

Doppler Institute

for Mathematical Physics and Applied Mathematics

2023 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

After five years the European Union project ‘Center of Advanced Applied Sciences’ which supported the Doppler Institute activities came to conclusion in the middle of the year, and as it is our habit, we have to rely again on various *ad hoc* sources. We have also benefited from the European Marie Curie programme SOMPATY funding collaboration with Central Asian universities.

People

1. *Permanent staff* consisted of 34 members the salaries of whom were payed, fully or partially, by the three participating institutions, namely CTU (Ambrož, Chadzitaskos, Dolce, Dvořáková, Exner–*part*, Gábris, Hamilton, Havlíček, I. Jex, M. Jex, Masáková, Pelantová, Pošta, Šnobl, Štampach, Štoviček, Štefaňák, Tolar, Tušek), NPI (Exner–*part*, Ditrich, Jakubský, Lotoreichik, Schneiderová, Tater, Turek, Znojil) and UHK (Baradaran, Borisov, 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, Singh and Semorádová.
3. *Students*: the DI members supervised PhD programme of 15 students, of which eleven were based at the CTU, two in the NPI and two at the Ostrava University. In addition, a number of undergraduate students were supervised.
4. *Degrees obtained*: Two senior members, *Vít Jakubský* and *Vladimir Lotoreichik*, defended this year, in February and May, respectively, their higher doctorate (DSc) theses, which can be regarded as an analogue of the French HDR degree. Furthermore, *Martin Malachov* defended in September his PhD thesis written under supervision of *Igor Jex*.
5. *Other personalia*: *Elliott Lieb*, our advisory board member, was awarded the highly prestigious *Kyoto Prize* in November. *Jan Kríž* was in December elected *rector* of the University of Hradec Králové.
6. *Visitors*: Altogether 26 visitors, some of them for longer periods supported by the SOMPATY programme.

Publications

1. *Research papers*: there were 60 journal papers published, of which 47 of this year while 13 were accepted earlier and published in 2022. In addition there were 8 papers accepted; a full list is attached. The spectrum of journals in which we published was rather wide. There were five papers in *J. Phys. A: Math. Theor.*, four in *Ann. Phys.*, three in *Anal. Math. Phys.* and *Phys. Scripta*, two in *J.Spect. Theory*, *SIAM J. Math. Anal.*, *Eur. J. Phys. Plus.*, *J. Math.Anal.Appl.* and *Acta Polytechnica*, and single papers in *Phys. Lett. B*, *J. Stat. Phys.*, *Phys. Rev. A*, *J. Number Theory*, *Ann. H. Poincaré*, *J. Math. Phys.* and twenty eight other journals.
2. *Submitted papers*: altogether 18 items, see the attached list

Meetings

1. *31st Student Winter School on Mathematical Physics*, Janské Lázně, January 22–28, 2023; a traditional Czech-Polish meeting, 24 talks

2. *Analytic and algebraic methods in physics (AAMP XX)*, Prague, August 29–31, 2023; 47 participants from 13 countries, 36 talks
3. SOMPATY summer school and conference *Mathematics for the Micro/Nano-World: From soliton dynamics, nonlinear optics to quantum science and technology*, Samarkand, September 11–22, 2023; about 60 participants, 4 minicourses, 34 talks
4. Workshop *Methods and Applications of Quantum Computing with Light and Qubits*, Prague, October 17, 2023; Czech-Hungarian meeting with 16 participants and 9 talks

Seminars

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

1. *Doppler Institute Seminar*, 10 sessions in 2023
2. *Quantum Circle Seminar*, 13 sessions
3. *Combinatorial and Algebraic Structures Seminar*, one session
4. *MAFIA Seminar*, 10 sessions
5. *UHK Mathematical Physics Seminar*, 6 sessions

Václav Votruba Prize

In the twenty first year of competition for the best PhD thesis in theoretical physics the award went to *Danielle Ferretti* from Università di Roma ‘La Sapienza’ for the work *Università di Roma ‘La Sapienza’*; a honourable mention was given to *Kateřina Sýkorová* for the thesis *Quantum aspects of particle physics models with extended gauge symmetries*.

Prague, December 29, 2023



Pavel Exner

DI Scientific Director