

# Doppler Institute

*for Mathematical Physics and Applied Mathematics*

## 2020 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 28 members the salaries of whom were payed, fully or partially, by the three participating institutions, namely CTU (Ambrož, Chadžitaskos, 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, Kříž, Lipovský, Šeba).
2. *Temporary positions* covered by various grant and institutional sources were given to postdocs and external collaborators, namely Baradaran, Dolce, Frymark, and Weir.

3. *Students*: the DI members supervised PhD programme of 15 students, of which 11 were based at the CTU, two in the NPI, one at the UHK, and one at the Ostrava University. In addition, a number of undergraduate students were supervised.
4. *Degrees obtained*: In September *Kateřina Kalova, nee Medkova*, defended a PhD thesis entitled “Substitutive sequences and their properties” written under the supervision of Edita Pelantova. In December *Antonın Hoskovec* defended a PhD thesis entitled “Information transfer for multiple excitations” written under supervision of Igor Jex.
5. *Visitors*: This year was particular, the pandemic restrictions prevented most of the planned visits. On the other hand, a larger number of colleagues from abroad participated in our online activities.

## Publications

1. *Research papers*: there were 72 journal papers published, of which 47 of this year while 25 were accepted earlier and published in 2019. In addition there were 11 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.* and *J. Math. Sci.*, three in *Phys. Lett. A* and *Rev. Math. Phys.*, two in *Ann. Phys.*, *Eur. J. Phys. Plus*, *Eur. Phys. J. C*, *J. Math. Anal. Appl.*, *J. Math. Phys.*, *Lett. Math. Phys.*, *Mod. Phys. Lett.*, *Operators and Matrices*, *Phys. Rev. A*, *Proc. Roy. Soc. A*, and *Symmetry*, and single papers in *Ann. H. Poincare*, *Comm. PDE*, *J. Diff. Eqs*, *J. Funct. Anal.*, *J. Phys.: Cond. Mat.*, *J. Sect. Theory*, *Phys. Rev. B*, *Phys. Rev. Lett.*, and *Proc. London Math. Soc.*, and twenty four other journals.
2. *Submitted papers and proceedings contributions*: altogether 19 items, see the attached list

## Meetings

Including both held in the Doppler Institute and abroad with significant DI participation; the pandemic restrictions had an effect:

1. 29th *Student Winter School on Mathematical Physics*, Janske Lazne, January 26–February 1, 2020; 25 participants including those from Slovakia and Poland, 20 talks

2. *Quantum Mechanics of Artificial Material Structures*, Sirius Mathematics Center, Sochi, February 16–22, 2020; 30 participants from 13 countries, 29 talks
3. *Analytic and algebraic methods in physics (VA<sup>2</sup>MP)*, Prague, September 2–3, 2020, partially online; 25 participants, 12 talks

## Seminars

Five, more or less regular seminars worked:

1. *Doppler Institute Seminar*, 3 sessions in 2020 before the corona break
2. *Quantum Circle Seminar*, 11 sessions, since November fully online
3. *Combinatorial and Algebraic Structures Seminar*, 3 sessions in 2020 before the corona break
4. *MAFIA Seminar*, 9 sessions, in the fall online
5. A *microseminar* on quantum theory and related topics and methods, one sessions before the corona break

## Václav Votruba Prize

In the eighteens year of competition for the best PhD thesis in theoretical physics the award went to *Arman Tursunov* from the Silesian University in Opava for the work *Astrophysical processes in the field of compact objects*. The jury also gave honourable mentions to Luca Buoninfante, Armin Tavakoli and Jakub Vošmera..

Prague, December 31, 2020



Pavel Exner  
DI Scientific Director