ESI

**The Erwin Schrödinger International
Institute for Mathematical Physics**

Boltzmanngasse 9
A-1090 Wien, Austria

Scientific Report for the Year 1999

Vienna, ESI-Report 1999

March 1, 2000

ERWIN SCHRÖDINGER INTERNATIONAL INSTITUTE
OF MATHEMATICAL PHYSICS,
SCIENTIFIC REPORT FOR THE YEAR 1999

ESI, Boltzmanngasse 9, A-1090 Wien, Austria

March 1, 2000

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Statement on Austria's current political situation

The political developments in Austria are viewed with great concern not only by the world media, but also by many Austrians.

The Governing Board and the Scientific Directors of the Erwin Schrödinger Institute would like to make it absolutely clear that they are totally opposed to the nationalistic, xenophobic, and racist sentiments expressed by some politicians of a party which is involved in Austria's new government.

The Institute will continue to do everything in its power to maintain and enhance international scientific interaction and exchange. We appeal to all our colleagues working abroad to continue to support the Institute in these endavours.

Jakob Yngvason, President,
Peter Michor, Klaus Schmidt, Scientific Directors,
February 7, 2000, amended on February 17, 2000.

Available as http://www.esi.ac.at/Statement.html.
Mentioned in NATURE/Vol 403/17 February 2000/ page 691.

General remarks

In the year 1999 ESI was host to 405 visitors. There were 168 preprints contributed to the preprint series (195 till beginning of February), some of them still belong to programs from 1998, 317 seminar talks or ESI-Colloquia were given outside of conferences, many more lectures were given in conferences at ESI.

ESI has spent AS 5.02 Mio for science which was supplemented by AS 2.15 Mio of foreign support; AS 4.27 Mio were spent for administrative costs including renting the premises and personnel cost.

From the preprint server `http://www.esi.ac.at/Preprints` 15845 preprints were downloaded during the year 1999 (January 1335, February 1217, March 864, April 1407, May 808, June 1021, July 1614, August 861, September 3119, October 1361, November 1092, December 1146). For comparison, 1998 there were 7011 downloads.

The following conferences were (co)organized by ESI:

(1) **The 19th Winter school on geometry and physics**, January 9–16, 1999, in Srni, a small village in the Bohemian forest, Czech republic.
(2) **International Colloquium on Operator Algebras** February 12 - 14, 1999, Landschloß Ort bei Gmunden. Part of the program on functional analysis, see below for more information.
(3) **International Colloquium on Convexity**, April 9 - 11, 1999, Schloß Weinberg, Kefermarkt. Part of the program on functional analysis, see below for more information.
(4) **International Colloquium on Complex Function Theory and Functional Analysis**, June 3 - 5, 1999 St. Wolfgang am Wolfgangsee. Part of the program on functional analysis, see below for more information.
(5) **ESI - Workshop on Geometrical Aspects of Spectral Theory**, July 5 - 12, 1999, in Matrei in East Tyrolia, Austria Joint aftermath of the programs 'Schrödinger Operators with Magnetic Fields' and 'Geometric Spectral Theory' from Spring 1998, see below for more information.

Winter School in Geometry and Physics

The traditional winter school in geometry and physics which takes places for one week each January since 1980 in a picturesque village in the Czech parts of the Bohemian mountains is a joint enterprise of the Czech society of mathematicians and physicists and ESI, from 1994 onwards. Usually there are proceedings, which are published as a supplement of the 'Rendiconti Matematici di Palermo'.

In this year, the 19th Winter school on Geometry and Physics took place in the week January 9–16, 1999. ESI has contributed AS 10.000.– The former conferences with ESI-participation are published in the proceedings volumes:

The proceedings of the Winter school 'Geometry and Physics', Srní, January 1994.
Suppl. Rend. Circ. Mat. Palermo, II. Ser. **39** (1996), 9–148

The proceedings of the 15th Winter school 'Geometry and Physics', Srní, January 14–21, 1995.
Suppl. Rend. Circ. Mat. Palermo, II. Ser. **43** (1996), 9–228

The proceedings of the 16th Winter school 'Geometry and Physics', Srní, January 13–20, 1996.
Suppl. Rend. Circ. Mat. Palermo, II. Ser. **46** (1997), 9–176

The proceedings of the 17th Winter school 'Geometry and Physics', Srní, January 11–18, 1997.
Suppl. Rend. Circ. Mat. Palermo, II. Ser. **54** (1998), 11–124

The proceedings of the 18th Winter school 'Geometry and Physics', Srní, January 10–17, 1998.
Suppl. Rend. Circ. Mat. Palermo, II. Ser. **59** (1999), 7–228

Contents:

ESI - Workshop Geometrical Aspects of Spectral Theory

ESI contributed AS 204.000.–. 8 ESI-preprints [657], [658], [673], [674], [765], [768], [774], [833].

This workshop took place in Matrei in East Tyrolia, Austria, July 5 - 12 1999. It was a consequence of 2 activities at the Erwin Schrödinger Institute (ESI) in Vienna, Austria simultaneously in 1998: Spectral Geometry (organized by L. Friedlander and V. Guillemin) and Schrödinger operators with magnetic fields (organized by I. Herbst, T. Hoffmann-Ostenhof and J. Yngvason).

Participants: Thomas Østergaard Sørensen (Austria), Mark Ashbaugh (USA), Michiel van den Berg (UK), Leonid Friedlander (USA), Bernard Helffer (France), Ira W. Herbst (USA), Maria Hoffmann-Ostenhof (Austria), Thomas Hoffmann-Ostenhof (Austria), Thomas Kappeler (Switzerland), Frederic Klopp (France), Horst Knörrer (Switzerland), Peter Kuchment (USA), Ari Laptev (Sweden), Matthias Lesch (USA), Peter W. Michor (Austria), Sergey P. Novikov (Russia and USA), Kate Okikiolu (USA), Robert Seeley (USA), Zhongwei Shen (USA), Alexander V. Sobolev (UK), Thomas Østergaard Sørensen (Austria), Gerald Teschl (Austria), Steven Zelditch (USA), Maciej Zworski (USA).

Program:

Mark S. Ashbaugh: Some Eigenvalue Comparison Results for Domains in $\mathbb{S}^n$ and for Annular Domains in $\mathbb{R}^n$

Michiel van den Berg and M. Lianantonakis: Asymptotics for the spectrum of the Dirichlet Laplacian on horn-shaped regions and Zeta- functions on cross-sections

Leonid Friedlander: An inequality between Dirichlet and Neumann eigenvalues

Bernard Helffer: Nodal sets for superconducting states in a non simply connected domain

R. Froese and I. Herbst: Holonomic constraints in classical and quantum mechanics

Thomas Hoffmann-Ostenhof: Multiplicity of eigenvalues of 2-dimensional Laplacians

T. Kappeler and B. Mityagin: Estimates for periodic and Dirichlet eigenvalues of the Schrödinger operator

Frédéric Klopp: Lifshitz tails for random Schrödinger operators with negative singular Poisson potential

Peter Kuchment: Mathematics of photonic crystals

Ari Laptev: New bounds on the constants $L_{\gamma,d}$ appearing in the Lieb-Thirring inequalities

Matthias Lesch: A simple analytic proof of the gluing formula for the analytic torsion in the presence of a general (nonunimodular) flat bundle

Peter W. Michor: Smooth perturbation theory of unbounded operators

Sergey P. Novikov: Schrödinger Operators on Graphs and Symplectic Geometry

Kate Okikiolu: Critical metrics for spectral Zeta functions

Zhongwei Shen: Absolute Continuity of Periodic Schrodinger Operators

Alexander V. Sobolev: On the Bethe-Sommerfeld conjecture for the polyharmonic operator

Steven Zelditch: Hearing analytic plane domains with the symmetry of an ellipse

Vesselin Petkov and Maciej Zworski: Breit-Wigner approximations

In the ESI-preprint [768] one can find abstracts of all talks, references, and collections of open problems.

PROGRAMS IN 1999

Functional Analysis

ESI contributed AS 890.000.–, foreign support was AS 770,500.–. 34 ESI-preprints: [585] (1998), [671], [686], [687], [688], [689], [690], [691], [693], [694], [699], [700], [710], [711], [712], [713], [714], [718], [719], [721], [723], [724], [725], [726], [727], [732], [736], [746], [753], [772], [818], [823], [826], [845].

The Functional Analysis Group of the Mathematical Department at the Johannes Kepler University organized a research semester at the ESI during the period from Jan. 1st to July 31st, 1999 on the topics: operator algebras, convexity, complex function theory (with emphasis on the functional analytic aspects). Further information can be found on

$$\text{http://shrimp.bayou.uni-linz.ac.at/Vienna1999/schroedinger.html}$$

The idea of the research semesters at the ESI is to provide a forum for senior researchers and young mathematicians to interreact, continue existing scientific projects or instigate new ones. In the case of the above semester this was enhanced by three international colloquia in Upper Austria.

As explicit examples of concrete research projects which were instigated or continued in Vienna we mention

(1) David Preiss, University College of London, Joram Lindenstrauss, Hebrew University of Jerusalem, Eva Matoušková, Czech Academy of Sciences, (Differentiation in Banach spaces)

(2) Carsten Schütt, Christian-Albrechts-Universität Kiel, Elisabeth Werner, Case Western Reserve University, Shlomo Reisner, University of Haifa, (Volume estimates for convex bodies)

(3) Peter Jones, Yale University, Paul Müller, Johannes Kepler Universität Linz, (Estimates for harmonic measure). (Preprints 732 (1999), 724 (1999), 725 (1999)).

The participants in the semester were leading researchers in analysis whose work has had a decisive influence on the development of their subjects. This is documented by the following facts:

A total of 111 mathematicians from the following countries took part; Austria, Germany, Swiss, France, Great Britain, Ireland, Denmark, Sweden, Norway, Italy, Spain, Greek, Russia, Poland, Czech Republic, Slovakia, Hungary, Japan, USA, Canada, Israel and India.

Amongst the Universities which were represented were: Yale University, Institute for Advanced Studies Princeton, Texas A&M University, University of California at Berkeley, Tel Aviv University, Weizmann Institute Rehovot, Université de Paris VI, Princeton University, University of California at Los Angeles, University of Illinois at Chicago, Royal Institute of Technology (Stockholm), California Institute of Technology, Max-Planck Institut für Mathematik in den Naturwissenschaften (Leipzig), Lund University, University of British Columbia, University College London, Universität Zürich, Universität Heidelberg, The Filds Institute Toronto, City College of New York, Università di Roma, Polish Academy of Sciences, Czech Academy of Sciences.

The following participants are holders of the prestigious Salem prize: C. Thiele, G. David, P. Jones, N. Makarov, S. Treil, A. Volberg, G. Pisier. Prof. Pisier is also holder of the Ostrowksi prize.

The following is a list of important monographs whose authors participated in the seminar:

[**1.**] D. Amir, Tel Aviv University, *Characterizations of inner product spaces*, Basel, Birkhäuser, 1986;

[**2.**] A. Pełczyński, Polnische Akademie der Wissenschaften, *Banach spaces of analytic functions and absolutely summing operators , expository lectures from the CBMS regional* (1977);

[**3.**] C. Bessaga, A. Pełczyński, *Selected topics in infinite-dimensional topology*, Warszawa, PWN, 1975;

[**4.**] P. Wojtaszczyk, Warsaw University, *Banach spaces for analysts*, Cambridge Univ. Press, 1991;

[**5.**] P. Wojtaszczyk, *A mathematical introduction to wavelets*, Cambridge Univ. Press, 1997;

[**6.**] J. Lindenstrauss, Hebrew University of Jerusalem, *Extension of compact operators*, Providence, RI, American Mathematical Soc., 1964;

[**7.**] J. Lindenstrauss, L. Tzafiri, *Classical Banach spaces*, Berlin, Springer, 1973; Benyamini, J. Lindenstrauss, *Non linear functional analysis* (erscheint);

[**8.**] W.B. Johnson, J. Lindenstrauss (eds.), *Handbook of functional analysis* (erscheint);

[**9.**] D. Voiculescu, University of California at Berkeley, (gemeinsam mit S. Stratila), *Representations of AF-algebras and of the group U*, Berlin, Springer, 1975;

[**10.**] K. J. Dykema, A. Nica, D. Voiculescu, *Free random variables, a noncommutative probability approach to free products with applications to random matrices*, Providence, RI, American Math. Soc., (1992);

[**11.**] V. Milman, G. Schechtman, Weizmann Institute Rehovot, *Asymptotic theory of finite dimensional normed spaces*, Berlin, Springer, 1986;

[**12.**] W. B. Johnson, B. Maurey, V. Milman, L.Tzafriri, *Symmetric structures in Banach spaces*, Providence, RI, American Mathematical Soc., 1979;

[**13.**] V. Milman, Tel Aviv University, (siehe G. Schechtman)

[**14.**] H. Jarchow, Universität Zürich, *Locally convex spaces*, Stuttgart, Teubner, 1981;

[**15.**] J. Diestel, H. Jarchow, A. Tonge, *Absolutely summing operators*, Cambridge Univ. Press, 1995;

[**16.**] B. Carl, I. Stephani, Friedrich-Schiller-Universität Jena, *Entropy, compactness and the approximation of operators*, Cambridge Univ. Press, 1990;

[**17.**] W. Johnson, Texas A&M University, (gemeinsam mit B. Maurey, G. Schechtman, L.Tzafriri), *Symmetric structures in Banach spaces*, Providence, RI, American Mathematical Soc., 1979;

[**18.**] N. Ghoussoub, University of British Columbia, *Some topological and geometrical structures in Banach spaces*, Providence, RI, American Mathematical Soc., 1987;

[**19.**] N. Ghoussoub, *Duality and perturbation methods in critical point theory*, Cambridge Univ. Press, 1993;

[**20.**] N. Ghoussoub, B. Maurey, H_δ - *embeddings in Hilbert space and optimization on G_δ - sets*, Providence, RI, American Mathematical Soc., 1986;

[**21.**] A. Olevskii, Tel Aviv University, *Fourier series with respect to general orthogonal systems*, Berlin, Springer, 1975;

[**22.**] V. Havin, St. Petersburg State University, *Linear and complex analysis problem book*, Berlin, Springer, 1994;

[**23.**] V. Havin, *The uncertainty principle in harmonic analysis*, Berlin, Springer, 1994;

[**24.**] G. Pisier, Université Paris VI, *Espaces de Banach classiques et quantiques*, Paris, 1994;

[**25.**] M.B. Marcus, G. Pisier, *Necessary and sufficient conditions for the uniform convergence of random trigonometric series* 1978;

[**26.**] M.B. Marcus, G. Pisier, *Random Fourier series with applications to harmonic analysis*, Princeton, NJ, 1981;

[**27.**] G. Pisier, *Factorization of linear operators and geometry of Banach spaces expository lectures from the CBMS regional conference held* (1986);

[**28.**] G. Pisier, *Non-commutative vector valued Lp-spaces and completely p-summing maps*, Paris, Soc. Math/'ematique de 1998;

[**29.**] G. Pisier, *The operator Hilbert space OH, complex interpolation and tensor norms*, Providence, RI, American Mathematical 1996

[**30.**] G. Pisier, *Similarity problems and completely bounded maps*, Berlin, Springer, 1996;

[**31.**] G. Pisier, *The volume of convex bodies and Banach space geometry*, Cambridge Univ. Press, (1989).

The following participants have held main talks at the International Mathematical Congresses:

Invited plenary talkes:

A. Pełczyński 82, D. Voiculescu 94, G. Pisier 98,

Invited section talks:

J. Lindenstrauss 70, V. Milman 86, 98, N. Tomczak Jaegerman 98, Th. Schlumprecht 94, G. David 86, V. Havin 78, P. Jones 82, N. Makarov 86, A. Olevskii 86, G. Pisier 82, A. Pełczyński 66, D. Voiculescu 82, A. Volberg 90, D. Preiss 90, R. Longo 94.

The research semester was supported financially from the budget of the Schrödinger institute. This was used to finance the living costs of most of the foreign participants. Further financial support was provided by the International Mathematical Union, the Austrian Mathematical Union, the Government of Upper Austria, the City Council of Linz, the Linzer Hochschulfonds, VOEST-ALPINE Industrieanlagenbau GmbH and the Johannes Kepler University of Linz.

This covered the costs of the three international colloquia and the organizers' living costs in Vienna.

In would like to conclude this report by expressing my gratitude to the above-mentioned sponsors and to my colleagues Renata Mühlbachler, A.Prof. Paul F.X. Müller, A.Prof. Michael Schmuckenschläger und A.Prof. Charles Stegall for their efforts which were indispensable for the success of this semester.

James Cooper

International Colloquium on Operator Algebras. February 12 - 14, 1999, Landschloß Ort bei Gmunden.

Program: Walter Thirring (ESI Wien): The Thirring Model 40 Years after

Heide Narnhofer (Universität Wien): Anosov Property and K Property in quantum Systems

Christian Jäkel (Universität Wien): Applications of modular theory in local quantum physics

Ken Dykema (Odense Universitet): Exactness of reduced free product C^*-algebras

Alexandru Nica (University of Waterloo): R-diagonal elements and freeness with amalgamation

Flemming Larsen (Odense University): On powers of R-diagonal elements

Daniele Guido (Universita della Basilicata, Potenza): Non commutative Riemann integration and singular traces for C^*-algebras

Martin Mathieu (The Queen's University of Belfast): Automatic Continuity of Lie Homomorphisms on C^*-Algebras

Anna Paolucci (University of Leeds): Duality for quantum groups and the Cuntz Algebra

Ilona Krolak (Wroclaw University): Wick product for general commutation relations

Romuald Lenczewski (Wroclaw University): The hierarchy of freeness - the GNS construction, limit theorems and other developments

Piotr Sniady (Wroclaw University): Quantum Stochastic Calculus of Bounded Operators

Wolfgang Lusky (Universität Paderborn): Fourier analysis of operators on Hilbert spaces of holomorphic functions

International Colloquium on Convexity. April 9 - 11, 1999, Schloß Weinberg, Kefermarkt.

Program: Joram Lindenstrauss (Hebrew University of Jerusalem): A new look at James's theorem

Gilbert Helmberg (Universität Innsbruck): The speed of convergence for alternating series with a convexity property

Christian Richter (Universität Jena): Linear combinations of partitions of unity with restricted supports

Eva Matouskova (Czech Academy of Sciences): Lipschitz image of a null set can have null complement

Thomas Schlumprecht (Texas A&M University):

Thomas Kühn (Universität Leipzig): The complex binary trilinear unit ball

William B. Johnson (Texas A&M University):

Katalin Marton (Hungarian Academy of Sciences): Measure concentration for processes with memory

Denes Petz (Technical University of Budapest): Monotone inner products on matrix spaces

Frank Barthe (Universite de Marne-la-Vallee): A short solution of the Busemann-Petty problem

Apostolos A. Giannopoulos (University of Crete): Isomorphic positions of convex bodies

Yehoram Gordon (Technion): On volume ratios

Gideon Schechtman (Weizmann Institute of Science): Lewis' change of density revisited

International Colloquium on Complex Function Theory and Functional Analysis. June 3 - 5, 1999 St. Wolfgang am Wolfgangsee.

Program: James Groves (University of Lancaster): Spectral representations of Banach space valued Ornstein-Uhlenbeck processes

Silke Holtmanns (Universität Paderborn): Operator Representation for Weighted Spaces of Holomorphic Functions

Peter W. Jones (Yale University): Continua support measures with bounded Cauchy Transforms

Michael Kaltenbäck (TU Wien): Pontryagin Spaces of Entire Functions

Bernd Kirchheim (Max Planck Institut Leipzig): Gradients without Rank-One Connections
Heinz König (Universität des Saarlandes): Extension of the Riesz Representation Theorem to Arbitrary Hausdorff Topological Spaces
Nikolai Makarov (Caltech): Some Facts and Questions Concerning Non-branching Aggregation in the Complex Plane
Herve Queffelec (Universite de Lille 1): Some New Properties of Thin Sets of Integers in Harmonic Analysis
Sheel Pandey (R.D. University Jabalpul): The Theory of Multipliers in Banach and Locally Convex Spaces
Alexei Poltoratski (Texas A&M University): Maximal Properties of the Cauchy Transform
Stanislav Smirnov (Yale University & KTH): Dimension of quasicircles and multifractal spectra
Dirk Schlingemann (Erwin Schrödinger Institut): From Euclidean Field Theory to Quantum Field Theory
Przemyslaw Wojtaszczyk (Uniwersytet Waszawski): Wavelets in H_2

Nonequilibrium Statistical Mechanics

ESI contributed 509,000.–, foreign support was AS 21,000.–. 4 ESI-preprints: [659], [675], [684], [843], [844]

February/March 1999 The workshop was organized by G. Gallavotti (Rome), H. Spohn (München), and H. A. Posch (Vienna).

In the original proposal, we planned to cover
- Gaussian thermostatted dynamics
- spatially extended dynamical systems
- stochastic particle systems and growth processes
- Hamiltonian dynamics

We could attract specialists in the field and generate a stimulating research environment. The workshop included also a topical conference with many lectures by participants. A listing of these lectures is given in the Appendix. However, we did not fully succeed in terms of stays beyond two weeks. Presumably there are many causes, the most obvious one is that for most countries this period in February and March is in the middle of teaching.

It is not possible to cover all activities in such a summary. Instead, we take one or two representative topics from each of the four areas.

Stochastic particle systems and growth processes. (Derrida, Henkel, Krug, Landim, Olla, Redig, Schütz, Sidoravicius, Spohn, van Beijeren)

In a growth process a stable phase is growing at the expense of an unstable phase. On a macroscopic scale, the interface is flat and one is interested in the size and statistics of fluctuations. Around the time of the ESI workshop, this problem underwent spectacular advance. Baik, Deift, and Johansson could map the problem on random matrices and obtained explicit scaling functions, for the first time. Derrida had already analyzed the N-dependence of the corresponding large deviation function. We tried to understand how these approaches are related. We also used the exact time-dependent solution of Schütz for the asymmetric exclusion process to obtain directly the random matrix representation without the detour through the Schensted formula for Young diagrams. A related intensely discussed topic is how and if at all conformal invariance is relevant for growth processes.

Hamiltonian dynamics. (Bambusi, Bennettin, Bunimovich, Eckmann, Gallavotti, Gaspard, Cohen, Jauslin, Liverani, O. Penrose, Pillet, Posch, Rey-Bellet, Rondoni, Tel, Torcini)

Physically one expects that a small system coupled to an ideal, infinitely-extended reservoir at a definite temperature will approach equilibrium in the long-time limit. The list of models for which this can be proved is rather short. Even worse, the proofs are not stable against small, physically natural perturbations. A nonequilibrium variant is to couple the small system to two reservoirs at different temperatures. In the steady state there is a constant energy flux. The steady state is only indirectly determined and its statistical properties are poorly understood. The ESI discussions centered around the results by Eckmann, Pillet, and Rey-Bellet for flux through an anharmonic chain and the result by Liverani for a weakly anharmonic quantum oscillator.In the former case, a variant of the Gallavotti-Cohen fluctuation theorem was established. We tried to relax the so far rather strong conditions on the interaction potentials. In fact, the theory is really a considerable progress in the long-time limit for highly-singular nonreversible diffusion processes. In the quantum case one uses a careful iterative estimate on

the time-dependent Born series to prove its convergence uniformly in time. The progress is that such estimates do not require any longer the exponential decay of the uncoupled two-point function.

Another important discussion developed about the hydrodynamic mode-like structures exhibited by the Lyapunov vectors, associated with the small (in the absolute sense) Lyapunov exponents, in the tangent space of many-body hard-disk and hard-sphere systems in and close to equilibrium. These modes are a consequence of the translation invariance of extended dynamical systems. They were found by computer simulation (Posch) and were unexpected. The discussions concentrated on the symmetries of these modes which show a hitherto not fully-understood multiplicity of the corresponding exponents. A simple random matrix model (Eckmann) was subsequently shown to exhibit weakly perturbed coherent long wavelength modes analogous to the simulation results.

Thermostatted systems. (Bonetto, Cohen, Dorfman, Gallavotti, Hoover, Maes, Posch, Rateitschak, Rondoni, Spohn, Tel, Vollmer)

The Gallavotti-Cohen fluctuation theorem is one of the few general results for thermostatted systems out of equilibrium. It considers the large deviations in the phase space volume contraction integrated along the trajectory of the system. Under the chaotic hypothesis, the odd part of the corresponding rate function is linear. The fluctuation theorem is global. So one important issue is whether and how one could prove a local version of the fluctuation theorem which is important in application to real systems. Numerically one often finds a linear odd part but with a slope different from the one predicted by the theory. The problem is then in which sense the chaotic hypothesis fails and whether it could be replaced by a weaker version still yielding a linear dependence. The fluctuation theorem is not restricted to deterministic systems out of equilibrium. In fact it holds also for stochastic systems. The large deviations are then for the time-integrated currents of the locally conserved fields. Maes explained us how the fluctuation theorem relates to general symmetries of space-time Gibbs measures. Towards the end of the workshop, rather unexpectedly, a lively discussion developed on the issue of steady versus non-steady fluctuation theorems. While the GC formulation is for the steady state, a similarly looking fluctuation theorem by Evans and Searles holds also for a rather special choice of the initial distribution with in essence no assumption on the dynamics. Thus, one has to understand whether the non-steady version is of any physical relevance and how the two versions are quantitatively related.

Another topic discussed in detail was the definition and identification of the hydrodynamic entropy production for dynamically thermostated systems, and the connection to the Evans-Searles and the Gallavotti-Cohen fluctuation theorem, relating the entropy fluctuations to the growth rate of the phase-space density, a generalization of the phase-space contraction rate. Also the role of non-dynamical but stochastic boundaries was investigated. It was demonstrated for a Brownian diffusion model that it is possible to formulate the tangent-vector dynamics such that the dissipative flux still determines the sum of the Lyapunov exponents which is related to the phase-space contraction rate. Experimentally, the dynamical randomness of Brownian motion has been analyzed in terms of an entropy per unit time (Gaspard). Although this interpretation has also been criticized, it nevertheless indicates that some of the novel measures of complex dynamics and microscopic chaos may also be obtained from experiment.

In conclusion, the workshop provided a platform for very lively discussions and scientific exchange. The field of nonequilibrium statistical mechanics is moving fast and some of the recently developed concepts provide a major step towards a better understanding of nonequilibrium processes. We are grateful to have been given the opportunity to organize this workshop and thank the Erwin Schrödinger Institute in Vienna for providing facilities and financial support.

February 10, 2000

G. Gallavotti, H. Posch, H. Spohn

Holonomy Groups in Differential Geometry

ESI contributed AS 540,000.–, foreign support was AS 21,000.– 14 ESI-preprints: [756], [769], [771], [779], [783], [796], [806], [816], [817], [821], [824], [827], [835], [839].

Organizers: Dmitri Alekseevsky, Krzysztof Galicki, and Claude LeBrun.

The program opened with the **Second Meeting on Quaternionic Structures in Mathematics and Physics** which was held in Rome, September 6-10, 1999. Many participants of the holonomy program were also invited speakers at the Rome meeting. The conference was organized by Max Pontecorvo (Roma III) and Stefano Marchiafava and Paolo Piccinni (Roma I). The scientific committee consisted of D. Alekseevsky, K. Galicki, P. Gauduchon, S. Marchiafava, and S. Salamon. Many lectures were excellent and there was a lot of interaction between geometers and physicists. The meeting was a great success. A proceeding volume will be published electronically later by the EMS. More information about the conference with the full list of registered participants can be obtained from
`www.mat.uniroma3.It/users/max/meeting/meeting.html`.

After this very strong opening some of the participant departed for Vienna. The last guests stayed at ESI until the end of the year. Altogether about 50 participants visited the Institute this Fall. They represented many research areas. The following list of research topics pursued by the visiting participants during their stay in Vienna, even if not complete, should provide a brief summary of the scope of the program:

- classification of holonomy groups of torsion-free connections (Merkulov, Schwachhöfer)
- Kähler, Kähler-Einstein, CR geometry, momentum mappings (Alekseev, Alekseevsky, Bielawski, Bourguignon, Moroianu, Podesta, Spiro, Sergeev, Wiśniewski)
- quaternionic, hypercomplex, quaternion-Kähler, and hyperkähler manifolds (Alekseev- sky, Barberis, Battaglia, Bielawski, Boyer, Dancer, Davidov, Dotti, Fino, Gauduchon, Galicki, Kobak, Pedersen, Poon, Singer, Swann, Verbitsky)
- locally conformal structures in complex and quaternionic geometry (Barberis, Dotti, Fino, Gauduchon, Marchiafava, Ornea, Piccinni, Pontecorvo)
- moduli spaces of connections over quaternion-Kähler and quaternionic manifolds (Nitta)
- Sasakian-Einstein geometry and contact structures (Boyer, Friedrich, Figueroa, Galicki, Kath, Ornea)
- exceptional holonomy groups (Friedrich, Galicki, Kath, Semmelmann, Swann)
- holonomy reduction and Einstein manifolds (Boyer, Dancer, Galicki, Kobak, Mushkarov, Swann, Wang, LeBrun)
- twistor and spinor geometry, parallel spinors, Killing spinors (Baum, Baily, Calderbank, Eastwood, Friedrich, Kath, Moroianu, Semmelmann, Singer)
- holonomy reduction and string theory, special Kähler geometry, Frobenius manifolds, and other related topics (Agricola, Alekseevsky, Devchand, Cortés, Figueroa, Merkulov, Ogievetsky, Vandoren)
- Maldacena's Conjecture, near horizon geometries and holonomy group in physics (Figue- roa, Vandoren, Ogievetsky, Devchand)

Many visitors gave one hour talks during their stay. There were about 40 such talks. Some of the participants already have (or will in the future) published results of their research in the ESI Preprint Series. All the relevant data can be found on the ESI Web Page.

It would be hard to choose just one key event in the program. We had many experts famous in their respective fields working on important and exciting research projects. We also had many young people just starting their scientific careers.

One should certainly mention here the lecture of Jarek Wiśniewski. He chose his visit for an announcement of a very important result in the field of Riemannian manifolds with special holonomy. All symmetric compact positive quaternion Kähler manifolds were classified over 20 years ago by Wolf. Ever since many people tried to find a non symmetric compact positive quaternionic Kähler manifold. More recently, LeBrun and Salamon used some of their rigidity

results to conjecture that all such manifolds must be symmetric. Wiśniewski now claims to have the proof of the LeBrun-Salamon Conjecture. If the proof is correct it certainly will be one of the highlights of this wonderfully successful semester.

There were many other interesting talks. The full list of the titles can be found on the program's web page. To give a few more examples, Claude LeBrun talked about his work on the existence and non-existence of supreme Einstein metrics, Uwe Semmelman's on his work on vanishing of Betti numbers on quaternion Kähler manifolds, and Sergei Merkulov's on his exciting results concerning Frobenuis manifolds. José Figueroa gave an excellent series of lectures explaining to a mathematical audience how holonomy groups come up in modern supergravity theories. Thomas Friedrich spoke about his new work on weak holonomy in dimension 16 and the theme of weakening holonomy came back later in the talk of Andrew Swann. Sun Poon described his new results on the so-called HKT manifolds and Paul Gauduchon talked about Einstein 4-manifolds with hyperhermitian structures. Jean Pierre Bourguignon gave a beautiful lecture about spinors and special holonomy and Andre Moroianu spoke on parallel spinors on non-simply connected manifolds. Helga Baum and Ines Kath were describing their work on Killing spinors on pseudo-Riemannian manifolds. Charles Boyer talked about contact manifolds admitting Einstein metrics and Mike Singer about new hyperkähler manifolds in dimension 4. Armen Sergeev presented a twistor approach to the geometric quantization of some infinite-dimensional Kähler manifolds, for example, loop groups. McKenzie Wang spoke about integrability of cohomogeneity one Einstein equation, considered as a (finite dimensional) Hamiltonian system. Misha Verbitsky talked about trianalytic subvarieties of hyperKähler and hypercomplex manifolds and stated his surprising result that a submanifold of a hyperkähler manifold, which is complex with respect to a generic parallel complex structure, is 3-analytic and, hence, totally geodesic. All these, and many more, were truly first rate lectures, often describing completely new and exciting results

Short abstracts of many of these talks can be found on the Program Web Page. Expanded abstracts of all talks will appear in an ESI Preprint.

Complex Analysis

ESI contributed AS 565,000.–, foreign support was AS 1,000.– 20 ESI-preprints: [741], [749], [750], [762], [764], [766], [782], [786], [790], [795], [798], [799], [800], [803], [804], [808], [820], [830], [834], [836].

Organized by Friedrich Haslinger and Harald Upmeier August–November 1999.

The project started with the lecture of Adam Koranyi, whose contributions to complex analysis on symmetric spaces in combination with harmonic analysis were of great importance for the development of a rich and deep theory with far-reaching applications. In his report he explained some ideas how to generalize the theory of quasiconformal mappings to several variables which is of special interest for certain topics in theoretical physics.

The next activities concentrated on discrete group actions on Stein manifolds, invariant C-R operators, the Berezin tranform and the problem of quantization (B. Krötz and G. Zhang). These topics met with a lively response from the parallel-running project on Applications of Integrability.

Three prominent scientists, B. Gaveau (Paris), P. Greiner (Toronto) and D. Tartakoff (Chicago) represented complex analysis methods in the theory of partial differential equations, such as the Hamilton-Jacobi equation, the transport equation, real Hamiltonian mechanics and regularity of sum of squares of real analytic vector fields.

The theory of CR-mappings found very much attention in the last years, the promising new results are presented in a recent Princeton Mathematical Series book by M. Baouendi, P. Ebenfelt and Linda Preiss Rothschild. In his address at ESI P. Ebenfelt gave an excellent survey of the most important new methods in this rapidly growing field. Interesting contribution to this subject were also delivered by A. Tumanov (extremal discs and regularity of CR mappings), B.Lamel (Segre sets) and R.Dwilewicz (extension of CR-mappings), G.Zampieri (analytic discs in symplectic spaces) and N.Shcherbina (Levi flat surfaces).

Between September 15 and October 15 the main activities on several complex variables took place. A series of survey talks by leading experts was organized : D.Barrett (Bergman kernels), K.Diederich (pluricomplex Green functions), I.Lieb (boundary values of the Neumann solution to $\bar{\partial}$), T. Ohsawa (L^2-holomorphic functions, extension and sampling), J.Leiterer ($\bar{\partial}$-cohomology), P.Pflug (completeness of Bergman and Caratheodory metrics). These survey talks were accompanied by reports on more special topics such as singularities of the Bergman kernel, Bochner -Hartogs theorems in the complex projective space, characterization of solvability and regularity of Lewy equations for special domains in $\mathbb{C}^2$, boundary behavior of Kobayashi metrics, convexifiability of finite type domains and q-complete spaces. 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. At the end of this part of the project E.Straube, one of the last Bergman prize winners, gave an interesting survey talk on plurisubharmonic defining functions, vector fields and exactness of the winding form.

The link to the other part of the project was provided by the contribution of M.Englis on weighted Bergmann kernels and quantization. Here the main topics were symmetric spaces, C^*-algebras of Toeplitz operators, Hecke operators, application of quantization methods to the theory of modular forms, Berezin-Toeplitz quantization, the analysis of loop spaces, the spectrum of the hyperbolic Laplace-Beltrami operator, invariant domains in the complexification of a noncompact Riemannian symmetric space, B-functions on symmetric spaces, a microlocal version of Cartan-Grauert's theorem and Hermitian symmetric spaces and the Barlet-Koziarz method for holomorphic convexity.

Harald Upmeier will give a more detailed description of this part of the seminar.

All participants were pleased by the inspiring atmosphere of the ESI and ensured us of having found new and important insights to their own problems with the help of other colleagues staying at ESI.

We also tried to support colleagues from Eastern Europe and invited several scientists from Russia, Poland, Bulgaria, Romania and the Czech Republic.

We planned to save some money for a follow-up conference. It happened that quite a lot of the planned long term visitors canceled their visit in the last moment, so that it was impossible to find substitutes in time. We hope we can use most of the money we left for a seminar in November 2000, which seems to be a period where the ESI is not occupied too much by the regular activities.

Many colleagues showed great interest to come again in November 2000.

Fritz Haslinger

Among the highlights of this part of the Seminar, devoted to the interactions between complex analysis and harmonic analysis, number theory and operator theory, were contributions by Y. Neretin (Moscow State University) on Beta-functions in several variables, J. Wolf (Berkeley) on representation theory via partially holomorphic functions, K.H. Neeb (Darmstadt) on infinite dimensional holomorphy on Grassmann flag manifolds, A. Unterberger (Reims) on modular functions and quantization of SL(2.R)-representations, T. Wurzbacher (Strasbourg) on Kaehler geometry of loop spaces, M. Schlichenmaier (Mannheim) on Toeplitz quantization of general Kaehler manifolds, L. Coburn (Buffalo) on Toeplitz operator algebras and applications to quantum mechanics and pseudodifferential calculus, and A. Sergeev (Steklov Institute) on general tube domains and envelopes of holomorphy. Also, several younger mathematicians (e.g., A. Alldridge and U. Hagenbach) presented important results on non-commutative Hardy spaces, while other participants, such as J. Arazy (Haifa), were mostly engaged in joint collaboration on new research projects, certainly an integral part of the activities at ESI-Seminars. It should be stressed that there were also fruitful interactions with the program on non-commutative geometry and mathematical physics directed by A. Alekseev, L.Faddeev, and H. Grosse.

H. Upmeier

Applications of Integrability

ESI contributed AS 768,000.–, no foreign support. 26 ESI-preprints: [656], [676], [696], [698],

[708], [723], [742], [743], [744], [745], [747], [751], [755], [758], [759], [760], [778], [784], [785], [791], [797], [802], [831], [832], [841], [842].

Organized by A. Alekseev, L. Faddeev, H. Grosse.

The program **Applications of Integrability** took place in the period August 15 - October 31, 1999. The main topics that were considered in the program were as follows:

(1) Completely integrable models and their applications to various fields of Physics.
(2) Conformal Field Theory (CFT) and boundary CFT, applications to strings and D-branes.
(3) Deformation quantization and path integrals.

The program was centered around three lecture series (3 lectures each) by the leading scientists participating in the program. Here is the brief description of these lecture series:

Prof. G. Felder (Zürich) gave a lecture course on his recent work explaining the universal deformation quantization formula of Kontsevich from the point of view of functional integral. His lectures attracted a lot of attention and, in particular, initiated an interaction with mathematicians visiting ESI at the same time. In particular, *Prof. L. Takhtajan* presented his work on deformation quantization of symplectic manifolds via the Bergmann kernel.

Dr. V. Schomerus (Hamburg) presented a lecture series on his recent pioneering work relating D-branes to Noncommutative Geometry via boundary CFT. Several participants of the program presented talks on related topics and started collaborations which resulted in publications during the period of the program! In particular, *Prof. G. Felder* reported on his joint work with *Prof. J. Fröhlich, Dr. J. Fuchs and Dr. C. Schweigert* relating the boundary CFT to 3-dimensional topological field theory. Two groups, *Dr. A. Alekseev, Dr. A. Recknagel and Dr. V. Schomerus* and *Prof. K. Gawedzki and Prof. I. Todorov* published preprints on D-branes in the Wess-Zumino-Witten model.

Prof. L. Faddeev (St.Petersburg and Helsinki) and Dr. A. Volkov (Brussels) gave a lecture series devoted to the new results in the quantum Liouville model. This is one of the most famous 2-dimensional models bridging between the theory of integrability and CFT. Other contributions on the Liouville model were presented by *Dr. B. Ponsot and Dr. J. Teschner.*

Among other important contributions one should mention the following two:

Prof. P. Wiegmann and Dr. A. Zabrodin published a preprint and presented a series of talks relating the classical problem of reconstructing a curve on a plane by its momenta with the integrable Toda hierarchy.

Prof. S. Lukyanov reported on his recent solution of the problem of a quantum wire with impurity. This is one of the fundamental problems of low-dimensional condensed matter which attracted a lot of attention during the last 20 years. A talk devoted to another interesting problem in the same field, the so-called *0.7 plateau* was presented by *Dr. V. Cheianov.*

We conclude that, in our view, the program was very successful. It initiated an extensive scientific exchange between the participants which resulted in a number of collaborations. Some of these collaborations led to contributions presented already during the program.

We would like to mention that our program got an excellent support from the ESI staff.

<div align="center">A. Alekseev   L. Faddeev   H. Grosse</div>

Continuation of programs from 1998 and earlier

Quantization, generalized BRS cohomology and anomalies, follow-up of a program from 1998. ESI contributed AS 51,000.–, foreign support was AS 33,000.– 10 ESI-preprints: [656], [664], [682], [683], [698], [709], [733], [780], [787], [789].

Organized by R.A. Bertlmann, M. Kreuzer, W. Kummer, A. Rebhan, M. Schweda.

The program was a prolongation of the 1998 program in order to continue the collaborations of the participants and to work out the open problems. 8 ESI preprints could be finished as a result of such collaborations.

The activity started end of June with the visits of R. Banerjee and T. Sykora who investigated the Hamilton approach to gauge theories. R. Banerjee presented a method for finding the complete set of gauge transformations for a given Lagrangian and T. Sykora could solve due to the fruitful discussions with R. Banerjee and H. Grosse a calculation of Schwinger terms in

a 1+1 dimensional fully quantized theory. It appeared as ESI preprint No. 787. The output of the visit of L. Colatto are two preprints: "Renormalization of N=1 super-QED3 coupled to parity-preserving matter" and "No parity anomaly in massless QED3". These works were done in collaboration with L.P. Colatto, O.M. Del Cima, D.H.T. Franco, O. Piguet and M. Schweda. S. Krivonos has been invited as a specialist on partial breaking of global supersymmetry in connection with the supermembrane. The invitation of D. Sorokin was a consequence of his extensive work on superconformal theories and supertwistor dynamics. In December there was an activity on the geometric aspects of quantum field theory. C. Ekstrand gave a talk on the joint work with J. Mickelsson (who participated in the 'anomaly' progam last year) explaining the theory of bundle gerbes applied to the calculation of anomalies and Schwinger terms (inclusive gravitation), the work appeared as ESI preprint No.698. C. Adam (who also participated last year) reported on his recent successful efforts (together with C. Nash) to relate the zero-modes of the Dirac operator (in 3 dimensions) to Hopf maps. The discussion of the open problems in this connection led to a joint collaboration of Adam, Ekstrand, Sykora and Bertlmann. The program ended with a visit of P. Landshoff, originally scheduled for December but slightly postponed for beginning of January, which was devoted to a continuation of work on consequences of the trace anomaly in thermal quantum field theory. This work was begun in the previous year within the research program and first results were published as ESI preprint 709 (by now published in Physics Letters B) together with A. Rebhan. It also should be mentioned that several discussions benefited much by L. Faddeev, I.T. Todorov and H. Grosse, who were present as participants of an other ESI research program.

Supplementary information on the research program including transparencies of talks can be obtained from our homepage: http://tph16.tuwien.ac.at/ano98.html

Program on Mathematical Relativity 1997.
ESI contributed AS 7,000.– foreign support was AS 54,000.– No ESI-preprints.
Organized by Robert Beig.

Mathematical Problems of Quantum Gravity. Continuation of the 1996 program, organized by A. Ashtekhar and P. Aichelburg.
ESI contributed AS 2,000.–, no foreign support.

Nonlinear theory of generalized functions. Continuation of a program from 1997. Organized by M. Oberguggenberger (Innsbruck), M. Kunzinger, M. Grosser.
ESI contributed AS 26,000.–, no foreign support. 9 ESI-preprints: [653], [666], [811], [812], [813], [814], [815], [829], [837].

Number theory and Physics II. Quantum Field Theory and the Statistical Distribution of Prime Numbers. Continuation of a program from 1998, Organized by I. Todorov. ESI contributed AS 175,000.–, no foreign support. ESI-preprints: [778], [805], [828]

Charged particle kinetics. Continuation of a program organized by Christian Schmeiser and Peter Markowich. ESI contributed AS 280,000.–, foreign support was AS 383,000.– 21 ESI-preprints: [655], [657], [661], [662], [667], [677], [678], [701], [702], [703], [704], [705], [706], [707], [728], [729], [738], [752], [777], [819], [833].

Spaces of geodesics and complex structures in general relativity and differential geometry. Continuation of a program from 1997. Organized by Lionel Mason, Pawel Nurowski, Helmuth Urbantke. Urbantke, Nurovsky, Mason ESI contributed AS 61,000.–, no foreign support. 5 ESI-preprints: [731], [734], [735], [739], [821]

Guests via Director's shares

Guests of Walter Thirring. ESI contributed AS 149,000.–, foreign support was AS 14,000.– ESI-preprints: [695], [716], [717], [720], [825], [843]

Guests of Jakob Yngvason. This includes the continuation of the 1997 program on 'Local Quantum Physics' which was organized by D. Buchholz, H. Narnhofer, J. Yngvason, which was concentrated in a conference in February. ESI contributed AS 227,000.–, foreign support was

AS 360,000.– 21 ESI-preprints: [665], [679], [680], [681], [692], [715], [716], [723], [730], [737], [748], [773], [775], [776], [788], [793], [794], [807], [810], [838], [847].

Guests of Klaus Schmidt. ESI contributed AS 204,000.–, foreign support was AS 398,000.– 9 ESI-preprints: [654], [660], [685], [740], [757], [761], [809], [840], [846].

Guests of Peter Michor. ESI support was AS 249,000.–, foreign support was AS 94,000.–. 14 ESI-preprints: [663], [668], [669], [670], [672], [697], [754], [763], [767], [779], [781], [824], [827], [842].

Guests of A. Cap. ESI contributed AS 29,000.–, no foreign support. 3 ESI-preprints: [722], [792], [801].

List of Preprints

We try to keep track of the bibliographical data of the published versions of the preprints – this is incomplete and we are constantly updating it. The most complete list can always be found on the ESI server `http://www.esi.ac.at/ESI-Preprints.html`.

Here we no longer give the full list of all preprints, just the last 3 years.

1997

415. D.V. Alekseevsky, *Flag Manifolds* (1997), 32 pp..
416. S. Ruffo, *Lyapunov Spectra in Spatially Extended Systems* (1997), 23 pp..
417. R. Loll, *Further Results on Geometric Operators in Quantum Gravity* (1997), 25 pp..
418. R. Loll, *Latticing Quantum Gravity*, Proc. of the 2nd Conference on Constrained Dynamics and Quantum Gravity, Santa Margherita, Italy, pp. 7 pp. (to appear).
419. D.V. Alekseevsky, S. Marchiafava, M. Pontecorvo, *Compatible Almost Complex Structures on Quaternion–Kähler Manifolds*, Ann. of Global Anal. and Geom. **16** (1998), 419–444.
420. Editors: Peter Aichelburg, Abhay Ashtekar, *Abstracts of Seminars given at the Workshop on Mathematical Problems of Quantum Gravity held at the Erwin Schrödinger Institute, Vienna* (1997), 26 pp..
421. Ari Laptev, *Dirichlet and Neumann Eigenvalue Problems on Domains in Euclidean Spaces* (1997), 13 pp..
422. J. Gegenberg, G. Kunstatter, T. Strobl, *Edge States and Entropy of 2d Black Holes* (1997), 13 pp..
423. A. Bäcker, N. Chernov, *Generating Partitions for Two-dimensional Hyperbolic Maps* (1997), 12 pp..
424. A. Katok, R. J. Spatzier, *Differential Rigidity of Anosov Actions of Higher Rank Abelian Groups and Algebraic Lattice Actions*, Proc. of the Steklov Institute, Vol. 216, pp. 32 pp. (to appear).
425. O. Hryniv, *On Local Behaviour of the Phase Separation Line in the 2D Ising Model*, Probab. Theory Relat. Fields **110** (1998), 91–107.
426. Henrik Pedersen, Yat Sun Poon, Andrew Swann, *Hypercomplex Structures Associated to Quaternionic Manifolds*, Diff. Geom. Appl. **9, 3** (1998), 273–292.
427. Maciej Wojtkowski, Carlangelo Liverani, *Conformally Symplectic Dynamics and Symmetry of the Lyapunov Spectrum* (1997), 15 pp..
428. Mariusz Lemańczyk, *Entropy of Gaussian Actions for Countable Abelian Groups* (1997), 9 pp..
429. Maciej P. Wojtkowski, *Hamiltonian Systems with Linear Potential* (1997), 34 pp..
430. John C. Baez, Kirill V. Krasnov, *Quantization of Diffeomorphism-Invariant Theories with Fermions* (1997), 28 pp..
431. S. Moskaliuk (Editor), *Collection of Abstracts of the Lectures which will be given at the International Workshop "Mathematical Physics — today, Priority Technologies — for tomorrow" 12–17 May 1997, Kiev, Ukraine* (1997), 38 pp..
432. Paweł Nurowski, *On a Certain Formulation of the Einstein Equations*, J. Math. Phys. **39** (1998), 5477–5480.
433. T.B. Ward, *Almost All S–Integer Dynamical Systems Have Many Periodic Points*, Ergodic Theory and Dynamical Systems **18** (1998), 471–486.
434. L.J. Mason, *The Asymptotic Structure of Algebraically Special Space–times* (1997), 10 pp..
435. Simon Gindikin, *SO(1;n)-twistors* (1997), 10 pp..
436. Nándor Simányi, Domokos Szász, *Hard Ball Systems Are Fully Hyperbolic* (1997), 48 pp..
437. A. Latz, H. van Beijeren, J. R. Dorfman, *Lyapunov Spectrum and the Conjugate Pairing Rule for a Thermostated Random Lorentz Gas: Kinetic Theory*, Phys. Rev. Lett. **78** (1997), 207–210.
438. Thierry Dauxois, Stefano Ruffo, Alessandro Torcini, *Modulational Lyapunov Estimate for FPU–chains* (1997), 13 pp..
439. Manfred Einsiedler, Klaus Schmidt, *Markov Partitions and Homoclinic Points of Algebraic Z^d–actions*, Dynamical Systems and Related Topics (Proc. Steklov Inst. Math. 216), Interperiodica Publishing, Moscow, 1997, pp. 259–279.

440. N.A. Gromov, S.S. Moskaliuk, *Irreducible Representations of Cayley–Klein Orthogonal Algebras* (1997), 20 pp..

441. Robert Bartnik, *The Structure of Spherically Symmetric su(n) Yang–Mills Fields* (1997), 25 pp..

442. C. Appert, M.H. Ernst, *Chaos Properties and Localization in Lorentz Lattice Gases* (1997), 49 pp..

443. N.A. Gromov, S.S. Moskaliuk, *Induced Representations of Cayley–Klein Orthogonal Groups* (1997), 16 pp..

444. Eduardo Canale, Roberto Markarian, Sylvie Oliffson Kamphorst, Sônia Pinto de Carvalho, *A Lower Bound for Chaos on the Elliptical Stadium* (1997), 13 pp..

445. Lai–Sang Young, *Statistical Properties of Dynamical Systems With Some Hyperbolicity* (1997), 61 pp..

446. H.J. Borchers, *Half–sided Translations in Connection with Modular Groups as a Tool in Quantum Field Theory* (1997), 17 pp..

447. G. Rozenblum, M. Solomyak, *CLR-estimate for the Generators of Positivity Preserving and Positively Dominated Semigroups* (1997), 19 pp..

448. Dirk Schlingemann, *Construction of Kink Sectors for Two–Dimensional Quantum Field Theory Models (An Algebraic Approach)* (1997), 46 pp..

449. Hendrik Grundling, C.A. Hurst, *Constrained Dynamics for Quantum Mechanics I. Restricting a Particle to a Surface*, J. Math. Phys **39, 6** (1998), 3091–3119.

450. Andreas Čap, Hermann Schichl, *Parabolic Geometries and Canonical Cartan Connections*, Hokkaido Math. J., 34 pp. (to appear).

451. Simonetta Frittelli, Ezra T. Newman, *Poincaré Pseudo–symmetries in Asymptotically Flat Spacetimes* (1997), 10 pp..

452. D. V. Alekseevsky, J. Grabowski, G. Marmo, P. W. Michor, *Completely Integrable Systems: A Generalization*, Mod. Phys. Lett. A **12, 22** (1997), 1637–1648.

453. Peter W. Michor, Hermann Schichl, *No Slices on the Space of Generalized Connections*, Acta Math. Univ. Commenianae **66, 2** (1997), 221–228.

454. Peter W. Michor, Tudor Ratiu, *On the Geometry of the Virasoro–Bott Group*, J. Lie Theory **8** (1998), 293–309.

455. Leonid A. Bunimovich, Jan Rehacek, *How High–Dimensional Stadia Look Like* (1997), 25 pp..

456. Abhay Ashtekar, Troy A. Schilling, *Geometrical Formulation of Quantum Mechanics* (1997), 41 pp..

457. Rodolfo Gambini, Jorge Griego, Jorge Pullin, *Chern–Simons States in Spin–Network Quantum Gravity* (1997), 8 pp..

458. Rodolfo Gambini, Jorge Pullin, *Large Quantum Gravity Effects: Backreaction on Matter* (1997), 5 pp..

459. J.M. Aroca, Hugo Fort, Rodolfo Gambini, *On the Path Integral Loop Representation of (2+1) Lattice Non–abelian Gauge Theories* (1997), 16 pp..

460. R. Beig, N. Ó Murchadha, *Late Time Behaviour of the Maximal Slicing of the Schwarzschild Black Hole* (1997), 19 pp..

461. K.P. Tod, *Four–dimensional D'Atri Spaces with Extra Conditions* (1997), 10 pp..

462. Ingemar Bengtsson, Ted Jacobson, *Degenerate Metric Phase Boundaries*, Classical Quantum Gravity **14** (1997), 3109–3121.

463. Michael P. Reisenberger, Carlo Rovelli, *"Sum over Surfaces" Form of Loop Quantum Gravity* (1997), 27 pp..

464. Paweł Nurowski, *Elliptic Fibrations Associated with the Einstein Spacetimes*, J. Math. Phys. **39** (1998), 5481–5490.

465. D. Alekseevsky , J. Grabowski , G. Marmo , P.W. Michor, *Poisson Structures on Double Lie Groups*, J. Geom. Physics **26** (1998), 340–379.

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467. Robert Beig, László B. Szabados, *On a Global Conformal Invariant of Initial Data Sets*, Classical Quantum Gravity **14** (1997), 3091–3107.

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474. Gary T. Horowitz, Donald Marolf, *Where is the Information Stored in Black Holes?* (1997), 21 pp..

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476. A.O. Barvinsky, A.Yu. Kamenshchik, *Quantum Origin of the Early Inflationary Universe* (1997), 44 pp..

477. Paweł Nurowski, Maciej Przanowski, *A Four Dimensional Example of Ricci Flat Metric Admitting Almost-Kahler Non-Kahler Structure* (1997), 8 pp..

478. J. Madore, *Gravity on Fuzzy Space–Time* (1997), 31 pp..

479. Guosong Zhao, *Symmetric Covariant Tensor Fields of Order 2 on Pseudo–Riemannian Manifolds* (1997), 17 pp..

480. M. Hoffmann-Ostenhof, T. Hoffmann-Ostenhof, N. Nadirashvili, *On the Nodal Line Conjecture*, Contemp. Math., 16 pp. (to appear).

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482. Simon Gindikin, *Tube Domains in Stein Symmetric Spaces* (1997), 15 pp..

483. Jürgen Vollmer, Tamás Tél, Wolfgang Breymann, *Equivalence of Irreversible Entropy Production in Driven Systems: An Elementary Chaotic Map Approach*, Phys. Rev. Lett. **79** (1997), 2759–2762.

484. Michiko Yuri, *Slow Decay of Correlations for Multi–Dimensional Intermittent Maps* (1997), 10 pp..

485. Guosong Zhao, *Solutions of Finite Type of Sine–Gordon Equation* (1997), 15 pp..

486. Jörg Frauendiener, *On an Integral Formula on Hypersurfaces in General Relativity*, Classical Quantum Gravity **14** (1997), 3421–3423.

487. J. Tafel, D. Wójcik, *Null Killing Vectors and Reductions of the Self-Duality Equations* (1997), 12 pp..

488. Ivan Dimitrov, Ivan Penkov, *Partially Integrable Highest Weight Modules*, Transformation Groups **3, 3** (1998), 241–253.

489. D. Burago, S. Ivanov, *On Asymptotic Isoperimetric Constant of Tori* (1997), 5 pp..

490. H. Narnhofer, W. Thirring, *Spontaneously Broken Symmetries* (1997), 19 pp..

491. D. Burago, S. Ferleger, A. Kononenko, *Unfoldings and Global Bounds on the Number of Collisions for Generalized Semi–Dispersing Billiards* (1997), 14 pp..

492. Ivan Dimitrov, Olivier Mathieu, Ivan Penkov, *On the Structure of Weight Modules* (1997), 15 pp..

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Lyonid Bunimovich (Georgia Institute of Technology, Atlanta, USA): Selforganization and propagation in Lorentz lattice gases, 1999 02 22.

Guido Gentile (Univ. Roma "La Sapienca", Italy): Fluctuation theorem for Anosov flows, 1999 02 22.

Luc Rey-Bellet (Rutgers University, USA): Non Equilibrium Statistical Mechanics of Anharmonic Chains I, 1999 02 23.

Claude-Alain Pillet (CPT Marseille and Universitde Toulon): Non Equilibrium Statistical Mechanics of Anharmonic Chain II, 1999 02 23.

Jean-Pierre Eckmann (Université Geneve): Dimension and Entropy for Attractors of PDE's in Infinite Domains, 1999 02 22.

Carlangelo Liverani (Università Roma 2, Italy): Ergodic properties for a quantum non-linear dynamics, 1999 02 23.

Giancarlo Benettin (Università Milano, Italy): Exponentially-long equilibrium times in a one dimensional collisional of model classical gas, 1999 02 23.

Dario Bambusi (Università Milano, Italy): Long time stability and diffusion of energy to high frequency modes in nonlinear Klein Gordon equation, 1999 02 23.

Hans R. Jauslin (Université de Bourgogne, Dijon, France): KAM-Renormalization Group Analysis of Hamiltonian Instabilities, 1999 02 23.

Dénes Petz (Technical University, Budapest): Free entropy for unitaries, 1999 02 24.

Roland Speicher (Universität Heidelberg, Germany): Free cumulants with products as arguments and applications to R-diagonal elements, 1999 02 24.

Leonid Bunimovich (Georgia Institute of Technology, Atlanta): Two mechanicms of chaos in Hamiltonian systems, 1999 02 23.

Christel Chandre (Univ. de Bourgogne, Dijon, France): An approximate renormalization-group transformation for Hamiltonian systems with three degrees of freedom, 1999 02 24.

Paolo Politi (FB Physik, Univ.GH. Essen, Germany): Unstable growth of crystals in one dimension, 1999 02 24.

Katja Rateitschak, Rainer Klages, and G. Nicolis (Université Libre de Bruxelles, Belgium): Thermostatting by deterministic scattering, 1999 02 24.

Jacob. R. Dorfman (University of Maryland, USA): Nonlinear Baker Maps: Simple Representations of Thermostatted Systems, 1999 02 25.

Rainer Klages (Université Libre de Bruxelles, Belgium): Multibakers with fractal transport coefficients, 1999 02 25.

Joachim Krug (Universität Essen, Germany): Asymmetric particle models for traffic flow, 1999 02 25.

Gunter M. Schütz (Insitut für Festkörperforschung, Jülich, Germany): Nonequilibrium phase diagram of driven diffusive systems with open boundries, 1999 02 25.

Lamberto Rondoni, Tamas Tel und Jürgen Vollmer (Univ.): Fluctuation Relation for Entropy Production in Open Systems, 1999 02 25.

Oliver Penrose (Heriot-Watt University, Scotland): Statistical mechanics and two-dimensional trubulence, 1999 02 26.

William G. Hoover (University of California): Confined Free Expansions, 1999 02 26.

Thierry Gallay (Université Paris, France): Stability of Hyperbolic Fronts, 1999 02 26.

Alexander Mielke (Universität Hannover, Germany): Attractors for PDEs on unbounded domains and diffusive mixing, 1999 02 26 . Zoltan Racz (Eötvös University Budapest, Hungary): Transport in the XX chain: Emergence of flat magnetization profiles, 1999 02 26.

W. L. Spitzer, M. Moser and A. Prets (Univ): Time evolution of spin-waves as a macroscopic limit, 1999 02 26.

Harald A. Posch (University of Vienna, Austria): Nonequilibrium Lyapunov spectra and phase space distributions, 1999 02 26.

Guido Schneider (Universität Hannover, Germany): Nonlinear stability of Taylor vortices in infinite cylinders, 1999 03 02.

Gunter Schütz (Forschungszentrum Jülich, Germany): Diffusion and interaction of shocks in the asymmetric exclusion process, 1999 03 02.

Frank Redig (Univ. Heverlee, Belgium): Thermodynamic limit of Abelian sand pile models, 1999 03 02.

Alessandro Torcini (Universita Firenze, Italy): Equilibrium and dynamical propertis of two dimensional "self gravitating" systems, 1999 03 03.

Vladas Sidoravicius (IMPA, Brasil): Mixing properties for a one dimensional mechanical system, 1999 03 03.

Claudio Landim (Université de Rouen): Equilibrium fluctuation of asymmetric simple exclusion processes in three or more dimensions, 1999 03 04.

Federico Bonetto (Rutgers University, USA): Perturbation theory for a chain of coupled Arnold cat maps, 1999 02 25.

Tam/'as Tél (Eötvös University, Budapest): Thermodynamic Cross-Effects from Dynamical Systems, 1999 03 04.

Klaus Schmidt (University of Vienna): Pisot numbers, Salem numbers, beta-expansions and dynamical systems, 1999 03 15.

Malte Henkel (Université Henri Poincaré Nancy I, France): Local scale invariance in strongly anisotropic critical systems, 1999 03 10.

Peter Michor (University of Vienna): Geodesic equations on infinite-dimensional Lie groups and completely integrable systems, 1999 03 22.

Vitali Milman (Tel Aviv University, Tel Aviv): Isotropy in Geometric Functional Analysis, 1999 03 24.

Manfred Einsiedler (University of Vienna): Expansive subdynamics, 1999 04 12.

Vitali Milman (Tel Aviv University, Tel Aviv): Application of Isotropic Positions and Concentration Phenomenon without Metric, 1999 03 31.

Jakob Yngvason (University of Vienna): Geometrical Actions of Tomita-Takesaki Modular Groups, 1999 04 19.

Dan Amir (Tel Aviv University, Israel): Convexity of Chebyshev Sets in Hilbert Space, 1999 03 24.

Rolf Schneider (Universität Freiburg, Deutschland): Mixed Functionals of Convex Bodies, 1999 03 30.

Franck Barthe (Université de Marne-la-Valleée, France): Extremal Property of the Mean Width of the Simplex, 1999 03 31.

Apostolos A. Giannopoulos (University of Crete, Greece): Applications of the Brascamp - Lieb inequality to convex geometry, 1999 04 01.

Roberto Longo (Universita di Roma "Tor Vergata"): Towards a Quantum Index Theory (for Superselection Sectors), 1999 04 08.

Alain Pajor (Université de Marne-la-Valleé, France): The Isotropy Constant of the Schatten Classes, 1999 04 08.

William B. Johnson (A & M University, Texas): The Non-Linear Theory of Banach Spaces, 1999 04 14.

Thomas Schlumprecht (A & M University, Texas): An Analytic Proof of the Busemann-Petty Theorem, 1999 04 21.

Bruce Kitchens (IBM T.J. Watson Research Center, New York): Minkowski matrices and maps of the torus, 1999 04 26.

Peter Raith (University of Vienna): Intermingled basins in a two species systems, 1999 05 03.

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Cornelia Vizman (West University Timisoara, Romania): The Quantomorphism Group, 1999 05 19.

Hakaan Hedenmalm (Lund University, Sweden): An Hadamard Maximum Principle for Biharmonic Operators, 1999 05 20.

Luis A. Caffarelli (University Texas, Austin): Homogeneization and fully non linear equations, 1999 05 19.

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Sergei Kislyakov (St. Petersburg State University, Russia): Bourgain Projections and Partial Retractions for Weighted Hardy Spaces, 1999 05 27.

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Victor Havin (St. Petersburg State University, Russia; and Mc Gill University, Montreal, Canada): On the Uncertainty Principle for the M. Riesz Potentials, 1999 05 25.

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Haakan Hedenmalm (University of Lund, Sweden): An Hadamard Maximum Principle for Biharmonic Operators in Hyperbolic Spaces, 1999 06 11.

ESI-LECTURE: Martin Nowak (Institute for Advanced Study, Princeton): The evolution of language, 1999 06 25.

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Bernd Kirchheim (Max Planck Institut, Leipzig): Metric Currents, 1999 06 15.

Jay Jorgenson (City College of New York): Spectral Asymptotics on Sequences of Hyperbolic Manifolds of Dimension Two and Three, 1999 06 22.

Nets Katz (University of Illinois at Chicago): Recent progress on the Kakeya problem, 1999 06 28.

Sandra Pott (University of Edinburgh, UK): BMO, Muckenhoupt weights and the Hilbert transform, 1999 06 10.

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Carlos Kozameh (Universidad Nacional de Cordoba, Argentina): Light Cone Cuts, 1999 06 29.

Christoph Thiele (UCLA, Los Angeles): On multilinear singular Integrals, 1999 06 30.

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Andrzei Trautman (University of Warszawa, Poland): Two approaches to spinor fields on a Riemmanian manifold, 1999 06 30.

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Ludwik Dąbrowski (SISSA, Triest): Connections on Quantum Bundles: Some Examples, 1999 08 19.

Pavol Ševera (I.H.E.S, Paris): Kramers-Wannier Duality and its Topology, 1999 08 19.

Bernhard Krötz (Ohio State University): Discrete group actions on Stein manifolds, 1999 08 18.

Genkai Zhang (University of Karlstad, Sweden): Relative Discrete Series of Weighted L -Spaces on Bounded Symmetric Domains, 1999 08 20.

Edwin Langmann (Teoretisk Pysik KTH, Stockholm): Calogero - Moser type systems from gauge theories, 1999 08 24.

Peter Prešnajder (Comenius University, Bratislava): Fields on a noncommutative sphere and cylinder, 1999 08 24.

Bernard Gaveau (Université Paris VI, France): de Rham Complex on Singular Spaces, 1999 08 23.

Peter Greiner (University of Toronto, Canada): Hamilton-Jacobi Theory and Heat Kernels on Heisenberg Groups, 1999 08 30.

Vladimir Roubtsov (Université d'Angers, France): Geometry of the Monge-Ampere equation and (pseudo-) quaternions, 1999 08 26.

Benjamin Enriquez (Ecole Polytechnique, Paris): On solutions of the KZB equations in genus greater than one, 1999 08 26.

Genkai Zhang (University of Karlstad, Sweden): Berezin transform on real bounded symmetric domains, 1999 08 25.

Andrei Iordan (Université Pierre et Marie Curie, Paris): Boundary regularity of *overbar∂* and Bochner-Hartogs theorem in the complex projective space, 1999 08 27.

Anton Zabrodin (ITEP, Moscow): Laplacian Growth Problem and Conformal Maps, 1999 08 31.

Paul Wiegmann (University of Chicago and Landau Institute, Moscow): Conformal Maps and dispersionless Integrable Hierarchies, 1999 08 31.

Alexander Tumanov (University of Illinois, USA): Extremal discs and the regularity of CR mappings in higher codimension, 1999 08 30.

Gregor Herbort (Bergische Universität - GH Wuppertal, Germany): Boundary Behavior of the pluricomplex Green function, 1999 09 01.

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Nikolay Shcherbina (University of Göteborg, Sweden): Levi-flat surfaces with a given boundary, 1999 09 03.

Lucas Zinner (University Vienna): A relative fundamental solution of the Lewy operator, 1999 09 03.

Thomas Strobl (RWTH Aachen, Germany): Poisson sigma-models and 2d (super)gravity, 1999 09 02.

Giovanni Felder (ETH Zürich): Deformation quantization and path integrals, 1999 09 02.

Giovanni Felder (ETH Zürich): Deformation quantization and path integrals, 1999 09 07.

Giovanni Felder (ETH Zürich): Deformation quantization and path integrals, 1999 09 09.

Volker Schomerus (University Hamburg, Germany): Open strings, D-branes and non-commutative geometry, 1999 09 09.

Volker Schomerus (University Hamburg, Germany): Open strings, D-branes and non-commutative geometry, 1999 09 14.

Volker Schomerus (University Hamburg, Germany): Open strings, D-branes and non-commutative geometry, 1999 09 16.

Matthias Gaberdiel (University of Cambridge, U.K.): Logarithmic Conformal Field Theory, 1999 09 07.

André Unterberger (Université Reims, France): Applications of quantization methods to the theory of modular forms, 1999 09 06.

Tilmann Wurzbacher (IRMA Strasbourg, France): Rotation-invariance in the geomety and analysis of loop spaces, 1999 09 08.

Bernhard Lamel (University of California, San Diego): Mappings of real submanifolds of complex spaces of different dimensions, 1999 09 10.

Christoph Schweigert (ETH Zürich, Switzerland): WZW branes and symmetry breaking, 1999 09 09 . Sergei Lukyanov (Rutgers University, USA): Once again about Bethe Ansatz, 1999 09 14.

Andreas Recknagel (AEI Potsdam, Germany): Boundary deformations and D-brane moduli spaces, 1999 09 14.

Detlef Dürr (Universität München, Germany): From the quantum flux to scattering theory, 1999 09 22.

Walter Thirring (Universität Wien): Noncommutative Ergodic Theory: A panoramic View, 1999 09 23.

Karl-Hermann Neeb (Technische Universität Darmstadt, Germany): Highest Weight Representations of infinite-dimensional classical groups, 1999 09 13.

Karl-Hermann Neeb (Technische Universität Darmstadt, Germany): L2 - Realizations of Hilbert spaces of holomorphic functions on infinite-dimensionals domaines, 1999 09 15 . Giovanni Felder (ETH Zürich, Switzerland): Boundary conditions in WZW models and Chern-Simons theory, 1999 09 16.

Jürgen Leiterer (Humboldt Universität Berlin, Germany): The Dolbecult isomorphism for q-concave CR manifold, 1999 09 17.

Yurii Neretin (Moscow State Institute of Electronics and Mathematics): Boundary values of holomorphic functions and Berezin kernels in Cartan domains, 1999 09 20.

Nikita Nekrasov (ITEP Moscow and Princeton University): The freckled Instantons, 1999 09 21.

Nikita Nekrasov (ITEP Moscow and Princeton University): The freckled Instantons, 1999 09 23.

Nikita Nekrasov (ITEP Moscow and Princeton University): The freckled Instantons, 1999 09 28.

Andrew Dancer (Oxford University, U.K.): Einstein manifolds with large symmetry group, 1999 09 17.

Yat-Sun Poon (University of California at Riverside, USA): Geometry of hyper Kähler connections with torsion, 1999 09 17.

Anke Schorr (ETH Zürich, Switzerland): Separation of variables for quantum integrable systems on elliptic curves, 1999 09 21.

Alexei Rosly (ITEP Moscow): Polar homology, 1999 09 21.

Liviu Ornea (University of Bucharest, Romania): Automorphisms of compact locally conformally Kähler manifolds, 1999 09 24.

Karl-Georg Schlesinger (University of Wuppertal, Germany): Constructing trialgebras, 1999 09 23.

Ingo Lieb (Universität Bonn, Germany): Boundery values of the Neumann solution to the Cauchy-Riemann equations, 1999 09 20.

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Alexander Alldridge (Universität Marburg, Germany): Toeplitz Operators on Hardy Spaces over SL (2,R), 1999 09 22.

Takeo Ohsawa (Nagoya University, Japan): L^2 - holomorphic functions, 1999 09 27.

Roger Bielawski (University of Edinburgh, United Kingdom): Ricci-flat Kähler metrics on bundles, 1999 09 27.

Andreas Unterreiter (Universität Kaiserslautern, Germany): Entropies and Csiszar-Kullback inequalities, 1999 10 04.

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Vladimir Fock (ITEP Moscow, Russia): Quantum Teichmüller space, 1999 09 30.

Matthias Blau (ICTP Triest, Italy): A Moment Map for the Group Algebra of the Gauge Group and other Oddities in the G/G Model, 1999 10 05.

Klas Diederich (Universität Wuppertal, Germany): Why are pluricomplex Greene functions so useful?, 1999 09 29.

Laura Barberis (National University of Córdoba, Argentina): Affine connections on homogeneous hypercomplex manifolds, 1999 10 01.

Misha Verbitsky (Steklov Institute, Moscow): Trianalytic subvarieties of hyperkähler manifolds, 1999 09 29.

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Martin Schlichenmaier (University of Mannheim, Germany): Berezin-Toeplitz Quantization and Berezin Transform for General Compact Kähler manifolds, 1999 10 04.

Andreas Cap (Universität Wien): Pushing down geometric structures to local leaf-spaces of foliations, 1999 10 06.

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Ivan Todorov (Bulgarian Academy of Sciences): Coset parfermionic construction of a family of quantum Hall states, 1999 10 07.

Masamichi Takesaki (UCLA): Quantum Flow of Weights and Characteristic Square for a Factor, 1999 10 18.

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Paul Gauduchon (Ecole Polytechnique, France): Four Dimensional Einstein Manifolds with Hyperhermitian Structures, 1999 10 08.

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José Figueroa O'Farrill (University of Edinburgh): Holonomy groups in supergravity, 1999 10 07.

José Figueroa O'Farrill (University of Edinburgh): Holonomy groups in supergravity, 1999 10 08.

Charles P. Boyer (University of New Mexico): Einstein Manifolds via Contact Geometry, 1999 10 11.

Thomas Friedrich (Humboldt Universität Berlin): Solutions of the Einstein-Dirac Equation and Contact Geometry, 1999 10 11.

Ilka Agricola (Humboldt Universität Berlin): G-invariant differential operators and the Frobenius decomposition of affine G-varieties, 1999 10 13.

Jörg Teschner (DIAS, Dublin): Liouville theory and noncompact quantum groups, 1999 10 14.

Andrei Bytsko (Steklov Institute, St. Petersburg): On factorized and fermionic sum forms of Virasoro characters, 1999 10 14.

Gabor Francsics (Columbia University, New York): Spectrum of the automorphic complex hyperbolic Laplace-Beltrami operator, 1999 10 13.

Ludwig Faddeev (Steklow Institute St. Petersburg and University Helsinki and Alexander Volkov University Brussel): Quantum Liouville model on descrete space-time, 1999 10 14.

Ludwig Faddeev (Steklow Institute St. Peterburg and University Helsinki and Alexander Volkov University Brussel): Quantum Liouville model on descrete space-time, 1999 10 19.

Ludwig Faddeev (Steklow Institute St. Petersburg and University Helsinki and Alexander Volkov University Brussel): Quantum Liouville model on descrete space-time, 1999 10 21.

Jerzy Konderak (Università di Bari, Italy): On Weierstrass Representation for Lorentz Surfaces, 1999 10 11.

Thomas Friedrich (Humboldt Universität Berlin): Weak Holonomy in Dimension 16, 1999 10 12.

Wolfgang Kummer (Technische Universität Wien): Exact Quantum Integral of 2d Gravity and intermediate Black Hole Formation, 1999 10 19 . Leon Takhtajan (SUNY at Stony Brook): Deformation Quantization of Kähler manifolds, 1999 10 12.

Helga Baum (Humboldt University, Berlin): Killing and twistor spinors on Lorentzian manifolds and their relations to CR - and Kähler geometry, 1999 10 15.

Laura Geatti (Universitá di Roma, Italy): Invariant Domains in the Complexification of a non Compact Riemannian Symmetric Space, 1999 10 13.

Joe Kamimoto (Kumamoto University, Kumamoto): The Regularity of the Bergman Kernel on the Boundary, 1999 10 13.

Jouko Mickelsson (KTH - Royal Institute of Technology, Stockholm): Gerbes and destructive QFT, 1999 10 19.

Michel Dubois-Violette (Université Paris Sud, Orsay): A Noncommutative Generalization of the De-Rham-Kähler exterior Differential Calculus, 1999 10 21.

Joseph A. Wolf (University of California, USA): Hermitian Symmetric Spaces, Cycle Spaces and the Barlet-Koziarz method for Holomorphic Convexity, 1999 10 20.

Udo Hagenbach (Philipps Universität, Marburg): Hardy-Toeplitz C -Algebras over Non-Convex Cones, 1999 10 20.

Uwe Semmelmann (Universität München): Weitzenböck formulas and vanishing of Betti numbers on quaternionic Kähler manifolds, 1999 10 18.

Domokos Szsasz (Technical University, Budapest): Correlation decay for multi-dimensional dispersing billiards, 1999 10 25.

Andrew Swann (Ødense University, Denmark): Weakening Holonomy, 1999 10 20.

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Ines Kath (Humboldt Universität zu Berlin): Killing spinors on Pseudo-Riemannian manifolds, 1999 10 22.

Henrik Pedersen (Odense University, Denmark): Some Examples of Quasi-Einstein Kähler Metrics, 1999 10 22.

Andrei Moroianu (Ecole Polytechnique, France): Parallel spinors on non simply connected manifolds, 1999 10 20.

Claude LeBrun (Sony at Stony Brooks, New York): Supreme Einstein metrics and Special Holonomy, 1999 10 22.

David M.J. Calderbank (EPSRC, Edinburgh): The Hitchin-LeBrun construction of selfdual Einstein and the SU (∞) Toda equation, 1999 10 21.

Ludwig Faddeev (Steklov Institute St. Petersburg and University Helsinki and Prof. Antti Niemi Uppsala University): Infrared Decomposing of the SU (N) Yang-Mills Field, 1999 10 21.

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Ludwig Faddeev (Steklov Institute, St. Petersburg and Helsinki University): Modular Double of a Quantum Group, 1999 10 28.

Nevena Ilieva (Bulgarian Academy of Sciences, Sofia and ESI, Vienna): Anyons and the Bose-Fermi duality in the finite temperature Thirring model, 1999 10 28.

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Anton Alekseev (Uppsala University): Lie group valued moment maps, 1999 10 25.

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Pierre Cartier (École Normale Supérieure, Paris): The Structuralist Tide in Mathematics During the 20th Century; A Retrosprective View, 1999 11 11.

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Guiseppe Zampieri (Università di Padova): Analytic Discs in Symplectic Spaces, 1999 11 10.

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Martin Kolar (Masaryk University, Brno): On convexifiability of finite type domains in

Miroslav Engliš (Academy of Sciences, Prague): Weighted Bergman kernels and quantization, 1999 11 18.

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David Broadhurst (Open University, UK): Polylogs of roots of unity in QFT, 1999 11 22.

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Fiammetta Battaglia (Università di Firenze): Simple Non-Rational Convex Polytopes and Kähler Structures, 1999 12 02.

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Christoph Adam (Universität Karlsruhe): Zero Modes of the Dirac Operator in three Dimensions, 1999 12 14.

Michael Eastwood (University of Adelaide): Normal Forms and Classification Problems in Affine Differential Geometry, 1999 12 03.

Jaroslaw Wisniewski (Warsaw University, Poland): Lines and Conics on Fano Contact Manifolds, 1999 12 09.

Paolo Piccinni (Universitá di Roma, La Sapienza): Foliations with transversal quaternionic structures, 1999 12 15.

Michael Singer (University of Edinburgh): The Kummer construction revisited, 1999 12 14.

Michael Eastwood (University of Adelaide): Two Applications of Involutive Structures, 1999 12 14.

List of all visitors in the year 1999

Abakumov Evgeny, Université de Marne-la-Vallée, 06.06 - 14.06, COO,

Ageev Oleg, Moscow Technical State University, 11.01 - 22.01, SCH,

Agricola Ilka, Humboldt-Universität zu Berlin Institut für Reine Mathematik , 06.10 - 15.10, GAL,

Alekseev Anton, University of Uppsala, Institute of Theoretical Physics, 17.08 - 30.10, AFG,

Alexeevski Dmitri, Center "Sophus Lie", 22.09 - 31.10, MI, 01.11 - 31.12, SF,

Alldridge Alexander, Philipps-Universität Marburg Fachbereich Mathematik, 12.09 - 01.10, HU,

Alonso Daniel, Universidad de la Laguna Dpto.Fisico Funademental y Experimental, 09.02 - 19.02, PGS,

Amir Dan, Tel Aviv University Department of Mathematics, 12.03 - 25.03, COO,

Anile Angelo Marcello, University of Catania Dept.of Mathematics, 12.01 - 17.01, SM, 16.05 - 22.05, SM,

Arazy Jonathan, University of Haifa Mathematics Department, 01.09 - 24.09, HU,

Artuso Roberto, Universita dell 'Insubria, Como Dipartimento di Scienze Chimiche, Fisiche e Matematiche, 09.02 - 19.02, PGS,

Ascher Uri, University of British Columbia Department of Computer Sciences, 30.06 - 01.07, SM,

Ashbaugh Mark S., University of Missouri Department of Mathematics, 02.07 - 04.07, HOF,

Bailey Toby, University of Edinburgh Department of Mathematics, 04.10 - 10.10, GAL,

Bambusi Dario, Univ. Statale Milano Dipartimento Matematica, 23.02 - 26.02, PGS,

Banerjee Rabin, S.N. Bose National Centre for Basic Sciences, 21.06 - 30.06, BK,

Banica Teodor, Institut de Math. de Jussieu Univ. Paris 6 , 12.01 - 06.02, COO,

Balodis Pedro, Universität Regensburg , 31.05 - 04.06, EU,

Barberis Maria Laura, Univ. Nac. de Cordoba FAMAF, 20.09 - 04.10, GAL,

Bardos Claude, CMLA ENS Cachan , 11.01 - 25.01, SM,

Barrett David, University of Michigan Department of Mathematics, 23.08 - 04.09, HU,

Barthe Franck, Université de Marne-la-Valleé, 23.03 - 22.04, COO,

Battaglia Fiammetta, Dipartimento di Matematica Applicata, 29.11 - 05.12, GAL,

Baum Helga, Humboldt Universität Berlin Institut für Mathematik, 11.10 - 17.10, GAL,

Bechouche Philippe, Universida de Granada, 01.11 - 10.11, SM,

Beijeren Henk van, Utrecht University Institute for Theoretical Physics, 12.02 - 19.02, PGS,

Ben Abdallah Naoufel, Université Paul Sabatier MIP, Mathematique pour l'Industirie et la Physique, 18.04 - 24.04, SM,

Benatti Fabio, University of Trieste Department of Theoretical Physics, 05.10 - 08.10, YNG,

Benettin Giancarlo, Universitá di Padova, Dipartimento di Matematica, 23.02 - 28.02, PGS,

Berg Marcus, DMA, ENS, 19.11 - 28.11, TOD2,

Bertoluzza Silvia, Istituto di Analisi Numerica del CNR, 10.01 - 28.01, SM,

Biane Philippe, DMI Ecole Normales Superieure, 15.02 - 26.02, COO,

Bielawski Roger, University of Glasgow, 20.09 - 03.10, GAL, 07.12 - 12.12, GAL,

Binder Ilia, Institute of Advanced Studies, 06.06 - 12.06, COO,

Blau Matthias, ICTP Staff 1, 01.10 - 10.10, AFG,

Bokanowski Olivier, Université Paris VII Laboratoire de Probabilités, 19.05 - 25.05, SM,

Bonetto Federico, Rutgers University Math. Department, 23.02 - 08.03, PGS,

Borchers Hans-Jürgen, Universität Göttingen Inst. für Theoretische Physik, 15.02 - 13.03, BYN2, 26.05 - 19.06, YNG, 17.10 - 13.11, YNG,

Bourguignon Jean-Pierre, Institut des Hautes Études Scientifiques IHES, 29.10 - 03.11, GAL,

Boyer Charles P., University of New Mexico Dept. of Mathematics, 05.10 - 17.10, GAL,

Bozejko Marek, Institute of Mathematics Wroclaw University, Plac Grunwaldzki 2/4, 24.01 - 18.02, COO,

Brenier Yann, Université Paris 6, 13.01 - 23.01, SM, 26.07 - 30.07, SM,

Broadhurst David, Open University Dep. of Physics, 17.11 - 23.11, TOD2,

Bruchet Sébastien, ENS de Cachan, 09.01 - 15.01, SM,

Brunet Éric, Ecole Normale Superieure LPS, 23.02 - 28.02, PGS,

Buchholz Detlev, Universität Hamburg Institut für Theoretische Physik II, 16.02 - 22.02, BYN2,

Buchholz Volker, Humboldt Universität zu Berlin Institut für Reine Mathematik, 05.10 - 15.10, GAL,

Bunimovich Leonid, Georgia Institute of Technology, 19.02 - 25.02, PGS,

Bytsko Andrei, Steklov Mathematics Institute, 05.10 - 17.10, AFG,

Caffarelli Luis A., University of Texas Institute of Mathematics, 16.05 - 21.05, SM,

Calderbank David, EPSRC Department of Mathematic and Statistic, 18.10 - 24.10, GAL,

Carrillo Jose A., Universidad de Granada Departamento de Matematica Aplicada Facultad da Ciencias, 23.06 - 30.06, SM,

Casetti Lapo, Politecnico di Torino INFM - Dipartimento di Fisica, 15.02 - 20.02, PGS,

Castella Francois, Université de Rennes I IRMAR - EQUIPE "EDP", 01.01 - 31.01, SM,

Chandre Christel, CNRS Laboratoire de Physique, 22.02 - 28.02, PGS,

Cheianov Vadim, Copenhagen University Ørsted Lab., 02.10 - 07.10, AFG,

Cherbonnier Frédèric, CMLA ENS Cachan, 09.01 - 17.01, SM,

Chlebik Miroslav, Comenius University Department of Mathematics, 07.06 - 13.06, COO,

Choda Marie, Osaka Kyoiku University, 06.01 - 16.01, COO,

Coburn Lewis A., SUNY at Buffalo Department of Mathematics, 13.11 - 27.11, HU,

Cohen E.G.D., The Rockefeller University, 06.02 - 26.02, PGS,

Colatto Luiz Paulo, Universidade do Estado do Rio de Janeiro - UERJ, 13.08 - 01.09, BK,

Combescure Monique, Laboratoire de Physique Théorique, 09.01 - 13.01, SM,

Cooper James Bell, Johannes-Kepler-Universität, Linz, 01.01 - ., COO,

Cortés Vicente, Universität Bonn Mathematisches Institut, 05.10 - 13.10, GAL,

Dabrowski Ludwik, SISSA, 17.08 - 21.08, AFG,

Daems David, Rutgers University Mathematics Department, 16.02 - 26.02, PGS,

Dancer Andrew, Oxford University Jesus College, 14.09 - 17.09, GAL,

David Guy, Université de Paris XI Mathematiques, Bat 425, 08.06 - 18.06, COO,

Davidov Johann, Bulgarian Academy of Sciences Institute of Mathematics and Sciences, 12.11 - 18.11, GAL,

Del Cima Oswaldo, Monteiro, TU-Wien Inst. für Theoretische Physik, 16.08 - 01.09, BK,

Dellago Christoph, University Berkeley Department of Chemistry, 04.03 - 13.03, PGS,

Demaestri Fulvia, University of Pavia, 17.12 - 21.12, SM,

Derrida Bernard, Ecole Normale Supérieure Laboratoire de Physique Statistique, 21.02 - 26.02, PGS,

Deuflhard Peter, Konrad Zuse Zentrum Berlin und Freie Universität Berlin, 11.01 - 12.01, SM,

Desvillettes Laurent, Ecole Normale Superieure Cahan, 31.10 - 03.11, SM,

Devchand Chand, MPI für Mathematik in den Naturwissenschaften , 02.10 - 23.10, GAL,

Diederich Klas, Universität Wuppertal Fachbereich Mathematik, 20.09 - 03.10, HU,

Dorfman Jacob Robert, University of Maryland Institute for Physical Science and Technology, 22.02 - 06.03, PGS,

Dubois-Violette Michel, Universite Paris XI, 18.10 - 24.10, AFG,

Dubrovin Boris, SISSA, 16.11 - 30.11, TOD2,

Dunajski Maciej, University of Oxford The Mathematical Institute, 29.06 - 04.07, UNM2,

Dürr Detlef, LMU Mathematisches Institut, 23.09 - 23.09, YNG,

Dwilewicz Roman, Polish Academy of Sciences Institute of Mathematics, 11.11 - 17.11, HU,

Ebenfelt Peter, Royal Institute of Mathematics Department of Mathematics, 11.11 - 19.11, HU,

Eckmann Jean Pierre, Université Genève Dept. de Physique Théorique, 18.02 - 25.02, PGS,

Erhardt Matthias, TU-Berlin, FB Mathematik, MA6-2 Strasse des 17.Juni, 136 , 11.01 - 13.01, SM,

El aidi Mohammed, Laboratoire M.I.P. UFR MIG, 23.11 - 31.12, HOF,

Elashvili Alexandre, Academy Sciences Institut of Mathematic , 28.10 - 01.11, GAL,

Elliott George A., The Fields Institute, 14.06 - 27.06, COO,

Engliš Miroslav, Academy of Sciences Mathematic Institute, 15.11 - 20.11, HU,

Enriquez Benjamin, Ecole Polytechnique CNRS, 24.08 - 04.09, AFG,

Eppel Constanze, Universität Wuppertal, 25.09 - 03.10, HU,

Erdős László, School of Mathematics, 20.12 - 22.12, SM,

Faddeev Lioudvig, Russian Academy of Sciences Steklow Mathematical Institute, 04.10 - 31.10, AFG,

Fagiolo Gianlorenzo, Universitá di Roma ”La Sapienza”, 22.02 - 26.02, PGS,

Farina Alberto, Université de Picardie Jule Verne, 10.12 - 12.12, SM,

Felder Giovanni, ETH-Zürich Department of Mathematics, 02.09 - 16.09, AFG,

Figueroa-O’Farrill José M., University of Edinburgh Department of Mathematics & Statistics, 03.10 - 09.10, GAL,

Fil Bohdan, State University ”Lviv Pol. Technik”, 25.01 - 12.02, MI,

Florig Martin, University of Florida Department of Mathematics, 15.02 - 22.02, BYN2,

Fock Vladimir, Institute for Theoretic and Experimental Physics, 27.09 - 21.10, AFG,

Fornaess John Erik, University at Michigan Department of Mathematics, 19.09 - 24.09, HU,

Fournais Soren, Århus University Mathematic Institut, 27.08 - 10.12, EU,

Fraczek Krzysztof, Nicholas Copernicus University Faculty of Mathematics and Informatics , 01.09 - 31.12, SCH,

Francsics Gábor, Columbia University Dep. of Math. , 06.10 - 18.10, HU,

Frauendiener Jörg, Inst. für Theor. Astrophysik Universität Tübingen, 29.06 - 04.07, UNM2,

Friedlander Leonid, University of Arizona Dept. of Mathematics, 29.06 - 04.07, HOF, 13.07 - 31.07, HOF,

Friedrich Thomas, Humboldt Universität Berlin Fachbereich Mathematik, 06.10 - 15.10, GAL,

Frommlet Florian, TU-Berlin, 01.01 - 28.02, SM,

Gaberdiel Matthias, University of Cambridge Department of Applied Mathematics and Theoretical Physics, 02.09 - 11.09, AFG,

Gabetta Ester, Universita di Pavia, 17.12 - 20.12, SM,

Galicki Krzysztof, University of New Mexico Department of Mathematics, 12.12 - 22.12, GAL,

Gallavotti Giovanni, Universitá di Roma 1 Dipartimento di Fisica, 15.02 - 27.02, PGS,

Gallay Thierry, University of Paris XI Batiment 425, 17.02 - 27.02, PGS,

Gasser Ingenium, Universität Hamburg, 09.01 - 14.01, SM, 12.10 - 14.10, SM,

Gaspard Pierre, Université Libre de Bruxelles Centre for Nonlinear Phenomena & Complex Systems, 22.02 - 28.02, PGS,

Gauduchon Paul, CMAT-Ecole Polytechnique, 02.10 - 10.10, GAL,

Gaveau Bernard, Université Paris 6, 14.08 - 25.08, HU,

Gawedzki Krzysztof, IHES, 26.09 - 11.10, AFG,

Geatti Laura, Universitá di Roma 2 - Tor Vergata Dipartimento di Matematica, 12.10 - 17.10, HU,

Gentile Guido, Università di Roma Dipartimento di Matematica, 22.02 - 06.03, PGS,

Ghoussoub Nassif, University of Britisch Columbia, 04.05 - 12.05, COO,

Giannopoulos Apostolos, University of Crete Department of Mathematics, 29.03 - 12.04, COO,

Globevnik Josip, University of Ljubljana Department of Mathematics, 27.09 - 03.10, HU,

Golse Francois, University Paris 7, 13.01 - 14.01, SM,

Gordon Yehoram, Technion Dept. of Mathematics , 05.04 - 18.04, COO,

Gover Rod A., University of Auckland Department of Mathematics, 07.06 - 19.06, CAP,

Grabowski Janusz, University of Warsawa Institute of Mathematics, 01.02 - 28.02, MI,

Grasselli Maurizio, Politecnico di Milano Dipartimento di Mathematica, 11.12 - 14.12, SM,

Grebert Benoit, Université de Nantes Faculté des sciences, 16.05 - 20.05, SM,

Greiner Peter, University of Toronto Dept. of Mathematics, 11.08 - 31.08, HU,
Guido Daniele, Univ. della Basilicata Dipartamento di Matematica , 15.02 - 21.02, BYN2,
Guzzetti Davide, SISSA - ISAS, 16.11 - 30.11, TOD2,
Györffy Balázs, University of Bristol H.H. Wills Phusics Laboratory, 22.04 - 22.05, YNG,
Hadjiivanov Ludmil, Bulgarian Academy of Sciences, 06.11 - 14.11, TOD2,
Hadrovich Fedja, University of Oxford Mathematical Institute, 29.06 - 04.07, UNM2,
Hagenbach Udo, Philipps-Universität Marburg Fachbereich Mathematik, 07.10 - 27.10, HU,
Hedenmalm Haakan, Lund Universitet Institute for Mathematics, 17.05 - 27.05, COO, 04.06 - 15.06, COO,
Helffer Bernard, Université Paris-Sud Department de Mathematiqués, 03.07 - 03.07, HOF,
Henkel Malte, Université Henri Poincaré Nancy I Laboratoire de Physique des Matériaux, 09.03 - 13.03, PGS,
Herbort Gregor, Bergische Universität - GH Wuppertal, 30.08 - 04.09, HU,
Herbst Ira, University of Virginia Methematics Department Kerchof Hall, 04.07 - 04.07, HOF,
Hiai Fumio, Tohoku University Graduate School of Information Sciences , 25.01 - 02.02, COO,
Hoover Bill, University of California Dep. of Applied Science, 13.02 - 15.03, PGS,
Host Bernard, Université Marne la Vallée, 17.09 - 22.09, SCH,
Ilieva-Litova Nevena Petrova, Bulgarian Academy of Sciences Institute for Nuclear Research and Nuclear Energy,
        01.01 - 31.03, THI, 04.10 - 31.11, THI,
Iordan Andrei, Université Pierre et Marie Curie Institut de Mathématique, 22.08 - 28.08, HU,
Jäkel Christian, Universita di Roma Dipartimento di Matematica, 16.02 - 20.02, BYN2,
Jauslin Hans-Rudolf, Université de Bourgogne Laboratoire de Physique LPUB, 22.02 - 28.02, PGS,
Johnson William B., Texas A & M University Department of Mathematics, 13.04 - 18.04, COO,
Jones Peter Wilcox, Yale University Mathematics Department, 22.05 - 11.06, COO,
Jorgenson Jay, City College of New York (CUNY), 19.06 - 28.06, COO,
Jüngel Ansgar, TU-Berlin , 09.01 - 13.01, SM, 08.03 - 12.03, SM,
Kaimanovich Vadim, CNRS, 18.11 - 25.11, SCH,
Kamber Franz W., University of Ilinois Department of Mathematics, 22.04 - 20.05, MI,
Kamvissis Spyros, University Marseille III, 10.01 - 13.01, SM,
Kamimoto Joe, Kumamoto University, 11.10 - 18.10, HU,
Kath Ines , Humboldt Universität zu Berlin Institut für Mathematik, 18.10 - 23.10, GAL,
Katz Nets, University of Illinois, 24.06 - 09.07, COO,
Khavin Viktor, St. Petersburg State University Department of Mathematics and Mechanics, 22.05 - 11.06, COO,
Kirchheim Bernd, Max-Planck Institut für Mathematik in den Naturwissenschaften, 07.06 - 20.06, COO,
Kislyakov Sergey, St. Petersburg branch of V.A. Steklov Institute, 24.05 - 03.06, COO,
Kitchens Bruce, IBM Watson Research Center, 20.04 - 30.04, SCH,
Klages Rainer, Center for Nonlinear Phenomena and Complex Systems, 21.02 - 28.02, PGS,
Klein Christian, Universität Tübingen Institut für Theoretische Physik, 28.10 - 29.10, BE,
Kobak Piotr Z., Uniwersytet Jagielloński Instytut Matematyki, 12.09 - 19.09, GAL, 18.12 - 31.12, GAL,
Kolar Martin, Masaryk University, 11.11 - 20.11, HU,
Konderak Jerzy, Università di Bari Dipartimento di Matematica, 01.10 - 20.10, GAL,
Koranyi Adam, H.H. Lehman College Mathematics Department, 08.08 - 17.08, HU,
Kosmann-Schwarzbach Yvette, Ecole Polytechnique Centre de Mathematiques, 14.09 - 19.09, AFG,
Kozameh Carlos, FAMAF - University of Cordoba, 29.06 - 04.07, UNM2,
Kravchenko Olga, Université Lyon I, 19.09 - 03.10, AFG,
Kreimer Dirk, Universität Mainz, 16.11 - 26.11, TOD2,
Krivonos Serguei, Joint Institue for Nuclear Research, 25.09 - 01.10, BK,
Krolak Ilona, Polish Academy of Sciences, 15.02 - 18.02, COO,
Krötz Bernhard, TU Clausthal Mathematisches Institut, 16.08 - 22.08, HU,
Kuchment Peter, Wichita State University Dep. of Math., 13.07 - 14.07, HOF,
Kuckert Bernd, Univ. di Roma ”La Sapienza” , 16.02 - 21.02, BYN2,
Krug Joachim, Universität GH Essen Fachbereich Physik, 22.02 - 05.03, PGS,
Ladyzhenskaja Olga, Steklov Mathematical Instiute, 08.03 - 12.03, HOF,
Lamel Bernhard, UC San Diego Department of Mathematics, 09.09 - 13.09, HU, 16.11 - 28.11, HU,
Landim Claudio, IMPA, 03.03 - 11.03, PGS,
Lange Horst, Universität Köln Mathematische Institut, 11.01 - 16.01, SM,
Langmann Edwin, University Uppsala, 17.08 - 10.09, AFG,
Laptev Ari, Royal Institute of Technology, 28.06 - 04.07, HOF,
Lauret Jorge, FAMAF - Univ. Nac. Córdoba, 29.10 - 03.11, GAL,
LeBrun Claude, Department of Mathematics SUNY, 18.10 - 23.10, GAL,
Ledoux Michel, Université Paul-Sabatice Département de Mathématique, 07.04 - 13.04, COO,
Lehner Franz, IMADA, Odense Universitet, 05.01 - 26.02, COO,
Leinert Michael, Universität Heidelberg, 15.02 - 26.02, COO,
Leiterer Jürgen, Humboldt Universität Berlin Institut für Mathematik, 13.09 - 19.09, HU,
Lesch Matthias, Universität Bonn Institut für Mathematik, 28.06 - 04.07, HOF,
Levermore C.David, University of Arizona Department of Mathematics, 06.01 - 19.01, SM,
Liakhovskaia Anna, Yale University Dept. of Math., 17.08 - 29.08, AFG,
Lieb Ingo, Universität Bonn Mathematisches Institut, 12.09 - 26.09, HU,
Lin Chi-Kun, National Cheng-Kung University Department of Mathematics, Taiwan, 10.01 - ., SM,

Lightwood Samuel, Dept. of Mathematics University of Victoria, Victoria, British Columbia V8W 3P4, Canada, 01.01 - 31.08, SCH,

Lind Douglas, University of Washington Dept. of Mathematics, 24.05 - 25.06, SCH,

Lindenstrauss Joram, Hebrew University of Jerusalem, 17.02 - 21.02, COO, 05.04 - 11.04, COO,

Liverani Carlangelo, Universitá di Roma " Tor Vergata ", 18.02 - 27.02, PGS,

Longo Roberto, Univ. di Roma "Tor Vergata" Dipartimento die Matematica, 15.02 - 21.02, BYN2, 04.04 - 11.04, COO,

López Fernández José Luis, Departemento de Matemática Aplicada Facultad de Ciencias, Campus Fuentenueva, Universidad de Granada , 11.01 - 13.01, SM,

Losik Mark V. , Saratov State University Department of Mathematics , 01.11 - 12.12, MI,

Lukierski Jerzy, Univ. Wroclaw Institute for Theoretical Physics, 04.10 - 09.10, AFG,

Lukyanov Sergei, Rutgers University, 03.09 - 17.09, AFG,

Madore John, Université de Paris Sud, Laboratoire de Physique Theorique et Hautes Energies, 26.03 - 28.03, AFG, 06.10 - 30.10, AFG, 13.12 - 19.12, YNG,

Maes Christian, KU Leuven Instituut voor Theoretische Fysica, 22.02 - 28.02, PGS,

Makarov Nikolai, California Institute of Technology, 02.06 - 30.06, COO,

Marchiafava Stefano, Universitá di Roma "La Sapienza" Dipartimento di Matematica, 28.10 - 05.11, GAL,

Marmo Giuseppe, Universitá Frederico II Napoli Dipartimento di Scienze Fisiche, 12.02 - 24.02, MI,

Masmoudi Nader, Universitë de Paris-Dauphine, 09.01 - 15.01, SM, 18.06 - 23.06, SM,

Marton Katalin, Hungarian Academy of Sciences Mathematical Institute, 30.03 - 09.04, COO,

Mason Lionel, University of Oxford Mathematical Institute, 29.06 - 04.07, UNM2,

Matouskova Eva, Czech Acad. of Science, 16.02 - 19.02, COO, 02.04 - 09.04, COO, 11.05 - 15.05, COO,

Mátyás László, Eötvös University Institute for Theoretical Physics, 03.03 - 05.03, PGS,

McLaughlin David, New York University, 09.01 - 17.01, SM,

McLaughlin Kenneth, University of Arizona Dept.of Mathematics, 11.01 - 14.01, SM,

Merkulov Sergei, Russian Academy of Sciences Dept. of Theoretical Problems University of Glasgow Dept. of Mathematics, 22.10 - 12.11, GAL,

Mickelsson Jouko, Royal Institute of Technology Theoretical Physics, 11.10 - 23.10, AFG,

Mielke Alexander, Universität Hannover Institut für Angewandte Mathematik, 23.02 - 27.02, PGS,

Milman Vitali, Tel Aviv University Dept. of Mathematics , 16.03 - 04.04, COO,

Mlotkowski Wojciech, University of Wroclaw Mathematical Institute, 14.02 - 18.02, COO,

Moroianu Andrei, Centre de Mathématiques Ecole Polytechnique, 18.10 - 24.10, GAL,

Müger Michael, Universita di Roma "Tor Vergata" Dipartimento di Matemática, 15.02 - 20.02, BYN2,

Müller Paul, Universität Linz Institut für Mathematik, 04.01 - 31.07, COO,

Muscato Orazio, Universita Catania Dipartimento di Matematica, 17.02 - 21.02, SM,

Mushkarov Oleg, Bulgarian Academy of Sciences Institute of Mathematics and Informatics, 12.11 - 18.11, GAL,

Nahm Werner, Universität Bonn Physik Institut, 15.11 - 20.11, TOD2,

Nedeljkov Marko, University of Novi Sad Institute of Mathematics - Faculty of Science, 07.12 - 13.12, OGK,

Neeb Karl-Hermann, Technische Universität Darmstadt Fachbereich Mathematik, 07.09 - 24.09, HU,

Nekrassov Nikita, ITEP, Moscow Princeton University Physics Dept., 15.09 - 30.09, AFG,

Neretin Yurii A., Moscow State Institute of Electronics and Mathematics, 11.09 - 01.10, HU,

Newman Ezra Ted, Dept. of Physics University of Pittsburgh, 29.06 - 04.07, UNM2,

Nica Alexandru, University of Waterloo Dept. of Pure Mathematics, 13.02 - 28.02, COO,

Niemi Antti, Uppsala University Dept. of Theoretical Physics, 21.10 - 22.10, AFG,

Nitta Takashi, Mie University Department of Education, 14.12 - 18.12, GAL,

Nouri Anne, INSA Lyon, 15.06 - 22.06, SM,

Nurowski Pawel, Warsaw University Dept. of Math. Methods in Physics, 27.06 - 04.07, UNM2,

Ogievetsky Oleg, Center of Theor. Physics, 20.10 - 31.10, AFG, 01.11 - 17.11, GAL, 18.11 - 20.11, TOD2,

Ohsawa Takeo, Nagoya University Graduate School of Mathematics, 14.09 - 29.09, HU,

Okikiolu Kate, UC San Diego Mathematics Department, 04.07 - 04.07, HOF, 13.07 - 16.07, HOF,

Olevskii Alexander, Tel Aviv University, 28.06 - 11.07, COO,

Olla Stefano, Université de Cergy-Pontoise Dept. Mathematiques, 02.03 - 07.03, PGS,

Ornea Liviu, University of Bucharest Faculty of Mathematics, 14.09 - 28.09, GAL,

Pajor Alain, Université de Marne-la-Valleé, 05.04 - 21.04, COO,

Paouris Grigorios, University of Crete Department of Mathematics, 28.03 - 12.04, COO,

Pedersen Henrik, SDU-Odense University Institut for Matematik, 18.10 - 24.10, GAL,

Penna Vittorio, Politecnico di Torino Dept. of Physics, 01.01 - 28.02, MI,

Penrose Oliver, Heriot Watt University, 23.02 - 27.02, PGS, 03.03 - 14.03, PGS,

Penrose Roger, University of Oxford Mathematical Institute, 29.06 - 04.07, SCH,

Perjés Zoltán, KFKI Central Research Institute for Physics, 29.06 - 04.07, UNM2,

Perroni Fabio, Università di Roma 1, 22.02 - 26.02, PGS,

Perthame Benoit, ENS/DMI , 11.01 - 14.01, SM,

Petkova Valentina, Institute for Nuclear Research and Nuclear Energy, 08.11 - 21.11, TOD2,

Petz Dénes, Technical University of Budapest Mathematical Department, 12.01 - 16.01, COO, 15.02 - 18.02, COO, 23.02 - 27.02, COO, 21.04 - 24.04, COO, 17.06 - 19.06, COO, 23.06 - 26.06, COO,

Pfister Herbert, Institut f. Theoretische Physik der Universität, 20.01 - 19.03, BE,

Pflug Peter, Universität Oldenburg Fachbereich Mathematik, 30.08 - 05.09, HU,

Piccinni Paolo, Universitá "La Sapienza" Dipartimento di Matematica, 03.11 - 06.11, GAL, 15.12 - 17.12, GAL,

Pietra Paola, Ian, Pauia, 01.01 - 30.06, SM,

Pillet Claude-Alain, Université de Toulon, 18.02 - 27.02, PGS,

Pinnau René, Universität Kaiserslautern Fachbereich Mathematik, 11.01 - 13.01, SM,

Pilipović Stevan, University of Novi Sad Faculty of Science - Institute of Mathematics, 07.12 - 13.12, OGK,

Pisier Gilles, Université Paris 6, 26.05 - 03.06, COO, 08.06 - 11.06, COO,

Podesta Fabio, Facoltà di Architettura Istituto di Matematica, 28.09 - 09.10, GAL, 07.12 - 12.12, GAL,

Podolsky Jiri, Charles University Department of Theoretical Physics, 18.05 - 23.05, OGK,

Pollicott Mark, University of Manchester Department of Mathematics, 22.05 - 29.05, SCH,

Politi Paolo, Universität Essen Fachbereich Physik, 23.02 - 05.03, PGS,

Poltoratski Alexei, Texas A & M University, 03.06 - 12.06, COO,

Ponsot Bénédicte, Université Montpellier II LPM c.c. 70, 01.10 - 21.10, AFG,

Pontecorvo Massimiliano, Universitá di Roma Tre Dipartimento di Matematica, 28.10 - 11.11, GAL,

Poon Yat S., University of California at Riverside Dept. of Mathematics, 13.09 - 18.09, GAL,

Pott Sandra, University of Edinburgh Department of Mathematics and Statistics, 07.06 - 12.06, COO,

Preiss David, University College London Department of Mathematics, 14.02 - 21.02, COO,

Prešnajder Peter, Comenius University Department of Theoretical Physics, 17.08 - 10.09, AFG,

Pullin Jorge, Pennsylvania State University, 18.06 - 19.06, AA,

Rácz Zoltán, Eötvös University Institute for Theoretical Physics, 22.02 - 28.02, PGS,

Radford Christopher, University of New England School of Mathematical & Computing Scienses, 01.09 - 28.09, MI,

Radulescu Florin, University of Iowa, 11.01 - 16.01, COO, 17.06 - 30.06, COO,

Rasulova Mukhaya, Institute of Nuclear Physics Uzbekistan Academy of Science, 20.10 - 25.10, SM,

Rateitschak Katja, Université Libre de Bruxelles Center for Nonlinear Phenomena and Complex Systems, 21.02 - 07.03, PGS,

Recknagel Andreas, AEI Potsdam, 31.08 - 01.10, AFG,

Redig Frank, Institut vor Theoretische Fysica, 22.02 - 07.03, PGS,

Reisner Shlomo, University of Haifa, 28.02 - 13.03, COO,

Rey-Bellet Luc, Rutgers University, 22.02 - 02.03, PGS,

Ringhofer Christian, Arizona State University Dept. of Mathematics, 01.01 - 31.01, SM,

Rondoni Lamberto, Politecnico di Torino Inst. Matematica, 18.02 - 23.02, PGS,

Rosly Alexei, Institute of Theoretical and Experimental Physics (ITEP), 15.09 - 03.10, AFG,

Roubtsov Vladimir, Université d'Angers Départment de Mathématiques , 23.08 - 06.09, AFG,

Sanders Barry, Macquarie University, 06.05 - 19.05, SCH, 23.05 - 29.05, SCH,

Schlag Wilhelm, Princeton University Dept. of Mathematics, 19.07 - 31.07, COO,

Schechtman Guido, Weizmann Institute of Science Dept. of Mathematics, 06.04 - 23.04, COO,

Schlesinger Karl-Georg, Universität Wuppertal FB Mathematik, 30.08 - 25.09, AFG, 30.11 - 13.12, YNG,

Schlumprecht Thomas, Texas A & M University Deptarture of Mathematics, 13.04 - 25.04, COO,

Schlichenmaier Martin, Universität Mannheim Mathematik, 27.09 - 16.10, HU,

Shlyakhtenko Dimitri, UCLA, Dept.Math., 04.01 - ., COO,

Schmalz Gerd, Universität Bonn Mathematisches Institut, 07.09 - 11.09, CAP,

Schmidt Wolfgang, University of Colorado, 01.06 - 11.06, SCH,

Schneider Guido, Universität Bayreuth Mathematisches Institut, 25.02 - 05.03, PGS,

Schneider Rolf, Universität Freiburg Mathematisches Institut, 24.03 - 08.04, COO,

Schomerus Volker, Universität Hamburg II. Inst. für Theoretische Physik, 31.08 - 20.09, AFG,

Schorr Anke, ETH Zürich, 14.09 - 26.09, AFG,

Schroer Bert, FU Berlin Institut für Theor. Physik, 15.02 - 24.02, BYN2,

Schütt Carsten, Universität Kiel Mathematisches Seminar, 14.02 - 13.03, COO,

Schütz Gunter, Forschungszentrum Jülich Institut für Festkörperforschung, 22.02 - 13.03, PGS,

Schwachhöfer Lorenz, Universität Leipzig Mathematisches Institut, 05.10 - 22.10, GAL,

Schweigert Christoph, ETH Hönggerberg Institut für Theoretische Physik, 07.09 - 12.09, AFG,

Semmelmann Uwe, Universität München Mathematisches Institut, 14.10 - 26.10, GAL,

Séré Eric, University of Paris-Dauphine, 10.01 - 16.01, SM,

Sergeev Armen, Steklov Mathematical Institute, 12.10 - 31.10, GAL, 02.11 - 22.11, HU,

Sevastianov Alexei, Max-Planck-Institute für Mathematik, 19.10 - 01.11, AFG,

Ševera Pavol, I.H.E.S., 16.08 - 21.08, AFG,

Sharp Richard, University of Manchester Dept. of Mathematics, 24.05 - 28.05, SCH,

Shcherbina Nikoay, University of Göteborg, 30.08 - 05.09, HU,

Shen Zhongwei, University of Kentucky Department of Mathematics, 01.07 - 04.07, HOF, 13.07 - 13.07, HOF,

Sidoravicius Vladas, IMPA Inst. of pure and applied Mathematics, 23.02 - 31.03, PGS,

Sidorov Nikita, University of Manchester UMIST Institute of Science and Technology, 19.05 - 16.06, SCH,

Singer Michael, University of Edinburgh Department of Mathematics and Statistics, 11.12 - 17.12, GAL,

Sitenko Yurii, Mathematic Academic Science of Ukraine Bogolyubov Institute of Ukraine, 19.05 - 01.06, THI,

Slovák Jan, Masaryk University Department of Algebra and Geometry, 16.02 - 16.02, CAP, 07.05 - 07.05, CAP, 18.05 - 18.05, CAP, 11.08 - 12.08, CAP, 29.09 - 01.10, GAL, 08.10 - 08.10, GAL, 13.10 - 15.10, GAL, 21.10 - 22.10, GAL, 05.11 - 05.11, GAL, 10.11 - 11.11, GAL, 18.11 - 19.11, GAL, 01.12 - 03.12, GAL,

Smirnov Fedor, LPTHE, 02.10 - 15.10, AFG,

Smirnov Stanislav, KTH - Royal Institut of Technology Department of Mathematics, 06.06 - 14.06, COO,

Sobolev Alexander V., University of Sussex School of Mathematical Sciences , 29.06 - 04.07, HOF, 11.07 - 11.07, HOF,

Soler Juan, Universidad de Granada Facultad de Ciencias, 11.01 - 14.01, SM,

SØrensen Østergaard Thomas, University of Copenhagen Department of Mathematik, 01.01 - 31.12, EU,

Sorokin Dmitri, INFN Sezione di Padova, 15.09 - 21.09, BK,

Souček Vladimir, Charles University Faculty of Mathematics and Physics Mathematical Institute, 16.08 - 21.08, CAP,

Sparano Giovanni, Universitá di Salerno DMI, 11.02 - 25.02, MI, 18.11 - 27.11, MI,

Sparling George, University of Pittsburgh Dept. of Mathematics, 28.06 - 04.07, UNM2,

Speicher Roland, Universität Heidelberg Instiut für Angewandte Mathematik, 23.02 - 27.02, COO,

Spiro Andrea, University of Ancona Facoltá di Ingegneria , 28.09 - 09.10, GAL, 05.12 - 07.12, GAL,

Spitzer Wolfgang, University of Copenhagen Department of Mathematics , 22.02 - 26.02, PGS,

Spohn Herbert, TU München, 22.02 - 24.03, PGS,

Stanev Yassen, Bulgarian Academy of Sciences Institute for Nuclear Research and Nuclear Energy, 18.11 - 28.11, TOD2,

Stegall Charles, Universität Linz, 01.01 - 31.07, COO,

Steinacker Harold, Ludwig-Maximiliansuniversität München Institut f. Theoretische Physik, 14.12 - 20.12, YNG,

Stensones Berit, University of Michigan Department of Mathematics, 28.09 - 03.10, HU,

Stepin Anatoli, Moscow State University Dept. of Mathematics, 11.01 - 09.02, SCH,

StØrmer Erling, University of Oslo Dept. of Mathematics, 12.01 - 22.01, COO,

Straube Emil J., Texas A & M Univerisity Department of Mathematics, 16.11 - 20.11, HU,

Strobl Thomas, RWTH – Aachen Inst. für Theoretische Physik, 18.08 - 30.09, AFG,

Swann Andrew, Odense University Syddansk Universitet Institute for Mathematics on Datalog I. , 14.10 - 25.10, GAL,

Sỳkora Tomàs, Charles Universtity Faculty of Mathematics and Physics Institue of Particle and Nuclear Physics, 09.12 - 11.12, BK, 15.12 - 18.12, BK,

Szász Domokos, Hungarian Academy of Sciences Institute of Mathematics, 22.10 - 30.10, SCH,

Takesaki Masamichi, University of California Department of Mathematics, 14.10 - 27.10, SCH,

Takhtajan Leon, SUNY at Stony Brook Department of Mathematics, 09.10 - 17.10, AFG,

Tartakoff David S., University of Illinois at Chicago Dept. of MAthematics, 01.10 - 07.10, HU,

Tél Tamás, Eötvös University Institute for Theoretical Physics, 18.02 - 19.02, PGS, 03.03 - 07.03, PGS,

Teschner Jörg, Dublin Institute for Advanced Studies School for Theoretical Physics, 05.10 - 17.10, AFG,

Thiele Christoph, UCLA, 22.06 - 10.07, COO,

Tod Kenneth Paul, University of Oxford Mathematical Institute, 29.06 - 04.07, UNM2,

Todorov Ivan, Bulgarian Academy of Sciences Institute for Nuclear Research and Nuclear Energy, 01.10 - 31.10, AFG, 01.11 - 30.11, TOD2,

Tomczak-Jaegermann Nicole, University of Alberto Department of Mathematical Sciences, 03.05 - 07.05, COO,

Torcini Alessandro, Unita di Firenze Instituto Nazionale di Fisica della Materia , 03.03 - 08.03, PGS,

Toscani Giuseppe, Universita di Pavia Dipartimento di Matematica, 09.01 - 15.01, SM, 26.11 - 28.11, SM,

Trautman Andrzej, University of Warsaw Institute for Theor. Physics , 28.06 - 04.07, SCH,

Treil Serguei, Michigan State University Department of Mathematics, 10.06 - 24.06, COO,

Tumanov Alexander, University of Illinois, 19.08 - 01.09, HU,

Tuncel Selim, University of Washington Dept. of Mathematics, 25.05 - 23.06, SCH,

Uhlmann Armin, Universität Leipzig Institut für Theoretische Physik, 04.11 - 18.11, YNG,

Unterberger André, Université de Reims Laboratoire de Mathematiques UPRESA 6056, 02.09 - 09.09, HU, 12.09 - 23.09, HU,

Unterreiter Andreas, Universität Kaiserlautern, 16.12 - 22.12, SM,

Upmeier Harald, University of Marburg, 17.08 - 24.09, HU,

Uraltseva Nina, University St. Petersburg, 08.03 - 12.03, HOF,

Vaisman Izu, University of Haifa Department of Mathematics, 01.01 - 15.01, MI,

Vajaitu Viorel, Romanian Academy Institute of Mathematics, 22.11 - 29.11, HU,

Vandoren Stefan, State University of New York, Stony Brook C.N. Yang Institute for Theoretical Physics, 13.12 - 20.12, GAL,

Venkov Boris, Steklov Mathematics Institute, 19.11 - 01.12, TOD2,

Verbitsky Misha, Steklov Insitute, 15.09 - 01.10, GAL,

Verch Rainer, Universität Göttingen Institut für Theoretische Physik, 16.02 - 20.02, BYN2,

Verdera Joan, Universitat Autonome de Barcelona Departament de Matematiques, 21.05 - 02.06, COO,

Vickers James, University of Southampton, 20.03 - 25.03, OGK,

Villani Cedric, Ecole normale superieure, 26.07 - 30.07, SM,

Vilasi Gaetano, Universitá di Salerno Dipartimento di Fisiche "E.R. Caianiello", 11.02 - 25.02, MI, 18.11 - 27.11, MI,

Vizman Cornelia, West University of Timisoara Insitute of Mathematics, 26.04 - 20.05, MI,

Voiculescu Dan-Virgil, University of California Berkeley Department of Mathematics, 04.01 - 17.01, COO, 14.06 - 22.06, COO,

Volberg Alexander, Michigan State University Department of Mathematics, 10.06 - 23.06, COO,

Volkov Alexandre, TENA, VUB and Steklov Mathematical Institut, 11.10 - 31.10, AFG,

Vollmer Jürgen, Uni-GH Essen Fachbereich Physik, 22.02 - 05.03, PGS,

Wagner Christoph, UniversitĹibre de Bruxelles Center for Nonlinear Phenomena and Complex Systems, 21.02 - 28.02, PGS,

Walther Björn, Royal Institute of Technology Department of Mathematics, 03.06 - 02.07, COO,

Wang McKenzie Y., McMaster University, 18.10 - 23.10, GAL,

Werner Elisabeth, Case Western Reserve University Department of Mathematics, 28.02 - 13.03, COO,

Wiegmann Paul B., University of Chicago Dept. of Physics, 26.08 - 20.09, AFG,

Wisniewski Jaroslaw, Warsaw University Institute of Mathematics, 07.12 - ., GAL,

Wojciechowski Michal, Polish Academy of Science Institute of Mathematics, 14.05 - 27.05, COO,

Wojtaszczyk Przemyslaw, Warsaw University Institut of Mathematics, 27.05 - 24.06, COO,

Wolf Joseph A., University of California, 01.10 - 21.10, HU,

Wollenberg Manfred, Universtät Leipzig Math. Institut, 15.02 - 21.02, BYN2,

Wulkenhaar Raimar, Centre de Physique Théorique, 21.04 - 25.04, AFG,

Wurzbacher Tilmann, IRMA, 01.09 - 17.09, HU,

Wysoczanski Janusz, Wroclaw University Institute of Mathematics, 14.02 - 18.02, COO,

Xu Ping, Pennsylvania State University Department of Mathematics, 27.10 - 29.10, AFG,

Yau Horng-Tzer, New York University Courant Institute, 11.01 - 16.01, SM,

Yokura Shoji, University of Kagoshima Faculty of Science Dept. of Mathematics and Computer Science, 08.08 - 26.08, MI,

Yuditskii Peter, Institute for Low Temp. Physics Math. Division, 09.06 - 13.06, COO,

Yui Noriko, Queen's University Department of Mathematics, 15.06 - 26.06, COO,

Zabrodin Anton, Institute of Theoretical and Experimental Physics, 26.08 - 24.09, AFG,

Zampieri Guiseppe, Università di Padova Dipartimento di Matematica, 14.10 - 16.10, HU, 06.11 - 13.11, HU,

Zannier Umberto, Istituto Universitario d'Architettura (I.U.A.V.), 07.06 - 11.06, SCH,

Zelditch Steve, Johns Hopkins University Dept. of Math., 13.07 - 20.07, HOF,

Zhang Genkai, University of Karlstad Department of Mathematics, 17.08 - 27.08, HU,

Zhang Kaijun, Institute of Mathematics Academia Sinica, 11.01 - 17.01, SM,

Zuber Jean-Bernard, CEA Saclay, 08.11 - 20.11, TOD2,

Zweifel Paul F., Virginia Tech, 09.01 - 23.01, SM,

Activities in electronic information and communication

by Peter W. Michor

It was asked to document the activities in electronic information and communication in the scientific report of the ESI. My involvement in this activities was ignited by the creation of ESI, thus this report is enclosed here.

After the ICM 1994 in Zürich I was elected secretary of the European Mathematical Society (EMS), for the period 1995-1998. I came there with the plan to create an electronic library for Mathematics. This is now working and called the *Eropean Mathematical Information Service (EMIS)*, see `http://www.emis.de` and 37 other mirrors throughout the world. The main part of EMIS is the lelctronci library of Mathematics, which now mirrors fulltext electronic versions of 38 Mathematical Journals, purely electronic ones and also traditional printed ones. There is also a section for conference proceedings which contains now 12 proceedings, and a section for monographs, which contains 5 books. The electronic library is supervised by the 'committee for electronic publishing of the EMS'; I serve as chairman since 1995.

In connection with Mathematical Databases I am member of the EMS-databse-committee which is the liaison between the EMS and Zentralblatt MATH, and I am also member of the innovations committee of Zentralblatt MATH. I have negotiated the consortium agreement between the Austrian Universities and Zentralblatt which opened the online access to Zentralblatt MATH for all Austrian Mathematician.

These negotiations were done in the framework of the BIBMAT group of the 'Österreichische Mathematische Gresellschaft (ÖMG)'. There are ongoing negotiations for opening online access to the Mathematical Reviews, for a consortium subscription to the journals of the AMS, and to the LINK electronic library of Springer-Verlag.

After the ICM 1998 in Berlin the International Mathematical Union created the 'committee on electronic information and communication (CEIC)' and I was persuaded to become its chairman. See the following report below. The next meeting of CEIC will take place at ESI, October 7-9, 2000. The meeting after that will be at the IHS in Princeton, in May 2001.

Finally, I am also a member of the mathematical advisory board of the arXiv

<div align="center">http://www.arxiv.org</div>

formerly known as the Los Alamos preprint archive, which was created by Paul Ginsparg.

The Committee on Electronic Information and Communication.

This is a report on the meeting of the Committee on Electronic Information and Communication (CEIC) of the IMU in Berkeley, December 5, 1999, MSRI, during and after the conference 'The Future of Mathematical Communication' Berkeley, Dec. 1-5, 1999, see:

<div align="center">http://msri.org/activities/events/9900/fmc99/index.html</div>

for the full record of the conference including overheads and streaming video. The conference was very successful. It was jointly sponsored by the three Canadian research Institutes (CRM, Fields and Pims) and by MSRI, with additional support from the IMU, AMS, CMS, Springer, Cambridge University Press, Mathematica and Maple. Their support is gratefully acknowledged.

There were roughly 100 participants and 35 speakers from more than a dozen countries representing mathematicians, computer scientists, physicists, educators, librarians, software developers, publishers and many other perspectives. One highlight was a stimulating public symposium held on December 4th. This symposium — as much of the rest of the meeting — helped emphasize that we are a small part of a much larger world. In particular, there are three parts to the mathematical literature: commercial journals, freely accessible parts (see below), and all the rest.

The CEIC is a standing committee of the IMU which held its first meeting in Berlin in November 1998 and its second meeting on December 5th, 1999 at Berkeley. It will meet next fall in Vienna. As described in Appendix 1, the CEIC has an ambitious mandate and is now quite advanced in its activity. Some details of the December 5 meeting follow. They give a good sense of the CEIC's preoccupations and of topics discussed at the conference.

The December 5 1999 CEIC Meeting.

The morning was a session of the CEIC, open to the general public, with the following lectures:

Peter Michor, Martin Grötschel: Presentation of CEIC, its members, and its subcommittees

Wolfram Sperber: The Idea of Secondary Home Pages in MathNet

Roland Schwänzl: Metadata — a Tool for Indexing and Linking Mathematical Preprints Globally

Wilfrid Hodges: What do you want from your publisher? (Copyright issues)

Peter Michor: Electronic services offered by the European Mathematical Society

Jonas Gomes: MathNet in Brazil

Kapil Paranjape: The Situation in India

Open Discussion of the Prospects for MathNet and Similar Activities

The afternoon was a closed session of CEIC. *Present*: Jonathan Borwein (deputy chair, CA), John Ewing (US), Jonas Gomes (Brazil), Wilfrid Hodges (UK), Martin Grötschel (D), Kapil Paranjape (India), Peter Michor (chair, A), David Morrison (US), Alf van der Poorten (AUS), Alexei Zhizhchenco (RU), *Absent*: Qin Zhou (China)

(1) The MathNet initiative which was started in Germany will be developed as a world-wide system of access to electronic information and communication. It is based on the use of machine readable metadata for preprints, institutions, persons, etc., which are developed within the framework of the 'Dublin core metadata initiative'. Contacts are being preserved with the Santa Fee initiative on metadata for preprint servers. See http://www.mathnet.de/ for an entry point into the existing system. A charter for the organizational infrastructure was discussed and will be available on the MathNet site soon. Many thanks are owed to our German colleagues who have been developing MathNet for several years.

   It is anticipated that the CEIC will have a robust web site by April and will make a general call for the establishment of secondary home pages and for development of harvestable preprint servers. Prototypes are presently being checked in Vancouver, Rio de Janeiro and elsewhere.

(2) A checklist devoted to copyright issues for authors of mathematical literature is in preparation. This will be continued as an open source intiative, lead by Wilfrid Hodges. See http://www.maths.qmw.ac.uk/ wilfrid/copyrightdoc.pdf.

(3) The CEIC discussed whether bundling of small and independent journals should be considered so that they could compete with the large electronic libraries of Elsevier, Springer-Verlag, and Academic Press in consortia negotiations. The European Mathematical Society EMIS (`http://www.emis.de`) is addressing this already, in freely accessible fashion. The work of EMIS is commended and encouraged by CEIC.

What will happen to the electronic material in the electronic libraries of the commercial publishers? Will the publishers archive this material permanently? Should there be an independent archiving facility somewhere?

(4) The arXiv (`http://www.arXiv.org`) is a very reliable and technically very competent server for primary physical and mathematical literature, growing out of the Los Alamos preprint server. It is willing to consider reliable archiving for the indefinite future. The work of the arXiv is also commended and applauded by the CEIC.

Appendix 1: the CEIC's Terms of Refererence.

Building on the enabling resolution passed by the General Assembly (GA) in Dresden on August 16, 1998, the Executive Committee of the International Mathematical Union establishes a *Committee on Electronic Information and Communication (CEIC)* of the International Mathematical Union (IMU).

Terms of Reference:

a) The CEIC shall be a standing committee of the Executive Committee (EC) of the IMU, to be reviewed every four years by the EC at its meeting preceding that of the GA. Members will be appointed for four year terms by procedures similar to those for Commissions of the IMU. The Executive Committee will appoint one of its members to serve on the CEIC.

b) The CEIC may meet as necessary in each four year period, review the development of Electronic Information and Communication as it impacts the international mathematical community and submit a report to the EC.

c) The CEIC may organize or sponsor international meetings or forums to bring together representatives of all interested parties, including societies, publishers, libraries, and researchers, publish and otherwise disseminate proceedings, reviews of recent developments, and technical surveys for the use of the mathematical community.

d) The CEIC may recommend international standards on issues related to electronic communication. Such recommendations should be reviewed by the EC and, if approved, may be published and promoted in the name of the IMU.

e) During its first 4 year term, the CEIC is specifically asked to address the coordination of world-wide efforts to establish web-based servers for mathematical papers, preprints, journals, and books. This includes issues of uniformizing metadata, document identifiers and supported formats, promoting mirroring and the development of search engines for mathematical material and coordination of existing servers. It should publish its findings with the goal of making the use of these servers universally understood and usable by the whole mathematical community. It is also asked to consider tranferring the World Directory of Mathematicians to an electronic freely accessible form.

f) Membership:

Peter Michor (chair), University of Vienna, Vienna, Austria; Peter.Michor@esi.ac.at
Jonathan Borwein (deuty chair), Simon Fraser University, Burnaby, Canada; jborwein@cecm.sfu.ca
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