

Doppler Institute

for Mathematical Physics and Applied Mathematics

2016 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, Havlíček, Jex, Krejčířík–part, Masáková, Pelantová, Šnobl, Šťovíček, Tolar, Chadzitaskos, Pošta), NPI (Exner–part, Znojil, Dittrich, Krejčířík–part, Tater) and UHK (Šeba, Kříž, Jezbera).
2. *Temporary positions* covered by various grant and institutional sources were given to postdocs, mostly continuing from the previous year, namely Barseghyan, Gábris, Háková, Hamilton, and Lotoreichik.
3. *Students*: the DI members supervised PhD studies of 15 students, of which 10 were based at the CTU, four in the NPI at one at the UHK; a part of the theses was prepared in collaboration with institutes abroad. In addition, a number of undergraduate students were supervised.
4. *Degrees obtained*: Three PhD's were defended. In February it was those by *Tomáš Hejda*, “Geometrical aspects of positional representations of real and complex numbers”, written under the supervision of E. Pelantová and W. Steiner, and of *Pavel Bažant*, entitled “Error correction of quantum protocols”, supervised by I. Jex. In October *Michal Jex* defended a thesis entitled “Strongly singular Schrödinger operators with with interactions supported by curves and surfaces” supervised by P. Exner.
5. *Awards*: Pavel Exner obtained the *Neuron Prize* for outstanding contributions to science. Marta Brzicová, Hana Dlouhá, Kateřina Medková, and Magdalena Tinková succeeded in student competitions in applied mathematics and theoretical informatics.

6. *Visitors*: About 30 people visited DI from abroad for collaboration purposes, typically with a talk given at one of the DI seminars.

Publications

1. *Research papers*: there were 30 journal papers published, of which 44 of this year while 16 were accepted earlier and published in 2015. In addition there were 18 papers accepted; a full list is attached. The spectrum of journals in which we published again wide. There were seven papers in *J. Phys. A: Math. Theor.*, four in *J. Math. Phys.* and *Acta Polytechnica*, three in *Phys. Rev. A*, two in *Theor. Comp. Sci., Comm. PDE, J. Math. Anal. Appl., El J. Combin., J. Diff. Eqs, Asympt. Anal., New J. Phys.*, and *Mod. Phys. Lett.*, and single papers in *Int. Eq. Oper. Theory, Ann. H. Poincaré, Lett. Math. Phys., Rev. Math. Phys., J. Funct. Anal.*, and twenty other journals.
2. *Submitted papers and proceedings contributions*: altogether 26 items, see the attached list

Meetings

1. 25th *Student Winter School on Mathematical Physics*, Janské Lázně, January 24–39, 2016; about 40 participants from Czechia and Poland with the same number of talks
2. BCAM Workshop on *Geometrical aspects of spectral theory*, Bilbao, April 4–6, 2016; 42 participants from ten countries, 19 talks
3. *Numeration 2016*, Prague, May 23–27, 2016; 64 participants from 11 countries, 35 talks
4. *DI-CRM Workshop* on the occasion of the 80th birthdays of Pavel Winternitz and Jiří Patera, May 30 – June 3, 2016; 41 participants from 11 countries, 30 talks
5. *Analytic and algebraic methods in physics*, in honor of Miloslav Znojil 70th birthday, June 6–9, 2016; 37 participants from 15 countries, 28 talks
6. Student Conference on *Combinatorics on Words and Mathematical Physics*, Zlaté Hory, August 21–28, 2016; about 25 participants

7. *QMath13: Mathematical Results in Quantum Physics*, an issue in our traditional series, Atlanta, October 8–11, 2016; 150 participants from 15 countries, 107 talks
8. Workshop *Quantum Simulation and Quantum Walks*, Prague, November 17–20, 2016; 49 participants from nine countries, 30 talks

Seminars

Four regular seminars worked:

1. *Doppler Institute Seminar*, 8 sessions in 2016
2. *Quantum Circle Seminar*, 10 sessions
3. *Combinatorial and Algebraic Structures Seminar*, 20 sessions apart from the workshops
4. *MAFIA Seminar*, 7 sessions
5. A *microseminar* on quantum theory and related topics and methods, 6 sessions

Václav Votruba Prize

In the fourteenth year of competition for the best PhD thesis in theoretical physics the award went to *Jakub Železný* from the The Institute of Physics, CAS, for the work *Electronic structure and magnetic properties of antiferromagnetic semiconductors and metals*. The jury also gave a honourable mention to *Samuel Kováčik* for the work *Aspects of physics in non-commutative space*.

Prague, January 2, 2017



Pavel Exner
DI Scientific Director