Doppler Institute

for Mathematical Physics and Applied Mathematics

2017 List of Publications

(a) Books

1. Igor Jex, Ivan Štoll, Jiří Tolar: *Classical Theoretical Physics* (in Czech) Karolinum, Prague 2017, ISBN 978-80-246-3545-3

(b) Research papers in journals

(b1) Accepted and published in 2017

1. Bijan Bagchi, Syed M. Kamil, Tarun R. Tummuru, Iveta Semorádová, Miloslav Znojil: Branched Hamiltonians for a class of velocity dependent potentials, *J. Phys.: Conf. Ser.* **839** (2017), 012011
2. Sonja Barkhofen, Thomas Nitsche, Fabian Elster, Lennart Lorz, Aurel Gabris, Igor Jex, Christine Silberhorn: Measuring topological invariants and protected bound states in disordered discrete time quantum walks, *Phys. Rev. Lett.* **118** (2017), 020502
3. Diana Barseghyan, Pavel Exner: A magnetic version of the Smilansky-Solomyak model, *J. Phys. A: Math. Theor.* **50** (2017), 485203 (24pp)
4. Diana Barseghyan, Pavel Exner: A regular analogue of the Smilansky model: spectral properties, *Rep. Math. Phys.* **80** (2017), 177-192
5. Francisco Correa, Vít Jakubský: Confluent Crum-Darboux transformations in Dirac Hamiltonians with PT-symmetric Bragg gratings, *Phys. Rev.* **A95** (2017), 033807
6. Pavel Exner, Jiří Lipovský: Pseudo-orbit approach to trajectories of resonances in quantum graphs with general vertex coupling: Fermi rule and high-energy asymptotics, *J. Math. Phys.* **58** (2017), 042101

7. Pavel Exner, Miloš Tater: Quantum graphs with vertices of a preferred orientation, *Phys. Lett.* **A382** (2018), 283-287
8. Pavel Exner, Ondřej Turek: Quantum graphs with the Bethe-Sommerfeld property, *Nanosystems: Phys. Chem. Math.* **8** (2017), 305-309
9. Pavel Exner, Ondřej Turek: Periodic quantum graphs from the Bethe-Sommerfeld perspective, *J. Phys. A: Math. Theor.* **50** (2017), 455201 (32pp)
10. Pavel Exner, Daniel Vašata: Cantor spectra of magnetic chain graphs, *J. Phys. A: Math. Theor.* **50** (2017), 165201 (13pp)
11. Dardo Goyeneche, Ondřej Turek: Equiangular tight frames and unistochastic matrices, *J. Phys. A: Math. Theor.* **50** (2017), 245304
12. Craig S. Hamilton, Regina Kruse, Linda Sansoni, Sonja Barkhofen, Christine Silberhorn, Igor Jex: Gaussian boson sampling, *Phys. Rev. Lett.* **119** (2017), 170501
13. Vít Jakubský, Axel Pérez-Obiol: Spontaneous twisting of carbon nanotubes at finite temperatures, *Phys. Rev.* **B95** (2017), 245431
14. Vít Jakubský, Matěj Tušek: Dispersionless wave packets in graphene and other Dirac materials, *Ann. Phys.* **378** (2017), 171-182
15. David Krejčiřík, Nicolas Raymond, Julien Royer, Petr Siegl: Non-accretive Schrödinger operators and exponential decay of their eigenfunctions, *Israel J. Math.* **221** (2017), 779-802
16. Sergii Kuzhel, Miloslav Znojil: Non-self-adjoint Schroedinger operators with nonlocal one point interactions, *Banach J. Math. Anal.* **11** (2017), 923-944
17. Jiří Lipovský: Quantum graphs and their resonance properties, *Acta Phys. Slovaca* **66** (2016), 265-363
18. Vladimir Lotoreichik, Jonathan Rohleder: Eigenvalue inequalities for the Laplacian with mixed boundary conditions, *J. Diff. Eqs* **263** (2017), 491–508
19. Antonella Marchesiello, Libor Šnobl: Superintegrable 3D systems in a magnetic field corresponding to Cartesian separation of variables, *J. Phys. A: Math. Theor.* **50** (2017), 245202 (24pp)
20. Danial Saadatmand, Denis I. Borisov, Panayotis G. Kevrekidis, Kun Zhou, Sergey V. Dmitriev: Resonant interaction of $\phi(4)$ kink with PT-symmetric perturbation with spatially periodic gain/loss coefficient, *Comm. Nonlin. Sci. Num. Sim.* **56** (2018), 62-76

21. Martin Štefaňák, Iva Bezděková, Igor Jex: Limit density of 2D quantum walk: zeroes of the weight function, *Interdisc. Inform. Sci.* **23** (2017), 19–25
22. Martin Štefaňák, Stanislav Skoupý: Perfect state transfer by means of discrete-time quantum walk on complete bipartite graphs, *Quantum Inf. Process.* **16** (2017), 72
23. Olena Vaneeva, Severín Pošta: Equivalence groupoid of a class of variable coefficient Korteweg-de Vries equations, *J. Math. Phys.* **58** (2017), 101504
24. Miloslav Znojil: Bound states emerging from below the continuum in a solvable PT-symmetric discrete Schroedinger equation, *Phys. Rev.* **A86** (2017), 012127
25. Miloslav Znojil: Non-Hermitian interaction representation and its use in relativistic quantum mechanics, *Ann. Phys.* **385** (2017), 162-179
26. Miloslav Znojil, František Růžicka, Konstantin G. Zloshchastiev: Schrödinger equations with logarithmic self-interactions: from antilinear PT-symmetry to the nonlinear coupling of channels, *Symmetry* **9** (2017), 165
27. Miloslav Znojil, Iveta Semorádová, František Růžicka, Hafida Moulla, Ilhem Leghrib: The problem of coexistence of several non-Hermitian observables in PT-symmetric quantum mechanics, *Phys. Rev.* **A95** (2017), 042122

(b2) Accepted earlier, published in 2017, or shortly before

1. Pedro R.S. Antunes, Pedro Freitas, David Krejčiřík: Bounds and extremal domains for Robin eigenvalues with negative boundary parameter, *Adv. Calc. Var.* **10** (2017), 357-380
2. Jussi Behrndt, Pavel Exner, Markus Holzmann, Vladimir Lotoreichik: Approximation of Schroedinger operators with delta-interactions supported on hypersurfaces, *Math. Nachr.* **290** (2017), 1215–1248
3. Jussi Behrndt, Matthias Langer, Vladimir Lotoreichik, Jonathan Rohleder: Quasi boundary triples and semibounded self-adjoint extensions, *Proc. Roy. Soc. Edinburgh* **A147** (2017), 895–916
4. Agata Bezubik, Jiří Hrivnák, Jiří Patera, Severín Pošta: Three-variable symmetric and antisymmetric exponential functions and orthogonal polynomials, *Math. Slovaca* **67** (2017), 427-446

5. Sabine Bögli, Petr Siegl, Christiane Tretter: Approximations of spectra of Schrödinger operators with complex potentials on $\mathbb{R}^d$, *Comm. PDE* **42** (2017), 1001-1041
6. Denis I. Borisov, Sergey V. Dmitriev: Klein-Gordon model with parity-time-symmetric perturbation, *Stud. Appl. Math.* **138** (2017), 317-342
7. Denis Borisov, Pedro Freitas: The spectrum of geodesic balls on spherically symmetric manifolds, *Comm. Anal. Geom.* **25** (2017), 507-544
8. Denis I. Borisov, Francisco Hoecker-Escuti, Ivan Veselič: Expansion of the spectrum in the weak disorder regime for random operators in continuum space, *Comm. Cont. Math.* **20** (2018), 1750008
9. Denis I. Borisov, Miloslav Znojil: On eigenvalues of a PT-symmetric operator in a thin layer, *Sbornik Math.* **208** (2017), 173–199
10. Pavel Exner, Vladimir Lotoreichik: A spectral isoperimetric inequality for cones, *Lett. Math. Phys.* **107** (2017), 717-732
11. Pavel Exner, Vladimir Lotoreichik, Miloš Tater: Spectral and resonance properties of Smilansky Hamiltonian, *Phys. Lett.* **A381** (2017), 756-761
12. Pavel Exner, Stěpan Manko: Spectral properties of magnetic chain graphs, *Ann. H. Poincaré* **18** (2017), 929-953
13. Pedro Freitas, Jiří Lipovský: Eigenvalue asymptotics for the damped wave equation on metric graphs, *J. Diff. Eq.* **263** (2017), 2780–2811
14. Aleksey S. Kostenko, Mark M. Malamud, Hagen Neidhardt, Pavel Exner: Infinite quantum graphs (in Russian), *Doklady AN* **472** (2017), 253-258
15. Jan Kříž, Jan Loskot, Vladimír Štěpánek, Lidmila Hyšplerová, Daniel Jezbera, Lucie Trnková, Agnieszka Dolhańczuk-Śródka, Zbigniew Ziembik, Malgorzata Rajfur, Andrzej Klos, Maria Waclawek: Modelling of mercury emissions from large solid fuel combustion and biomonitoring in CZ-PL border region, *Ecol. Chem. Eng.* **S2**3 (2016), 593-604
16. Vladimir Lotoreichik, Petr Siegl: Spectra of definite type in waveguide models, *Proc. AMS* **145** (2017), 1231-1246
17. Boris Mityagin, Petr Siegl, Joe Viola: Differential operators admitting various rates of spectral projection growth, *J. Funct. Anal.* **272** (2017), 3129-3175
18. Petr Siegl, František Štampach: Factorization of the characteristic function of a Jacobi matrix, *Operators and Matrices* **11** (2017), 901-928

19. Jan Šlégr, Kamila Váňová: Stochastic properties of lower ionosphere as earthquake precursor, *J. Seismol.* **21** (2017), 243-248
20. František Štampach, Pavel Štovíček: Factorization of the characteristic function of a Jacobi matrix, *Operators and Matrices* **11** (2017), 147-169
21. Pavel Štovíček: The heat kernel for two Aharonov-Bohm solenoids in a uniform magnetic field, *Ann. Phys.* **376** (2017), 254-282
22. Olena Vaneeva, Severín Pošta, Christodoulos Sophocleous: Enhanced group classification of Benjamin-Bona-Mahony-Burgers equations, *Appl. Math. Lett.* **65** (2017), 19-25
23. Konstantin G. Zloshchastiev, Miloslav Znojil: Logarithmic wave equation: origins and applications, *Visnyk Dnipropetrovs'kogo universytetu. Serija Fizyka, radioelektronyka* **24** (2016), 101-107

(c) Accepted for publication in 2017

1. Girish Agarwal, Roland E. Allen, Iva Bezděková, Robert W. Boyd, Goong Chen, Ronald Hanson, Dean L. Hawthorne, Philip Hemmer, Olga Kocharovskaya, Harald Losert, Moochan B. Kim, David M. Lee, Sebastian K. Lidstrom, Suzy Lidstrom, Helmut Maier, John W. Neuberger, Miles J. Padgett, Mark Raizen, Surjeet Rajendran, Ernst Rasel, Gavriil Shchedrin, Wolfgang P. Schleich, Marlan O. Scully, Gennady Shvets, Alexei Sokolov, Ronald L. Walsworth, Rainer Weiss, Frank Wilczek, Alan E. Willner, Eli Yablonovich and Nikolay Zheludev: Light, the universe, and everything — 12 Herculean tasks for quantum cowboys and black diamond skiers, *J. Mod.Optics*, to appear
2. Jussi Behrndt, Pavel Exner, Markus Holzmann, Vladimir Lotoreichik: On the spectral properties of Dirac operators with electrostatic delta-shell interactions, *J. Math. Pures Appl.*, to appear
3. Pavel Exner, Sylwia Kondej, Vladimir Lotoreichik: Asymptotics of the bound state induced by δ-interaction supported on a weakly deformed plane, *J. Math. Phys.*, to appear
4. David Krejčiřík, Vladimir Lotoreichik: Optimisation of the lowest Robin eigenvalue in the exterior of a compact set, *J. Convex Anal.* (2018), to appear
5. David Krejčiřík, Vladimir Lotoreichik, Thomas Ourmières-Bonafos: Spectral transitions for Aharonov-Bohm Laplacians on conical layers, *Proc. Roy. Soc. Edinburgh A* (2018), to appear

6. David Krejčiřík, Nicolas Raymond, Julien Royer, Petr Siegl: Reduction of dimension as a consequence of norm-resolvent convergence and applications, *Mathematika*, to appear
7. Jiří Lipovský, Vladimir Lotoreichik: Asymptotics of resonances induced by point interactions, *Acta Phys. Polonica A*, to appear
8. Boris Mityagin, Petr Siegl: Local form-subordination condition and Riesz basisness of root systems, *J. d'Anal. Math.*, to appear
9. Boris Shapiro, Miloš Tater: Asymptotics and monodromy of the algebraic spectrum of quasi-exactly solvable sextic oscillator, *Experimental Math.*, to appear

(d) Other papers, published and accepted in 2017, or shortly before

1. Jussi Behrndt, Matthias Langer, Vladimir Lotoreichik: Trace formulae for Schrödinger operators with singular interactions, in *Functional Analysis and Operator Theory for Quantum Physics* (J. Dittrich, H. Kovařík, A. Laptev, eds.) EMS Publishing House, Basel 2017; pp. 129-152
2. Pavel Exner: On the spectrum of leaky surfaces with a potential bias, *Festschrift in Honor of Helge Holden's 60th Birthday*, to appear
3. Pavel Exner, Vladimir Lotoreichik: Optimization of the lowest eigenvalue for leaky star graphs, *Proceedings of the conference "Mathematical Results in Quantum Physics"* (QMath13, Atlanta 2016), to appear
4. Pedro Freitas, David Krejčiřík: A lower bound to the spectral threshold in curved quantum layers, in *Functional Analysis and Operator Theory for Quantum Physics* (J. Dittrich, H. Kovařík, A. Laptev, eds.) EMS Publishing House, Basel 2017; pp. 261-269
5. Ondřej Turek: On quantum graph filters with flat passbands, in *Functional Analysis and Operator Theory for Quantum Physics* (J. Dittrich, H. Kovařík, A. Laptev, eds.) EMS Publishing House, Basel 2017; pp. 541-563
6. Miloslav Znojil: Three-Hilbert-space formulation of quantum theory: unitary evolution via non-Hermitian Hamiltonians, in *Topics in Quantum Physics and Path Integrals* (Abdenacer Makhlouf, ed.), to appear

(e) Submitted in 2017, not yet accepted

1. Fedor Bakharev, Pavel Exner: Geometrically induced spectral effects in tubes with a mixed Dirichlet-Neumann boundary, submitted (arXiv: 1708.08068 [math.SP])
2. Diana Barseghyan, Françoise Truc: Magnetic Schrödinger operators with radially symmetric magnetic field and radially symmetric electric potential, submitted (arXiv:1711.09754 [math-ph])
3. Jussi Behrndt, Matthias Langer, Vladimir Lotoreichik, Jonathan Rohleder: Spectral enclosures for non-self-adjoint extensions of symmetric operators, submitted (arXiv:1710.07542 [math.SP])
4. Jean-Claude Cuenin, Petr Siegl: Eigenvalues of one-dimensional non-self-adjoint Dirac operators and applications, submitted (arXiv:1705.04833 [math.SP])
5. Pavel Exner, Tomáš Kalvoda, Matěj Tušek: A geometric Iwatsuka type effect in quantum layers, submitted (arXiv:1701.05714 [math-ph])
6. Pavel Exner, Sylwia Kondej: Aharonov and Bohm *vs.* Welsh eigenvalues, submitted (arXiv:1712.04897 [math.SP])
7. Pavel Exner, Aleksey Kostenko, Mark Malamud, Hagen Neidhardt: Spectral theory of infinite quantum graphs, submitted (arXiv:1705.01831 [math-ph])
8. Pavel Exner, Vladimir Lotoreichik, Axel Pérez-Obiol: On the bound states of magnetic Laplacians on wedges, submitted (arXiv:1703.03667 [math.SP])
9. Pedro Freitas, Petr Siegl, Christiane Tretter: Damped wave equation with unbounded damping, submitted
10. Natalia G. Inozemtseva, Jaroslav Dittrich, Vladimir I. Inozemtsev: On the solution to the separated equation in the 3-particle Calogero-Moser problem, submitted (arXiv:1710.08658 [math-ph])
11. Werner Kirsch, David Krejčiřík, Georgi Raikov: Lifshits tails for randomly twisted quantum waveguides, submitted (arXiv:1705.04772 [math.SP])
12. David Krejčiřík, Vladimir Lotoreichik: Optimisation of the lowest Robin eigenvalue in the exterior of a compact set, II: non-convex domains and higher dimensions, submitted (arXiv:1707.02269 [math.SP])
13. David Krejčiřík, Petr Siegl: Pseudomodes for Schrödinger operators with complex potentials, submitted (arXiv:1705.01894 [math.SP])

14. David Krejčiřík, Matěj Tušek: Location of hot spots in thin curved strips, submitted (arXiv:1709.01279 [math.AP])
15. Antonella Marchesiello, Libor Šnobl, Pavel Winternitz: Integrable 3D systems in a magnetic field corresponding to spherical separation of variables, submitted
16. Thomas Nitsche, Sonja Barkhofen, Regina Kruse, Linda Sansoni, Martin Štefanák, Aurél Gábris, Václav Potoček: Recurrence in quantum walks: probing measurement induced effects in quantum walks via recurrence, submitted
17. Radek Novák, Xue Ping Wang: On the Kramers-Fokker-Planck equation with decreasing potentials in dimension one, submitted (arXiv:1712.01660 [math.AP])
18. Jaroslav Novotný, Jiří Maryška, Igor Jex: Asymptotics of quantum Markov processes: From algebraic structure to characterization of asymptotic states, submitted (arXiv:1711.02599 [quant-ph])