

Doppler Institute

for Mathematical Physics and Applied Mathematics

2024 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.fjfi.cvut.cz/>

Funding

Being used from the more than thirty years of Doppler Institute history to alternation of fat and lean years, in the present one we relied again mostly on various *ad hoc* sources. One of them, to be mentioned explicitly, was the European Marie Curie programme SOMPATY funding collaboration with Central Asian universities.

People

1. *Permanent staff* consisted of 31 members the salaries of whom were payed, fully or partially, by the three participating institutions, namely CTU (Ambrož, Chadzitaskos, Dvořáková, Exner-*part*, Gábris, Hamilton, I. Jex, M. Jex, Masáková, Pelantová, Pošta, Semorádová, Šnobl, Štampach, Šťovíček, Štefaňák, Tolar, Tušek), NPI (Exner-*part*, Ditrich, Jakubský, Lotoreichik, Tater, Turek, Znojil) and UHK (Baradaran, Jezbera, Khrabustovskyi, Kříž, Lipovský, Šeba, Studnička).

2. *Temporary positions* covered by various grant and institutional sources were given to postdocs and external collaborators, namely Hassanabadi and Singh.
3. *Students*: the DI members supervised PhD programme of 16 students, of which thirteen were based at the CTU , two in the NPI and one at the Ostrava University. In addition, a number of undergraduate students were supervised.
4. *Degrees obtained*: In December, *František Štampach* obtained his habilitation. Two PhD theses were defended, those of *Jana Lepšová*, written under the supervision of *Lubomíra Dvořáková* and *Sébastien Labbé* in May, and of *Ondřej Kubů* prepared under the supervision of *Libor Šnobl* in September.
5. *Other personalia*: We suffered heavy losses. *Miloslav Havlíček*, founder of the institute passed away at the beginning of September. Seven weeks later, we lost *John Klauder*, a member of our advisory board. On the more positive side, *Jan Kříž*, our senior member, became *rector* of the University of Hradec Králové.
6. *Visitors*: Altogether 22 visitors, some of them for longer periods supported by the SOMPATY programme.

Publications

1. *Research papers*: there were 50 journal papers published, of which 40 of this year while 10 were accepted earlier and published in 2024. In addition there were 5 papers accepted; a full list is attached. The spectrum of journals in which we published was rather wide. There were four papers in *J. Phys. A: Math. Theor.* and *Symmetry*, three in *J. Math. Phys.* and *Phys. Rev. A*, two in *J.Spect. Theory*, *Phys. Scripta*, *Phys. Lett. A*, *Phys. Rev. B*, *Pure Appl. Funct. Anal.* and *Theor. Comp. Sci.*, and single papers in *Eur. J. Phys. Plus.*, *Class. Quan. Grav.*, *Int. Math. Res. Not.*, *Lett. Math. Phys.*, *SIAM J. Math. Anal.*, *Math. Nachr.*, and eighteen other journals.
2. *Submitted papers*: altogether 19 items, see the attached list

Meetings

1. *32st Student Winter School on Mathematical Physics*, Janské Lázně, January 21–27, 2024; a traditional meeting, dominantly Czech Polish, 36 participants, 27 talks
2. *Czech-Japanese workshop on quantum information*, Tokyo, May 21–23, 2024; about 70 participants, 29 talks, 30 posters
3. *Joint symposium on quantum computing*, Taipei, August 22–24, 2024; about 40 participants, 24 talks
4. *Analytic and algebraic methods in physics (AAMP XXI)*, Prague, August 27–30, 2024; 35 participants from 15 countries, 30 talks
5. SOMPATY summer school and conference *Evolution Equations, Approximation and Spectral Optimization*, Almaty, September 11–18, 2024; about 50 participants, 4 minicourses, 32 talks
6. *21st International Workshop on Pseudo-Hermitian Hamiltonians in Quantum Physics (PHHQP-XXI)*, Chania, Crete, September 22–27, 2024; 62 participants, 62 talks
7. *Spectral Theory and Differential Equations*, Hradec Králové, November 4–7, 2024; about 35 participants, 25 talks
8. *Superintegrability, Exact-Solvability and Representation Theory*, Prague, November 22–24, 2024; 25 participants, 17 talks
9. Workshop *Quantum Machine Learning*, Prague, December 3–5, 2024; 14 participants and 10 talks

Seminars

Four, more or less regular seminars worked, in the on-site mode again:

1. *Doppler Institute Seminar*, 13 sessions in 2024
2. *Quantum Circle Seminar*, 18 sessions
3. *MAFIA Seminar*, 20 sessions
4. *UHK Mathematical Physics Seminar*, 7 sessions

Václav Votruba Prize

In the twenty second year of competition for the best PhD thesis in theoretical physics the award went to *Viktor Skoupy* from the Charles University

for the work *Gravitational wave templates from extreme mass ratio inspirals*; honourable mentions were given to *Marek Liška* for the thesis *Thermodynamics of spacetime: corrections from the quantum realm* and to *Chokri Manai* for the thesis *Quantum Spin Glass Models*.

Prague, December 20, 2024

A handwritten signature in blue ink, appearing to read 'Pavel Exner', is centered on the page.

Pavel Exner
DI Scientific Director