

Doppler Institute

for Mathematical Physics and Applied Mathematics

2020 List of Publications

(a) Research papers in journals

(a1) Accepted and published in 2020

1. Petr Ambrož, Zuzana Masáková, Edita Pelantová: Morphisms generating antipalindromic words, *Eur. J. Combin.* **89** (2020), 103160
2. Houcine Aounallah, Bekir Can Luftuoglu, Jan Kříž, Hassan Hassana-badi: Thermal properties of a two-dimensional Duffin-Kemmer-Petiau oscillator under an external magnetic field in the presence of a minimal length, *Mod. Phys. Lett.* **35** (2020), 2050278
3. Marzieh Baradaran, Pavel Exner, Miloš Tater: Ring chains with vertex coupling of a preferred orientation, *Rev. Math. Phys.* **32** (2020), 2060005
4. Sébastien Bertrand, Ondřej Kubů and Libor Šnobl: On superintegrability of 3D axially-symmetric non-subgroup-type systems with magnetic fields, *J. Phys. A: Math. Theor.* **54** (2021), 015201
5. Raymond F. Bishop, Miloslav Znojil: Non-Hermitian coupled cluster method for non-stationary systems and its interaction-picture reinterpretation, *Eur. Phys. J. Plus* **135** (2020), 374
6. Denis I. Borisov: Perturbations of the continuous spectrum of a certain nonlinear two-dimensional operator sheaf, *J. Math. Sci.* **252** (2021), 135–146
7. Denis I. Borisov, Anastasia M. Golovina: On finitely many resonances emerging under distant perturbations in multi-dimensional cylinders, *J. Math. Anal. Appl.* **496** (2021), 124809
8. Denis I. Borisov, Anastasia M. Golovina, A.I. Mukhametrakhimova: Analytic continuation of resolvents of elliptic operators in a multidimensional cylinder, *J. Math. Sci.* **250** (2020), 260–284

9. Denis I. Borisov, A.I. Mukhametrakhimova: On a model graph with a loop and small edges. Holomorphy property of resolvent, *J. Math. Sci.* **251** (2020), 573–601
10. Denis Borisov, Oskar Sultanov: Asymptotic analysis of mean exit time for dynamical systems with a single well potential, *J. Diff. Eqs* **269** (2020), 78–116
11. Denis I. Borisov, Oskar A. Sultanov: Complete asymptotics for solution of singularly perturbed dynamical systems with single well potential, *Mathematics* **8** (2020), 949
12. Philippe Briet, Jaroslav Dittrich, David Krejčířík: Spectrum absolute continuity in a twisted Dirichlet-Neumann waveguide, *J. Math. Phys.* **61** (2020), 013503
13. Biagio Cassano, Orif O. Ibrogimov, David Krejčířík, František Štampach: Location of eigenvalues of non-self-adjoint discrete Dirac operators, *Ann. Henri Poincaré* **21** (2020), 2193–2217
14. Won Sang Chung, Hassan Hassanabadi, Jan Kříž: Even and odd coherent states of Wigner algebra, *Int. J. Theor. Phys.* **59** (2020), 2924–2938
15. Alonso Contreras-Astorga, Francisco Correa, Vít Jakubský: Super-Klein tunneling of Dirac fermions through electrostatic gratings in graphene, *Phys. Rev.* **B102** (2020), 115429
16. Alonso Contreras-Astorga, Vít Jakubský: Multimode two-dimensional PT -symmetric waveguides, *J. Phys.: Conf. Ser.* **1540** (2020), 012018
17. Alonso Contreras-Astorga, Vít Jakubský, Alfredo Raya: On the propagation of Dirac fermions in graphene with the strain-induced inhomogeneous Fermi velocity, *J. Phys.: Cond. Matt.* **32** (2020), 295301
18. Jaroslav Dittrich: Scattering of particles bounded to infinite planar curve, *Rev. Math. Phys.* **32** (2020), 2050029
19. Ľubomíra Dvořáková, Kateřina Medková, Edita Pelantová: Complementary symmetric Rote sequences: the critical exponent and the recurrence function, *Discr. Math. & Theor. Comp. Sci.* **22** (2020), 20
20. Pavel Exner: Spectral properties of soft quantum waveguides, *J. Phys. A: Math. Theor.* **53** (2020), 355302
21. Pavel Exner, Jiří Lipovský: Topological bulk-edge effects in quantum graph transport, *Phys. Lett.* **A384** (2020), 126390
22. Pavel Exner, Miloš Tater: Spectral properties of spiral-shaped quantum waveguides, *J. Phys. A: Math. Theor.* **53** (2020), 505303

23. Nasrin Farahani, Hassan Hassanabadi, Jan Kříž, Won Sang Chung, Saber Zarrinkamar: DSR-GUP black hole based on COW experiment and Einstein-Bohr's photon box, *European Physical Journal C* **80** (2020), 696
24. Pedro Freitas, Jiří Lipovský: The determinant of one-dimensional polyharmonic operators of arbitrary order, *J. Funct. Anal.* **279** (2020), 108783
25. Tomáš Kalvoda, David Krejčířík, Kateřina Zahradová: Effective quantum dynamics on the Möbius strip, *J. Phys. A: Math. Theor.* **53** (2020), 375201
26. Tomáš Kalvoda, František Štampach: New family of symmetric orthogonal polynomials and a solvable model of a kinetic spin chain, *J. Math. Phys.* **61** (2020), 103305
27. D. Kishore Kumara, Jan Loskot, Jan Kříž, Nick Bennett, Hari M. Upadhyaya, Veera Sadhu, Ch. Venkata Reddy, Kakarla Raghava Reddy: Synthesis of SnSe quantum dots by successive ionic layer adsorption and reaction (SILAR) method for efficient solar cells applications, *Solar Energy* **199** (2020), 570–574
28. Bálint Kollár, András Gilyén, Iva Tkáčová, Tamás Kiss, Igor Jex, Martin Štefanák: Complete classification of trapping coins for quantum walks on the 2D square lattice, *Phys. Rev.* **A102** (2020), 012207
29. Bekir Can Luftuoglu, Parisa Sedaghatnia, Jan Kříž, Hassan Hassanabadi: The generalized Klein-Gordon oscillator in a cosmic space-time with a space-like dislocation and the Aharonov-Bohm effect, *European Physical Journal Plus* **135** (2020), 691
30. Antonella Marchesiello, Libor Šnobl: Classical superintegrable systems in a magnetic field that separate in Cartesian coordinates, *SIGMA* **16** (2020), 015
31. Jan Mareš, Jaroslav Novotný, Martin Štefanák, Igor Jex: Counterintuitive role of geometry in transport by quantum walks, *Phys. Rev.* **A101** (2020), 032113
32. Kateřina Medková, Edita Pelantová, Élise Vandomme: On non-repetitive complexity of Arnoux-Rauzy words, *Discrete Applied Mathematics* **285** (2020), 485–472
33. Thomas Nitsche, Syamsundar De, Sonja Barkhofen, Evan Meyer-Scott, Johannes Tiedau, Jan Sperling, Aurél Gábris, Igor Jex, Christine Sil-

- berhorn: Local versus global two-photon interference in quantum networks, *Phys. Rev. Lett.* **213** (2020), 213604
34. Sara Rahmani, Hassan Hassanabadi, Jan Kříž: Nonleptonic $\Lambda_b \rightarrow \Lambda_c$ transitions in a potential quark model, *European Physical Journal C* **80** (2020), 636
 35. Pawel Świsłowski, Jan Kříž, Małgorzata Rajfur: The use of bark in biomonitoring: heavy metal pollution of forest areas on the example of selected areas in Poland, *Ecological Chemistry and Engineering* **27** (2020), 195–210
 36. Matěj Tušek: Approximation of one-dimensional relativistic point interactions by regular potentials revised, *Lett. Math. Phys.* **110** (2020), 2585–2601
 37. Sławomir Wierzba, Agnieszka Dolhanczuk-Sródka, Jan Kříž: Optimization of the sorption process of copper cations from aqueous solution by pine bark (*Pinus sylvestris*), *Desalination and Water Treatment* **186** (2020), 258–266
 38. Miloslav Znojil: Arnold’s potentials and quantum catastrophes *Annals of Physics* **413** (2020), 168050
 39. Miloslav Znojil: Using five-Hilbert-space reformulation of unitary Quantum Mechanics, *Entropy* **22** (2020), 000080
 40. Miloslav Znojil: Passage through exceptional point: case study, *Proc. Roy. Soc.* **A476** (2020), 20190831
 41. Miloslav Znojil: Polynomial potentials and coupled quantum dots in two and three dimension, *Annals of Physics* **416** (2020), 168161
 42. Miloslav Znojil: Supersymmetry and exceptional points, *Symmetry* **12** (2020), 892
 43. Miloslav Znojil: Relocalization switch in a triple quantum dot molecule in 2D, *Modern Physics Letters* **B34** (2020), 2050378
 44. Miloslav Znojil, Denis I. Borisov: Anomalous mechanisms of the loss of observability in non-Hermitian quantum models, *Nuclear Physics* **B957** (2020), 115064
 45. Miloslav Znojil: Perturbation theory near degenerate exceptional points, *Symmetry* **12** (2020), 1309
 46. Miloslav Znojil: Unitary unfoldings of Bose-Hubbard exceptional point with and without particle number conservation, *Proc. Roy. Soc.* **A476** (2020), 20200292

47. Miloslav Znojil: Quantum phase transitions in nonhermitian harmonic oscillator, *Scientific Reports* **10** (2020), 18523

(a2) Accepted earlier, published in 2020, or shortly before

1. Diana Barseghyan, Pavel Exner: Spectral geometry in a rotating frame: properties of the ground state, *J. Math. Anal. Appl.* **489** (2020), 124130
2. Diana Barseghyan, Baruch Schneider: Eigenvalue bound for Schroedinger operators with unbounded magnetic field, *Rep. Math. Phys.* **85** (2020), 239–251
3. Diana Barseghyan, Françoise Truc: A Lieb–Thirring type inequality for magnetic Schrödinger operators with a radial symmetry, *Operator Theory: Advances and Applications* **276** (2020), 154–161
4. Jussi Behrndt, Pavel Exner, Markus Holzmann, Vladimir Lotoreichik: The Landau Hamiltonian with δ potentials supported on curves, *Rev. Math. Phys.* **32** (2020), 2050010
5. Denis I. Borisov: Elliptic operators in multidimensional cylinders with frequently alternating boundary conditions along a given curve, *J. Math. Sci.* **244** (2020), 378–389
6. Denis I. Borisov: Elliptic operators in multidimensional cylinders with frequently alternating boundary conditions along a given curve, *J. Math. Sci.* **244** (2020), 378–389
7. Denis I. Borisov, Giuseppe Cardone: Spectra of operator pencils with small \mathcal{PT} -symmetric periodic perturbation, *ESAIM: Control, Optimization and Calculus of Variation* **26** (2020), 21
8. Denis I. Borisov, Pavel Exner: Gap opening in two-dimensional periodic systems, *Commun. Contemp. Math.* **23** (2021), 1950080
9. Denis I. Borisov, Dmitry A. Zezyulin: Sequences of closely spaced resonances and eigenvalues for bipartite complex potentials, *Appl. Math. Lett.* **100** (2020), 106049
10. Philippe Briet, Hamza Abdou Soimadou, David Krejčířík: Spectral analysis of sheared nanoribbons, *ZAMP* **70** (2019), 48
11. Biagio Cassano, Vladimir Lotoreichik: Self-adjoint extensions of the two-valley Dirac operator with discontinuous infinite mass boundary conditions, *Operators and Matrices* **14** (2020), 667–678

12. Biagio Cassano, Fabio Pizzichillo, Luis Vega: A Hardy-type inequality and some spectral characterizations for the Dirac-Coulomb operator, *Rev. Mat. Complutense* **33** (2020), 1–18
13. Lucrezia Cossetti, David Krejčířík: Absence of eigenvalues of non-self-adjoint Robin Laplacians on the half-space, *Proc. London Math Soc.* **121** (2020), 584–616
14. Pavel Exner: Spectral optimization for singular Schrödinger operators, *Operators and Matrices* **14** (2020), 705–716
15. Pavel Exner: Singular Schrödinger operators and Robin billiards. Spectral properties and asymptotic expansions, *Afrika Matematika* **31** (2020), 71–88
16. Pavel Exner, Sylwia Kondej: Spectral optimization for strongly singular Schrödinger operators with a star-shaped interaction, *Lett. Math. Phys.* **110** (2020), 735–751
17. Pavel Exner, Vladimir Lotoreichik: Spectral asymptotics of the Dirichlet Laplacian on a generalized parabolic layer, *Int. Eqs Operator Theory* **92** (2020), 15
18. Luca Fanelli, David Krejčířík, Ari Laptev, Luis Vega: On the improvement of the Hardy inequality due to singular magnetic fields, *Comm. PDE* **45** (2020), 1202–1212
19. Felix Fournier, Libor Šnobl, Pavel Winternitz: Cylindrical type integrable classical systems in a magnetic field, *J. Phys. A: Math. Theor.* **53** (2020), 085203
20. Christos Koukouvinos, Marilena Mitrouli, Ondřej Turek: Efficient estimates in regression models with highly correlated covariates, *J. Comp. Appl. Math.* **373** (2020), 112416
21. David Krejčířík, Vladimir Lotoreichik: Optimisation of the lowest Robin eigenvalue in the exterior of a compact set, II: non-convex domains and higher dimensions, *Potential Anal.* **52** (2020), 601–614
22. Kateřina Medková, Edita Pelantová, Laurent Vuillon: Derivated sequences of complementary symmetric Rote sequences, *RAIRO: Theor. Inf. Appl.* **53** (2019), 125–151
23. Radek Novák, Xue Ping Wang: On the Kramers-Fokker-Planck equation with decreasing potentials in dimension one, *J. Spect. Theory* **10** (2020), 1–32

24. Jaroslav Novotný, Jan Mareš, Igor Jex: Quantum walk transport on carbon nanotube structures, *Phys. Lett.* **A384** (2020), 126302
25. David J. Stonner, Jaroslav Kysela, Graeme Weir, Jaroslav Novotný, Gernot Alber, Igor Jex: Deterministic twirling with low resources, *Phys. Lett.* **A384** (2020), 126179

(b) Accepted for publication in 2020

1. Petr Ambrož, Zuzana Masáková: Description of Voronoi tiles in quasicrystals with 8-fold symmetry, *J. Phys.: Conf. Ser.*, to appear
2. Pedro R.S. Antunes, Rafael D. Benguria, Vladimir Lotoreichik, Thomas Ourmieres-Bonafos: A variational formulation for Dirac operators in bounded domains. Applications to spectral geometric inequalities, *Commun. Math. Phys.*, to appear; [arXiv:2003.04061](#) [math.SP]
3. Diana Barseghyan, Pavel Exner: Magnetic field influence on the discrete spectrum of locally deformed leaky wires, *Rep. Math. Phys.* **87** (2021), to appear; [arXiv:2006.03877](#) [math.SP]
4. Juan Bory Reyes, Diana Barseghyan, Baruch Schneider: Dirichlet-type problems for certain Beltrami equations, *Mediterranean Journal of Mathematics*, to appear
5. Pavel Exner, Takashi Ichinose: Note on a product formula related to quantum Zeno dynamics, *Ann. H. Poincaré*, to appear
6. Pavel Exner, Vladimir Lotoreichik: Spectral optimization for Robin Laplacian on domains admitting parallel coordinates, *Mathematische Nachrichten*, to appear; [arXiv:2001.02718](#) [math.SP]
7. Dale Frymark, Constanze Liaw: Perspectives on general left-definite theory, *Operator Theory: Advances and Applications*, to appear; [arXiv:2012.01014](#) [math.SP]
8. David Krejčířík, Vladimir Lotoreichik, Konstantin Pankrashkin, Matěj Tušek: Spectral analysis of the multi-dimensional diffusion operator with random jumps from the boundary, *Journal of Evolution Equations*, to appear; [arXiv:2006.14392](#) [math.SP]
9. Vladimir Lotoreichik, Alessandro Michelangeli: Faber-Krahn inequalities for Schrödinger operators with point and with Coulomb interactions, *J. Math. Phys.*, to appear; [arXiv:2005.07561](#) [math.SP]
10. Zuzana Masáková, Jan Mazáč: Pentagonal quasicrystals and their linear self-similarities, *J. Phys.: Conf. Ser.*, to appear

11. Zuzana Masáková, Jan Mazáč, Edita Pelantová: On generalized self-similarities of cut-and-project sets, *Linear Algebra and Applications*, to appear; [arXiv:1909.10753](#) [math-ph]

(c) Other papers, published and accepted in 2020, or shortly before

1. Ľubomíra Dvořáková, Francesco Dolce, Edita Pelantová: On balanced sequences and their asymptotic critical exponent, in *LNCS proceedings to the conference LATA 2020 & 2021*, to appear
2. Pavel Exner: Schrödinger operators with a switching effect, in *Mathematical Modelling, Optimization, Analytic and Numerical Solutions* (P. Manchanda, R.P. Lozi, A.H. Siddiqi, eds.), Springer, Singapore 2020; pp.13–31
3. Pavel Exner Dirac operators with a delta-shell interaction, in Proceedings of the International Bogolyubov Conference ‘Problems of Theoretical and Mathematical Physics’ (Moscow and Dubna 2019), *Physics of Particles and Nuclei* **51** (2020), 405–409
4. Maryna Nesterenko, Severín Pošta: Contractions of realizations, in ‘Lie Theory and Its Applications in Physics’ (V. Dobrev, ed.), Springer Proceedings in Mathematics & Statistics 335, Singapore 2020; pp. 447–453.
5. Miloslav Znojil: Three-Hilbert-space formulation of quantum theory: unitary evolution via non-Hermitian Hamiltonians, in ‘Topics in Mathematical Physics, Quantum Physics and Path Integrals’ (A. Bounames, A. Makhlof, eds.), ISTE-Wiley Editions, 2021; pp. 79–126.

(d) Submitted in 2020, not yet accepted

1. Petr Ambrož, Zuzana Masáková, Edita Pelantová: Lattice bounded distance equivalence for 1D Delone sets with finite local complexity, [arXiv:2010.03884](#) [math.CO]
2. Denis I. Borisov, Pavel Exner: Approximation of point interactions by geometric perturbations in two-dimensional domains, [arXiv:2008.00478](#) [math-ph]

3. Michael Bush, Dale Frymark, Constanze Liaw: Singular boundary conditions of Sturm-Liouville operators via perturbation theory, [arXiv:2011.03388](#) [[math.SP](#)]
4. Goce Chazitaskos, Miloslav Havlíček, Jiří Patera: Orthonormal bases on $L^2(\mathbb{R}^+)$, [arXiv:2004.00106](#) [[math.FA](#)]
5. Monique Dauge, Michal Jex, Vladimir Lotoreichik: Trace Hardy inequality for the Euclidean space with a cut and its applications, [arXiv:2011.14712](#) [[math.AP](#)]
6. Francesco Dolce, Edita Pelantová:
 On morphisms preserving palindromic richness, [arXiv:2006.12207](#) [[cd.FL](#)]
7. Pavel Exner: Quantum graphs with vertices violating the time reversal symmetry (in Russian)
8. Pavel Exner, Vladimir Lotoreichik: Optimization of the lowest eigenvalue of a soft quantum ring, [arXiv:2011.02257](#) [[math-ph](#)]
9. Sylwia Kondej, David Krejčířík, Jan Kříž: Soft quantum waveguides with an explicit cut-locus, [arXiv:2007.10946](#) [[math-ph](#)]
10. Clément Lagisquet, Edita Pelantová, Sébastien Tavenas, Laurent Vuillon: On the Markov numbers: fixed numerator, denominator, and sum conjectures, [arXiv:2010.10335](#) [[math.NT](#)]
11. Jaroslav Novotný, Angelo Mariano, Saverio Pascazio, Antonello Scardicchio, Igor Jex: Relaxation to equilibrium in a quantum network, [arXiv:2009.13657](#) [[quant-ph](#)]
12. Adrian Ortega, Thomas Gorin, Craig S. Hamilton: Quantum transport in a combined kicked rotor and quantum walk system, [arXiv:2011.11813](#) [[quant-ph](#)]
13. Olga Parshina, Mickaël Postic: Open and closed complexity of infinite words, [arXiv:2005.06254](#) [[math.CO](#)]
14. Miloslav Znojil: Non-Hermitian N-state degeneracies: unitary realizations via antisymmetric anharmonicities, [arXiv:2010.15014](#) [[quant-ph](#)]