

Doppler Institute

for Mathematical Physics and Applied Mathematics

2008 Activity Report

This is a short overview of the DI activities; a list of publications is given in the attachment. The full account covering all aspects of the work done can be found at the DI web page, <http://doppler.ujf.cas.cz/index.html>

People

1. *Permanent staff* consisted of 17 members the salaries of whom were payed by the three participating institutions, CTU (Exner-part, Burdík, Havlíček, Jex, Pelantová, Šťovíček, Tolar, Chadzitaskos, Pošta, Svoboda), NPI (Exner-part, Znojil, Dittrich, Krejčířík, Tater) and UHK (Šeba, Kříž, Martiník) and one supported by the DI grant LC06002 (Masáková).
2. *Temporary positions* covered by the DI grant LC06002 were given to postdocs, in exceptional cases to PhD students, specifically the *long-term ones* (six months or more, in some cases extending to the next year) to Balková, Brougham, Cacciapuoti, Carlone, Junhua Chen, Gábris, Harmer, Kubieniec (continuation from the last year), Mestre, and *short-term ones* to Fraas, Hejčík and Štefaňák. In addition to that, DI visiting professorships for periods up to two months were given to Alfred M. Grundland, Pavel Winternitz, Eric Lutz and Pedro Freitas.

3. *Students*: the DI members supervised PhD theses preparation of 21 students, of which 16 were based at the CTU, 3 in the NPI and 2 at the UHK; a part of the theses were prepared in collaboration with institutes abroad. In addition, some number of undergraduate students was supervised.
4. *Degrees obtained*: Four *PhD theses* were defended: *Peter Baláži*: Infinite words coding k -interval exchange transformation (supervised by Pelantová, March), *Lubomíra Balková*: β -integers and quasicrystals (Masáková and Gazeau, May), *Martin Fraas*: Models of quantum systems with strong singular interactions (Exner, June), and *Pavel Hejčík*: Properties of simple quantum graphs (Šeba and Cheon, August)
5. *Visitors*: About 30 people visited DI from abroad for collaboration purposes, typically with a talk given at one of the DI seminars.

Publications

1. *Books*: The second edition of the Blank-Exner-Havlíček monograph on Hilbert-space operators and quantum physics, revised and extended, was published by Springer. Proceeding of 2007 AGA Programme in the Newton Institute, with our editorial participation, were published by the AMS. Proceedings of the last year workshop on pseudo-Hermitian Hamiltonians in quantum physics, co-organized by DI, appeared as a special issue of *J. Phys. A: Math. Theor.*
2. *Patent* on an optical term for Roentgen microscopy was registered.
3. *Research papers*: there were 49 journal papers published, of which 22 of this year while 27 were accepted earlier and published in 2008 (or at the very end of 2007). In addition there were four papers accepted; a full list is attached. Of the 49 journal publications thirteen were in *J. Phys. A: Math. Theor.*, three in *Phys. Lett. A*, *J. Math. Phys.* and *SIGMA*, two in *Phys. Rev. A*, *Phys. Rev. D*, *El. J. Combinatorial Number Theory* and *Acta Polytechnica*, plus single papers in *Phys. Rev. Lett.*, *Lett. Math. Phys.*, *Ann. H. Poincaré* and 17 other journals.
4. *Submitted papers and proceedings contributions*: 46 items, see the attached list

Meetings

1. 17th Student Winter School on *Mathematical Physics*, Horní Polubný, January 20–26, 2008; about 25 participants from DI and University of

Bialystok; lectures of DI members and T. Voronov of Manchester

2. Workshop *Modern trend in quantum optics and quantum information*, Prague, May 1–4, 2008; about 50 participants from 11 countries and 28 talks
3. Conference *Journées Numeration 2008*, Prague, May 26–30, 2008; about 60 participants from 14 countries and 32 talks
4. A Summer School and Workshop on *Algebraic Structures*, Telč, August 10–16, 2007; 15 participants from DI, 16 lectures
5. Microconference *A canonical realization*, Prague, October 21, 2008; about 30 participants from 5 countries, 10 talks
6. Workshop *Physics of social systems*, Hradec Králové, November 27–28, 2008; about 25 participants from Poland, Slovenia and Czech Republic, 10 talks

Seminars

Four regular seminars worked:

1. *Doppler Institute Seminar*, 16 sessions in 2008
2. *Quantum Circle Seminar*, 14 sessions apart of the workshops
3. *Combinatorial and Algebraic Structures Seminar*, 20 sessions apart of the workshops
4. A *microseminar* on quantum theory and related topics and methods, 22 sessions

DI Council Activity

1. *Discussions of Council members* occurred on *ad hoc* basis, either during meetings at conferences and other occasions, or through electronic correspondence
2. *The present report* was discussed and approved electronically

Other important facts

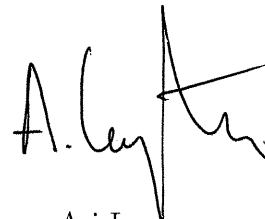
1. *The next ICMP*: As mentioned previously, the International Association of Mathematical Physics (IAMP) choose Prague as *the site of its next congress* in the summer of 2009 and its organization will be done within the DI. This event will require all the resources for the next year.

2. *Václav Votruba Prize*: the DI supports this award for the best PhD thesis in theoretical physics, sponsored by the *Foundation for Support of Theoretical Physics*. This year prize went to *Lenka Zdeborová* for the work entitled “Statistical physics of hard optimization problems”; honorable mentions were given to Sarah Croke, Martin Fraas, and Roman Orus-Lacort.
3. Scientific Director of the DI, Pavel Exner, was elected *IAMP President* for the 2009–2011 term.

Signed in Prague and London on December 22, 2008



Pavel Exner
DI Scientific Director



Ari Laptev
DI Council Chairman