Mathematical Institute; 01.10.2005 - 30.11.2005, JF;
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Tropp Joel A., University of Michigan; 06.06.2005 - 25.06.2005, FGB;
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Wimmer Robert, University Hannover; 03.01.2005 - 24.01.2005, SFS;
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Wohlgenannt Michael, Universität Wien; 01.10.2005 - 31.12.2005, JF;
Wojciechowski Michal, Polish Academy of Science, Institute of Mathematics; 25.05.2005 - 05.06.2005, CJS;
Wojtaszczyk Przemyslaw, Warsaw University, Institut of Mathematics; 04.06.2005 - 16.06.2005, FGB; 16.06.2005 - 19.06.2005, CJS;
Wolak Robert, Uniwersytet Yagiellonski, Instytut Matematyka; 12.09.2005 - 01.10.2005, ALB;
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