

Doppler Institute

for Mathematical Physics and Applied Mathematics

2021 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 30 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, Šťovíček, Štefaňák, Tolar, Tušek), NPI (Barseghyan, Exner-*part*, Dittrich, Jakubský, Lotoreichik, Tater, Turek, Znojil) and UHK (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 Baradaran, Dolce, Frymark, Scarbrough, Weir, and Zelava.

3. *Students:* the DI members supervised PhD programme of 10 students, of which eight 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:* The year was rich in concluded theses. In March *Jan Mareš* defended a PhD thesis entitled “Dynamics of percolated quantum walks on graphs”, two weeks later *Jiří Maryška* a thesis entitled ‘Asymptotic properties of quantum Markov processes’; both were co-supervised by Igor Jex and Jaroslav Novotný. In May *Josef Rukavička* defended a thesis entitled “Enumeration on finite rich words” written under the supervision of Štěpán Starosta. And finally, in December *Iveta Semorádová* defended a thesis entitled “Nonstandard perturbation methods and non-Hermitian models in quantum mechanics” which was supervised by Miloslav Znojil.
5. *Visitors:* Still well below the average but better than the last year, during the fall we were able to host nine colleague from abroad.

Publications

1. *Research papers:* there were 60 journal papers published, of which 45 of this year while 15 were accepted earlier and published in 2021. In addition there were 6 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.*, three in *J. Phys.: Conf. Ser.* and *Phys. Lett. A*, two in *Comm. Contemp. Math.*, *J. Math. Phys.*, *Lin. Alg. Appl.*, *Phys. Rev. A*, *Phys. Rev. E* and *Rev. Math. Phys.*, and single papers in *Ann. H. Poincaré*, *Commun. Math. Phys.*, *Eur. J. Phys. Plus*, *JEMS*, *J. Funct. Anal.*, *J. Math. Anal. Appl.*, *Lett. Math. Phys.*, *Sci. Reports*, and twenty nine other journals.
2. *Submitted papers and proceedings contributions:* altogether 23 items, see the attached list

Meetings

The pandemic restrictions had a serious effect, so that only one meeting was organized this year:

1. *Analytic and algebraic methods in physics (AAMP XVIII)*, Prague, September 1–3, 2021, in the hybrid form; 78 participants, 36 talks

On the other hand, this was compensated by the fact that the DI members were active in electronic meetings all round the world.

Seminars

Five, more or less regular seminars worked:

1. *Doppler Institute Seminar*, 9 sessions in 2021, first by zoom only, in the second half of the year in the hybrid form; the same applied to the other seminars
2. *Quantum Circle Seminar*, 24 sessions
3. *Combinatorial and Algebraic Structures Seminar*, two sessions
4. *MAFIA Seminar*, 10 sessions
5. A *microseminar* on quantum theory and related topics and methods, five sessions

Václav Votruba Prize

In the nineteenth year of competition for the best PhD thesis in theoretical physics the award went to *Francesco Di Filippo* from the SISSA Trieste for the work *Beyond general relativity: modified theories and non-singular black holes*. The jury also gave honourable mentions to Matěj Hudec and Katarína Karlová.

Prague, December 23, 2020



Pavel Exner
DI Scientific Director