

Doppler Institute

for Mathematical Physics and Applied Mathematics

2022 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>

Funding

The Doppler Institute activities keep to be supported, together with several other departments of the Czech Technical University, by the European Union project ‘Center of Advanced Applied Sciences’, as well as several smaller grants, both Czech and international.

People

1. *Permanent staff* consisted of 32 members the salaries of whom were payed, fully or partially, by the three participating institutions, namely CTU (Ambrož, Chadzitaskos, Dvořáková, Exner–*part*, Gábris, Hamilton, Havlíček, Jex, Masáková, Pelantová, Pošta, Šnobl, Štampach, Šťovíček, Štefaňák, Tolar, Tušek), NPI (Barseghyan, Exner–*part*, Dittrich, Jakubský, Lotoreichik, 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 Dolce, Frymark, Scarbrough, Weir, and Zelava.

3. *Students*: the DI members supervised PhD programme of 11 students, of which nine were based at the CTU, one in the NPI, and one at the Ostrava University. In addition, a number of undergraduate students were supervised.
4. *Degrees obtained*: After a number of theses concluded last year, there were none now, just several master and bachelor degrees were awarded.
5. *Other personalia*: We lost another member of our advisory board, *Jiří Patera*, who passed away in January. On the other hand, two board members, *John Klauder* and *Elliott Lieb*, became nonagenarians, and we wish them firm health. Pavel Exner was elected member of the *European Academy of Sciences*.
6. *Visitors*: Still well below the average of pre-covid times but slowly improving, during the fall we hosted twelve colleague from abroad.

Publications

1. *Research papers*: there were 46 journal papers published, of which 37 of this year while 9 were accepted earlier and published in 2022. In addition there were 11 papers accepted; a full list is attached. The spectrum of journals in which we published was rather wide. There were three papers in *J. Phys. A: Math. Theor.*, *J. Math. Phys. A: Math. Theor.*, *Phys. Lett. A* and *Eur. J. Phys. Plus*, two in *Ann. Phys.*, *Theor. Comp. Sci.*, *Lett. Math. Phys.*, *Phys. Rev. A*, *Phys. Scripta* and *Math. Nachr.*, and single papers in *J. Math. Anal. Appl.*, *Phys. Rev. B*, *Sci. Reports*, *SIAM J. Math. Anal.*, *J. Stat. Phys.*, and fifteen other journals.
2. *Submitted papers*: altogether 17 items, see the attached list

Meetings

1. *30th Student Winter School on Mathematical Physics*, Janské Lázně, January 23–29, 2022; after being canceled last year, the school was back with 20 participants
2. Workshop *Modern Trends in Quantum Theory*, Prague, May 23–28, 2022; 67 participants from 10 countries, 21 talks
3. *18e Journées Montoises d'Informatique Théorique*, Prague, September 5–9, 2022; 48 participants from 10 countries, 26 talks

4. *Analytic and algebraic methods in physics (AAMP XIX)*, Prague, September 6–9, 2022; in hybrid form, 40 participants, plus 8 online from 15 countries, 32 talks
5. Conference *Mathematical Results in Quantum Physics (QMath15)*, UC Davis, September 12–16, 2022; about 130 participants, 82 talks

Seminars

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

1. *Doppler Institute Seminar*, 8 sessions in 2022
2. *Quantum Circle Seminar*, 16 sessions
3. *Combinatorial and Algebraic Structures Seminar*, two sessions
4. *MAFIA Seminar*, 14 sessions
5. A *microseminar* on quantum theory and related topics and methods, 11 sessions

Václav Votruba Prize

In the twentieth year of competition for the best PhD thesis in theoretical physics the award went to *Simon Lucas Becker* from the University of Cambridge for the work *Spectral gaps for many-particle systems, semiclassical analysis of graphene, and quantum dynamics*.

Prague, December 29, 2022



Pavel Exner
DI Scientific Director