# Doppler Institute

*for Mathematical Physics and Applied Mathematics*

# 2022 List of Publications

## Attachment: a list of publications

### (a) Research papers in journals

#### (a1) Papers accepted and published in 2022

1. Marzieh Baradaran, Pavel Exner: Kagome network with vertex coupling of a preferred orientation, *J. Math. Phys.* **63** (2022), 083502
2. Marzieh Baradaran, Pavel Exner, Jiří Lipovský: Magnetic ring chains with vertex coupling of a preferred orientation, *J. Phys. A: Math. Theor.* **55** (2022), 375203
3. Marzieh Baradaran, Pavel Exner, Miloš Tater: Spectrum of periodic chain graphs with time-reversal non-invariant vertex coupling, *Ann. Phys.* **443** (2022), 168992
4. Denis I. Borisov: Analyticity of resolvents of elliptic operators on quantum graphs with small edges, *Advances in Mathematics* **397** (2022), 108125
5. Denis I. Borisov, Jan Kříž: Operator estimates for non-periodically perforated domains with Dirichlet and nonlinear Robin conditions: vanishing limit, *Anal. Math. Phys.* **13** (2023), 5
6. Miguel Castillo-Celeita, Vít Jakubský, Kevin Zelaya: Form-preserving Darboux transformations for $4 \times 4$ Dirac equation, *Eur. J. Phys. Plus* **137** (2022), 389
7. Jaroslav Dittrich: Measurement of a quantum particle position at two distant locations, *Acta Polytechnica* **62** (2022), 445–450

8. Francesco Dolce, Ľubomíra Dvořáková, Edita Pelantová: On balanced sequences and their critical exponent, *Theoret. Comput. Sci.* **939** (2023), 18–47
9. Francesco Dolce, Edita Pelantová: On morphisms preserving palindromic richness, *Fundamenta Informaticae* **185** (2022), 1–25
10. Ľubomíra Dvořáková, Daniela Opočenská, Edita Pelantová, Arseny M. Shur: On minimal critical exponent of balanced sequences, *Theoret. Comput. Sci.* **922** (2022), 158–169
11. Pavel Exner: Soft quantum waveguides in three dimensions, *J. Math. Phys.* **63** (2022), 042103
12. Pavel Exner: Magnetic transport in laterally coupled layers, *Physica Scripta* **97** (2022), 104004
13. Pavel Exner, Markus Holzmann: Dirac operator spectrum in tubes and layers with a zigzag type boundary, *Lett. Math. Phys.* **112** (2022), 102
14. Pavel Exner, Shu Nakamura, Yukihide Tadano: Continuum limit of the lattice quantum graph Hamiltonian, *Lett. Math. Phys.* **112** (2022), 83
15. Joshua Feinberg, Miloslav Znojil: Which metrics are consistent with a given pseudo-hermitian matrix? *J. Math. Phys.* **63** (2022), 013505
16. Craig S. Hamilton, Regina Kruse, Sonja Barkhofen, Stephen M. Barnett, Igor Jex, Christine Silberhorn: Quantum state creation in nonlinear waveguide arrays, *Phys. Rev.* **A105** (2022), 042622
17. Somayyeh Hassanabadi, Jan Kříž, Bekir Can Lüftüoglu, Hassan Hassanabadi: Relativistic solutions of generalized-Dunkl harmonic and anharmonic oscillators, *Physics Scripta* **97** (2022) 125305
18. Lukáš Heriban, Matej Tušek: Non-self-adjoint relativistic point interaction in one dimension, *J. Math. Anal. Appl.* **516** (2022), 126535
19. Vít Jakubský, Sengul Kuru, Javier Negro: Dirac fermions in armchair graphene nanoribbons trapped by electric quantum dots, *Phys. Rev.* **B105** (2022), 165404
20. Vít Jakubský, Kevin Zelaya: Landau levels and snake states of pseudospin-1 Dirac-like electrons in gapped Lieb lattices, *J. Phys: Cond. Mat. 35* (2023), 025302
21. Kimet Jusufi, Hassan Hassanabadi, Parisa Sedaghatnia, Jan Kříž, Wong Sang Chung, Hao Chen, Zi-Long Zhao, Zhen Wen Long: Thermodynamics and shadow images of charged black holes in Hořava-Lifshitz gravity, *Eur. J. Phys. Plus* **137** (2022), 1147

22. Ayman Kachmar, Vladimir Lotoreichik: On the isoperimetric inequality for the magnetic Robin Laplacian with negative boundary parameter, *J. Geom. Anal.* **32** (2022), 182
23. Andrii Khrabustovskyi, Michael Plum: Operator estimates for homogenization of the Robin Laplacian in a perforated domain, *J. Diff. Eqs* **338** (2022), 474–517
24. Vladimir Lotoreichik: An isoperimetric inequality for the perturbed Robin bi-Laplacian in a planar exterior domain, *J. Diff. Eqs* **335** (2023), 285–313
25. Antonella Marchesiello, Libor Šnobl: Pairs of commuting quadratic elements in the universal enveloping algebra of Euclidean algebra and integrals of motion, *J. Phys. A: Math. Theor.* **55** (2022)
26. Jan Mareš, Jaroslav Novotný, Martin Štefaňák, Igor Jex: Key graph properties affecting transport efficiency of flip-flop Grover percolated quantum walks, *Phys. Rev.* **A105** (2022), 062417
27. Atilla Portik, Orsolya Kálmán, Igor Jex, Tamás Kiss: Iterated $n$th order nonlinear quantum dynamics with mixed initial states, *Phys. Lett.* **A431** (2022), 127999
28. Iveta Semorádová, Petr Siegl: Diverging eigenvalues in domain truncations of Schrödinger operators with complex potentials, *SIAM J. Math. Anal.* **54** (2022), 5064–5101
29. Mehtab Singh, Jan Kříž, M.M. Kamruzzaman, Dhasarthan Vigneswaran, Abhishek Sharma, Somia A. Abd El-Mottaleb: Design of a high-speed OFDM-SAC-OCDMA-based FSO system using EDW codes for supporting 5G data services and smart city applications, *Frontiers in Physics* **2022** (2022), 934848
30. Pavel Šťovíček: A family of orthogonal polynomials corresponding to Jacobi matrices with a trace class inverse, *J. Approx. Theory* **279** (2022), 105769
31. Miloslav Znojil: Confluences of exceptional points and a systematic classification of quantum catastrophes, *Scientific Reports* **12** (2022), 3355
32. Miloslav Znojil: Feasibility and method of multi-step Hermitization of crypto-Hermitian quantum Hamiltonians, *Eur. J. Phys. Plus* **137** (2022), 335

33. Miloslav Znojil: Wheeler-DeWitt equation and the applicability of crypto-Hermitian interaction representation in quantum cosmology, *Universe* **8** (2022), 385
34. Miloslav Znojil: Factorized Hilbert-space metrics and non-commutative quasi-Hermitian observables, *EPL* **139** (2022), 32001
35. Miloslav Znojil: Interference of non-Hermiticity with Hermiticity at exceptional points, *Mathematics* **10** (2022), 3721
36. Miloslav Znojil: Hybrid form of quantum theory with non-Hermitian Hamiltonians, *Phys. Lett.* **A457** (2023), 128556
37. Miloslav Znojil, Denis I. Borisov: Arnold's potentials and quantum catastrophes II, *Ann. Phys.* **442** (2022), 168896

**(a2) Accepted earlier, published in 2022, or shortly before**

1. Diana Barseghyan, Baruch Schneider, Ly Hong Hai: Dirichlet-type problems for certain Beltrami equations, *Mediterranean Journal of Mathematics* **19** (2022), 126
2. Jussi Behrndt, Andrii Khrabustovskyi: Construction of self-adjoint differential operators with prescribed spectral properties, *Math. Nachr.* **295** (2022), 1063–1095
3. Miguel Castillo-Celeita, Vít Jakubský, Kevin Zelaya: Confinement in bilayer graphene via intra- and inter-layer interactions, *J. Phys. A: Math. Theor.* **55** (2022), 035202
4. Pavel Exner, Vladimir Lotoreichik: Spectral optimization for Robin Laplacian on domains admitting parallel coordinates, *Math. Nachr.* **295** (2022), 1163–1173
5. Vít Jakubský, Kevin Zelaya: Coupled system of Dirac fermions with different Fermi velocities via composites of SUSY operators, *Phys. Lett.* **A435** (2022), 128053
6. Vladimír Ježek, Jiří Lipovský: Application of quotient graph theory to three-edge star graphs, *Acta Phys. Polonica A* **A104** (2021), 514-524
7. Christos Koukouvinos, Angeliki Lappa, Marilena Mitrouli, Paraskevi Roupa, Ondřej Turek: Numerical methods for estimating the tuning parameter in penalized least squares problems, *Comm. Statist. Simul. Comput.* **51** (2022), 1542–1563

8. Zuzana Masáková, Tomáš Vávra, Francesco Veneziano: Finiteness and periodicity of continued fractions over quadratic number fields, *Bull. Soc. Math. France* **150** (2022), 77–109
9. Miloslav Znojil: Displaced harmonic oscillator $V \sim \min[(x+d)^2, (x-d)^2]$ as a benchmark double-well quantum model, *Quantum Reports* **4** (2022), 309–323

## (b) Accepted for publication in 2022

1. Jussi Behrndt, Vladimir Lotoreichik, Peter Schlosser: Optimization of the lowest eigenvalue for the Schrödinger operator with a $\delta$-potential supported on a hyperplane, *Oper. Theory Adv. Appl.*, to appear
2. Denis I. Borisov, Pavel Exner: Approximation of point interactions by geometric perturbations in two-dimensional domains, *Bull. Math.Sci.* (2022), 2250003, online ready
3. Biagio Cassano, Vladimir Lotoreichik, Albert Mas, Matěj Tušek: General $\delta$-shell interactions for the two-dimensional Dirac operator: self-adjointness and approximation, *Rev. Math. Iberoam.*, to appear
4. Goce Chadzitaskos: An asymmetric harmonic oscillator, *Proceedings of the Workshop on Geometric Methods in Physics 2022*, Birkhäuser, to appear
5. Wong Sang Chung, Hassan Hassanabadi, Bekir Can Lüftüoglu, Jan Kříž: Conformable fractional wave equation and conformable fractional KdV equation from the ordinary Newton equation with deformed translational symmetry, *Waves in Random Media*, to appear
6. Ľubomíra Dvořáková, Daniela Opočenská, Edita Pelantová: On minimal critical exponent of balanced sequences, *Mathematics in Computation*, to appear
7. Pavel Exner, Jiří Lipovský: Spectral transition model with the general contact interaction, in *From Complex Analysis to Operator Theory: A Panorama. In Memory of Sergey Naboko* (M. Brown, F. Gesztesy, P. Kurasov, A. Laptev, B. Simon, G. Stolz, and I. Wood, eds.), to appear
8. Dale Frymark, Vladimir Lotoreichik: Self-adjointness of the 2D Dirac operator with singular interactions supported on star-graphs, *Ann. H. Poincaré*, to appear
9. Antonín Hoskovec, Igor Jex: Dynamical decoupling and NNN discrete quantum networks, *Int. J. Quant. Inf.*, to appear

10. Dirk Hundertmark, Michal Jex, Markus Lange: Quantum systems at the brink, *Springer INdAM Series*, to appear
11. Michal Jex, Mathiew Lewin, Peter S. Madsen: Classical density functional theory: representability and universal bounds, *J. Stat. Phys.*, to appear

## (c) Submitted in 2022, not yet accepted

1. Diana Barseghyan, Pavel Exner: Spectral estimates for Dirichlet Laplacian on spiral-shaped regions, `arXiv:2206.14058 [math.SP]`
2. Jussi Behrndt, Markus Holzmann, Matej Tušek: Two-dimensional Dirac operators with general $\delta$-shell interactions supported on a straight line, `arXiv:2208.12761 [math-ph]`
3. Emily Blasten, Pavel Exner, Hiroshi Isozaki, Matti Lassas, Jinpeng Lu: Inverse problems for locally perturbed lattices - Discrete Hamiltonian and quantum graph, `arXiv:2202.00944 [math-ph]`
4. Biagio Cassano, Vladimir Lotoreichik: Self-adjointness for the MIT bag model on an unbounded cone, `arXiv:2201.08192 [math.AP]`
5. Émilie Charlier, Celia Cisternino, Zuzana Masáková, Edita Pelantová: Spectrum, algebraicity and normalization in alternate bases, `arXiv:2202.03718 [math.CO]`
6. Ľubomíra Dvořáková: String attractors of episturmian sequences, `arXiv:2211.01660 [math.CO]`
7. Ľubomíra Dvořáková, Edita Pelantová: An upper bound on asymptotic repetitive threshold of balanced sequences via colouring of the Fibonacci sequence, `arXiv:2211.11877 [math.CO]`
8. Pavel Exner, Sylwia Kondej, Vladimir Lotoreichik: Bound states of weakly deformed soft waveguides, `arXiv:2211.0198 [math.SP]`
9. Izabella Ingrid Farkas, Edita Pelantová, Milena Svobodová: From positional representation of numbers to positional representation of vectors, *preprint CTU 2022*
10. Md Fazlul Hoque, Libor Šnobl: Family of nonstandard integrable and superintegrable classical Hamiltonian systems in non-vanishing magnetic fields, `arXiv:2212.05338 [math-ph]`
11. Miroslav Korbelář, Jiří Tolar: Clifford group is not a semidirect product in dimensions N divisible by four, *preprint CTU 2022*

12. David Krejčiřík, Vladimir Lotoreichik: Quasi-conical domains with embedded eigenvalues, arXiv:2205.08172 [math.AP]
13. Ondřej Kubů, Libor Šnobl: Cylindrical first order superintegrability with complex magnetic fields, arXiv:2212.04141 [math-ph]
14. Jana Lepšová, Edita Pelantová, Štěpán Starosta: On a faithful representation of Sturmian morphisms, arXiv:2203.003735 [math.CO]
15. Etsuo Segawa, Shoko Koyama, Norio Konno, Martin Štefaňák: Survival probability of the Grover walk on the ladder graph, arXiv:2205.13188 [quant-ph]
16. Martin Štefaňák: Survival probability of the Grover walk on the ladder graph, arXiv:2212.00540 [quant-ph]
17. Daniel Štěrba, Jaroslav Novotný, Igor Jex: Asymptotic phase-locking and synchronization in two-qubit systems, arXiv:2210.07320 [quant-ph]