

Doppler Institute

for Mathematical Physics and Applied Mathematics

2017 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 19 members the salaries of whom were payed by the three participating institutions, CTU (Dvořáková, Exner-part, Havlíček, Jex, Krejčířík-part, Masáková, Pelantová, Šnobl, Štoviček, Štefaňák, 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 and external collaborators, mostly continuing from the previous year, namely Barseghyan, Gábris, Hamilton, Lotoreichik, and Turek.
3. *Students*: the DI members supervised PhD studies of 12 students, of which 8 were based at the CTU, three in the NPI and 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*: In March *Tomáš Vávra* defended the PhD thesis “Arithmetical properties of Pisot units”, written under the supervision of Z. Masáková. We also note the thesis “ Quantum aspects of beyond-Standard-model theories with extended gauge symmetries” of *Helena Kolečová*, née *Šediváková*, who started in our group but later switched to particle physics, prepared under the supervision of M. Malínský and defended in June.

5. *Awards: Igor Jex* was elected Fellow of *The Optical Society*; the citation was “for contribution to the applications of optical network in quantum optics, in particular, for their use for quantum state measurement and in implementing quantum walks using the optical feedback loop.”
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. *Books*: This year a voluminous textbook on classical theoretical physics by Igor Jex, Ivan Štoll, and Jiří Tolar was published.
2. *Research papers*: there were 50 journal papers published, of which 27 of this year while 23 were accepted earlier and published in 2017. In addition there were 9 papers accepted; a full list is attached. The spectrum of journals in which we published was again wide. There were five papers in *J. Phys. A: Math. Theor.*, three in *Ann. Phys.* and *Phys. Rev. A*, two in *Phys. Rev. Lett.*, *J. Math. Phys.*, *Phys. Lett. A*, *Asympt. Anal.* and *Operators and Matrices*, and single papers in *Rep. Math. Phys.*, *Phys. Rev. B*, *Math. Nachr.*, *Ann. H. Poincaré*, *Rep. Math. Phys.*, *Comm. PDE*, *J. Funct. Anal.*, *Proc. AMS*, and twenty other journals.
3. *Submitted papers and proceedings contributions*: altogether 24 items, see the attached list

Meetings

1. 26th *Student Winter School on Mathematical Physics*, Janské Lázně, January 22–28, 2017; 37 participants from Czechia, Slovakia, and Poland with the 24 talks
2. *Chaos, and what it can reveal*, in honour of Petr Šeba 60th birthday, Hradec Králové, May 9–11, 2017; 35 participants from six countries, 21 talks
3. Student Conference on *Combinatorics on Words*, Janov nad Nisou, May 22–26, 2017; about 25 participants
4. *Mathematical aspects of the physics with non-self-adjoint operators*, CIRM Luminy, June 5–9, 2017; 71 participants from 18 countries, 44 talks

5. *Analytic and algebraic methods in physics XIV*, Prague, September 11–14, 2017; 35 participants from 13 countries, 28 talks

Seminars

Four regular seminars worked:

1. *Doppler Institute Seminar*, 9 sessions in 2017
2. *Quantum Circle Seminar*, 7 sessions
3. *Combinatorial and Algebraic Structures Seminar*, 21 sessions apart from the workshops
4. *MAFIA Seminar*, 14 sessions
5. A *microseminar* on quantum theory and related topics and methods, 4 sessions

Václav Votruba Prize

In the fifteens year of competition for the best PhD thesis in theoretical physics the award went to *Dalimil Mazáč* from the Perimeter Institute for the work *Explorations in the conformal bootstrap*. The jury also gave a honorable mention to *Helena Kolečová* for the work *Quantum aspects of beyond-Standard-model theories*.

Prague, January 1, 2018



Pavel Exner
DI Scientific Director