Doppler Institute

for Mathematical Physics and Applied Mathematics

2016 List of Publications

(a) Research papers in journals

(a1) Accepted and published in 2016

1. Ľubomira Balková, Michelangelo Bucci, Alessandro De Luca, Jiří Hladký, Svetlana Puzynina: Aperiodic pseudorandom number generators based on infinite words, *Theor. Comput. Sci.* **647** (2016), 85–100

2. Diana Barseghyan, Pavel Exner, Andrii Khrabustovskyi, Miloš Tater: Spectral analysis of a class of Schrödinger operators exhibiting a parameter-dependent spectral transition, *J. Phys. A: Math. Theor.* **49** (2016), 165302

3. Diana Barseghyan, Pavel Exner, Hynek Kovařík, Timo Weidl: Semi-classical bounds in magnetic bottles, *Rev. Math. Phys.* **28** (2016), 1650002

4. Agata Bezubík, Severín Pošta: Three-variable alternating trigonometric functions and corresponding Fourier transforms, *Acta Polytechnica* **56** (2016), 156–165

5. Denis I. Borisov: Creation of spectral bands for a periodic domain with small windows, *Russ. J. Math. Phys.* **29** (2016), 19–34

6. Denis I. Borisov, R.K. Gaydukov: Existence of the stationary solution of a Rayleigh-type equations, *Math. Notes* **99** (2016), 636–642

7. Barbara Brandolini, Francesco Chiacchio, David Krejčiřík, Cristina Trombetti: The equality case in a Poincaré-Wirtinger type inequality, *Atti Accad. Naz. Lincei Rend. Lincei Mat. Appl.* **27** (2016), 443–464

8. Cristian Cazacu, David Krejčiřík: The Hardy inequality and the heat equation with magnetic field in any dimension, *Comm. PDE* **41** (2016), 1056–1088

9. Goce Chadzitaskos, Marzena Szajewska, Jiří Patera: Polytopes vibrations within Coxeter group symmetries, *Eur. J. Phys.* **B83** (2016), 132

10. Tomáš Dohnal, Petr Siegl: Bifurcation of eigenvalues in nonlinear problems with antilinear symmetry, *J. Math. Phys.* **57** (2016), 093502

11. Ľubomíra Dvořáková, Josef Florian: On periodicity of generalized pseudostandard words, *El. J. Combinatorics* **23** (2016), #P1.2

12. Pavel Exner, Vladimir Lotoreichik, Miloš Tater: On resonances and bound states of Smilansky Hamiltonian, *Nanosystems: Phys. Chem. Math.* **7** (2016), 789–802

13. Pavel Exner, Jonathan Rohleder: Generalized interactions supported on hypersurfaces, *J. Math. Phys.* **57** (2016), 041507

14. Pavel Exner, Semjon Vugalter: On the existence of bound states in asymmetric leaky wires, *J. Math. Phys.* **57** (2016), 022104

15. Lenka Háková, Jiří Hrivnák, Lenka Motlochová: On cubature rules associated to Weyl group orbit functions, *Acta Polytechnica* **56** (2016), 202–213

16. Rostyslav Hryniv, Stepan Manko: Inverse scattering on the half-line for ZS-AKNS systems with integrable potentials, *Int. Eq. Oper. Theory* **84** (2016), 323–355

17. Martin Kolb, David Krejčiřík: Spectral analysis of the diffusion operator with random jumps from the boundary, *Math. Z.* **284** (2016), 877–900

18. Sylwia Kondej, David Krejčiřík: Asymptotic spectral analysis in colliding leaky quantum layers, *J. Math. Anal. Appl.* **446** (2017), 1328–1355

19. Petra Košťáková, Pavel Šťovíček: The Aharonov-Bohm Hamiltonian with two vortices revisited, *Acta Polytechnica* **56** (2016), 224–235

20. Jiří Kracík, Hynek Lavička: Fluctuation analysis of high frequency power load in the Czech Republic, *Physica* **A462** (2016), 951–961

21. David Krejčiřík: The Hardy inequality and the heat flow in curved wedges, *Portugal. Math.* **73** (2016), 91–113

22. Sébastien Labbé, Edita Pelantová: Palindromic sequences generated from marked morphisms, *Eur. J. Combinatorics* **51C** (2016), 200–214

23. Jiří Lipovský: On the effective size of a non-Weyl graph, *J. Phys. A: Math. Theor.* **49** (2016), 375202

24. Hynek Lavička, Tomáš Lichard, Jaroslav Novotný: Sand in the wheels or wheels in the sand? Tobin taxes and market crashes, *International Review of Financial Analysis* **47** (2016), 328–342

25. Alexander Minakov: Asymptotics of step-like solutions for the Camassa–Holm equation, *J. Diff. Eqs* **261** (2016), 6055–6098

26. Boris Mityagin, Petr Siegl: Root system of singular perturbations of the harmonic oscillator type operators, *Lett. Math. Phys.* **106** (2016), 147–167

27. Maryna Nesterenko, Severín Pošta, Olena Vaneeva: Realizations of Galilei algebras, *J. Phys. A: Math. Theor.* **49** (2016), 115203

28. Thomas Nitsche, Fabian Elster, Jaroslav Novotný, Lennart Lorz, Aurel A. Gábris, Igor Jex, Ch. Silberhorn: Quantum walks with dynamical control: graph engineering, initial state preparation and state transfer, *New J. Phys.* **18** (2016), 063017

29. Edita Pelantová, Tomáš Hejda: Spectral properties of cubic complex Pisot units, *Math. Comput.* **85** (2016), 401–421

30. Edita Pelantová, Štěpán Starosta: Constructions of word rich in palindromes and pseudopalindrome, *Discrete Math. Theor. Comp. Sci.* **18** (2016), #16

31. Malgorzata Rajfur, Pawel Krems, Andrzej Klos, Rafal Kozlowski, Malgorzata A. Jóźwiak, Jan Kříž, Maria Waclawek: Application of algae in active biomonitoring of the selected holding reservoirs in Swietokrzyskie Province, *Ecol. Chem. Eng.* **S23** (2016), 237–247

32. Ryu Sasaki, Miloslav Znojil: One-dimensional Schrödinger equation with non-analytic potential $V(x) = -g^2 \exp(-|x|)$ and its exact Bessel-function solvability, *J. Phys. A: Math. Theor.* **49** (2016), 445303

33. Petr Siegl, František Štampach: On extremal properties of Jacobian elliptic functions with complex modulus, *J. Math. Anal. Appl.* **442** (2016), 627–641

34. František Štampach, Pavel Štovíček: The Nevanlinna parametrization for q-Lommel polynomials in the indeterminate case, *J. Approx. Theory* **201** (2016), 48–72

35. Martin Štefanák, Igor Jex: Persistence of unvisited sites in quantum walks on a line, *Phys. Rev.* **A93** (2016), 032321

36. Martin Štefanák, Jaroslav Novotný, Igor Jex: Percolation assisted excitation transport in discrete-time quantum walks, *New. J. Phys.* **18** (2016), 023040

37. Martin Štefanák, Stanislav Skoupý: Perfect state transfer by means of discrete-time quantum walk search algorithms on highly symmetric graph, *Phys. Rev.* **A94** (2016), 022301

38. Filip Studnička, Jan Šlégr, David Štenger: Free fall of a cat — freshman physics exercise, *Eur. J. Phys.* **37** (2016), 045002

39. Matěj Tušek: On an extension of the Iwatsuka model, *J. Phys. A: Math. Theor.* **49** (2016), 365205

40. Miloslav Znojil: Symmetrized quartic polynomial oscillators and their partial exact solvability, *Phys. Lett.* **A380** (2016), 1414–1418

41. Miloslav Znojil: Morse potential, symmetric Morse potential and bracketed bound-state energies, *Mod. Phys. Lett.* **A31** (2016), 1650088

42. Miloslav Znojil: Parity-time symmetry and the toy models of gain-loss dynamics near the real Kato's exceptional points, *Symmetry* **8** (2016), 52

43. Miloslav Znojil: A method of constructive quantum mechanics of remarkable hidden beauty, *J. Phys. A: Math. Theor.* **49** (2016), 451003

44. Miloslav Znojil: Symmetrized exponential oscillator, *Mod. Phys. Lett.* **A31** (2016), 1650195

(a2) Accepted earlier, published in 2016, or shortly before

1. Denis I. Borisov, Giuseppe Cardone, Tiziana Durante: Homogenization and norm-resolvent convergence for elliptic operators in a strip perforated along a curve, *Proc. Roy. Soc. Edinburgh* **A146** (2016), 1115–1158

2. Denis I. Borisov, Anastasia Golovina, Ivan Veselič: Quantum Hamiltonians with weak random abstract perturbation. I. Initial length scale estimates, *Ann. H. Poincaré* **17** (2016), 2341–2377

3. Denis I. Borisov, Francisco Hoecker-Escuti, Ivan Veselič: Expansion of the almost sure spectrum in the weak disorder régime, *J. Funct. Anal.* **270** (2016), 1684–1718

4. Denis I. Borisov, T.F. Sharapov: On the resolvent of multidimensional operators with frequently alternating boundary conditions with the Robin homogenized condition, *J. Math Sci.* **213** (2016), 461–503

5. Jaroslav Dittrich, Pavel Exner, Christian Kühn, Konstantin Pankrashkin: On eigenvalue asymptotics for strong δ-interactions supported by surfaces with boundaries, *Asympt. Anal.* **97** (2016), 1–25

6. Ľubomíra Dvořáková, Josef Florian: On periodicity of generalized pseudostandard words, *El. J. Combinatorics* **23** (2016), #P1.2

7. Fabian Elster, Sonja Barkhofen, Thomas Nitsche, Jan Novotný, Aurel Gábris, Igor Jex, Christine Silberhorn: Quantum walk coherences on a dynamical percolation graph, *Scientific Reports* **5** (2015), 13495

8. Pavel Exner, Sylwia Kondej: Strong coupling asymptotics for Schroedinger operators with an interaction supported by an open arc in three dimensions, *Rep. Math. Phys.* **77** (2016), 1–17

9. Orif O. Ibrogimov, Petr Siegl, Christiane Tretter: Analysis of the essential spectrum of singular matrix differential operators, *J. Diff. Eqs* **260** (2016), 3881–3926

10. Michal Jex, Vladimir Lotoreichik: On absence of bound states for weakly attractive δ'-interactions supported on non-closed curves in $\mathbb{R}^2$, *J. Math. Phys.* **57** (2016), 022101

11. Karel Klouda, Kateřina Medková: Synchronizing delay for binary uniform morphisms, *Theor. Comp. Science* **615** (2016), 12–22

12. Vladimir Lotoreichik, Thomas Ourmières-Bonafos: On the bound states of Schrodinger operators with δ-interactions on conical surfaces, *Comm. PDE* **41** (2016), 999–1028

13. Radek Novák: Bound states in waveguides with complex Robin boundary conditions, *Asympt. Anal.* **96** (2016), 251–281

14. Jaroslav Novotný, Gernot Alber, Igor Jex : Universality in random quantum networks, *Phys. Rev.* **A92** (2015), 062335

15. Edita Pelantová, Štěpán Starosta, Miloslav Znojil: Markov constant and quantum instabilities, *J. Phys. A: Math. Theor.* **49** (2016), 155201

16. Miloslav Znojil: Is PT-symmetric quantum theory false as a fundamental theory? *Acta Polytechnica* **56** (2016), 254–257

(b) Accepted for publication in 2016

1. Pedro R.S. Antunes, Pedro Freitas, David Krejčiřík: Bounds and extremal domains for Robin eigenvalues with negative boundary parameter, *Adv. Calc. Var.* (2017), to appear

2. Simon Baker, Zuzana Masáková, Edita Pelantová, Tomáš Vávra: On periodic representations in non-Pisot bases, *Monatsh. Math.* (2017), to appear

3. Jussi Behrndt, Matthias Langer, Vladimir Lotoriechik, Jonathan Rohleder: Quasi boundary triples and semibounded self-adjoint extensions, *Proc. Roy. Soc. Edinburgh A* (2017), to appear

4. Pavel Exner, Vladimir Lotoreichik: A spectral isoperimetric inequality for cones, *Lett. Math. Phys.* (2017), to appear

5. Pavel Exner, Vladimir Lotoreichik, Miloš Tater: Spectral and resonance properties of Smilansky Hamiltonian, *Phys. Lett. A* (2017), to appear

6. Pavel Exner, Stěpán Manko: Spectral properties of magnetic chain graphs, *Ann. H. Poincaré* (2017), to appear

7. Luca Fanelli, David Krejčiřík, Luis Vega: Spectral stability of Schrodinger operators with subordinated complex potentials, *J. Spectr. Theory* (2017), to appear

8. Tomáš Hejda, Wolfgang Steiner: Beta-expansions of rational numbers in quadratic Pisot bases, *Acta Arithmetica* (2017), to appear

9. Aleksey S. Kostenko, Mark M. Malamud, Hagen Neidhardt, Pavel Exner: Infinite quantum graphs (in Russian), *Doklady AN* (2016), to appear

10. Sébastien Labbé, Edita Pelantová, Štěpán Starosta: On the Zero Defect Conjecture, *Eur. J. Combinatorics* (2017), to appear

11. Boris Mityagin, Petr Siegl, Joe Viola: Differential operators admitting various rates of spectral projection growth, *J. Funct. Anal.* (2017), to appear

12. Daniel Vašata: Generalizations of the centroid with an application in stochastic geometry, *Math. Nachr.* (2017), to appear

13. Daniel Vašata: On long-range dependence of random measures, *Adv. Appl. Probab.* (2017), to appear

14. Zuzana Masáková, Edita Pelantová, Štěpán Starosta: Itineraries induced by exchange of three intervals, *Acta Polytechnica* **56** (6) (2016), to appear

15. Zuzana Masáková, Edita Pelantová, Štěpán Starosta: Exchange of three intervals: itineraries, substitutions and palindromicity, *Europ. J. Combin.* (2017), to appear

16. Jan Šlégr, Kamila Váňová: Stochastic properties of lower ionosphere as earthquake precursor, *J. Seismol.* **21** (2017), to appear

17. František Štampach, Pavel Štovíček: Factorization of the characteristic function of a Jacobi matrix, *Operators and Matrices* (2017), to appear

18. Pavel Štovíček: The heat kernel for two Aharonov-Bohm solenoids in a uniform magnetic field, *Ann. Phys.* (2017), to appear

(c) Other papers, published and accepted in 2016, or shortly before

1. Jiří Adam, Jr., Vyacheslav B. Belyaev, Paolo Ricci, Fedor Šimkovic, Miloš Tater, Emil Truhlík: SMWDs as SGRs/AXPs and the lepton number violation, in *AIP Conf. Proc.*, vol. 1686, issue 1 (2016)

2. 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, to appear

3. Marta Brzicová, Christiane Frougny, Edita Pelantová, Milena Svobodová: On-line multiplication and division in real and complex bases, in Proceedings of *IEEE ARITH 23*, IEEE Computer Society Press (2016); pp. 134–141

4. Denis I. Borisov, Miloslav Znojil: Mathematical and physical meaning of the crossings of energy levels, in $\mathcal{PT}$-symmetric systems in "Pseudo-Hermitian Operators in Quantum Physics", proceedings of PHHQP XV (F. Bagarello et al, eds.), Springer 2016; pp. 201–217

5. 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, to appear

6. 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, to appear

7. Miloslav Znojil: Quantization of Big Bang in crypto-Hermitian Heisenberg picture, in "Pseudo-Hermitian Operators in Quantum Physics", *Proceedings of PHHQP XIII* (F. Bagarello et al, eds.), Springer 2016; pp. 383-399

(d) Submitted in 2016, not yet accepted

1. 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, submitted (`arXiv:1606.00299 [quant-ph]`)

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.*, submitted (`arXiv:1609.00608 [math.SP]`)

3. Marta Brzicová, Christiane Frougny, Edita Pelantová, Milena Svobodová: On-line algorithms for multiplication and division in real and complex numeration systems, submitted (`arXiv:1610.08309 [cs.DS]`)

4. Francisco Correa, Vít Jakubský: Confluent Crum-Darboux transformations in Dirac Hamiltonians with PT-symmetric Bragg gratings, submitted (`arXiv:1612.06349 [hep-th]`)

5. Ľubomira Dvořáková, Josef Florian: A new estimate on complexity of binary generalized pseudostandard words, submitted (`arXiv:1611.05482 [math.CO]`)

6. Pavel Exner: On the spectrum of leaky surfaces with a potential bias, submitted to *Festschrift in Honor of Helge Holden's 60th Birthday*

7. Kevin Hare, Zuzana Masáková, Tomáš Vávra: On the spectra of Pisot-cyclotomic numbers, submitted

8. Vít Jakubský, Axel Pérez-Obiol: Spontaneous twisting of carbon nanotubes at finite temperatures, submitted (`arXiv:1609.07347 [cond-mat.mes-hall]`)

9. Vít Jakubský, Matěj Tušek: Dispersionless wave packets in graphene and other Dirac materials, submitted (`arXiv:1604.00157 [cond-mat.mes-hall]`)

10. Zuzana Krčmáriková, Wolfgang Steiner, Tomáš Vávra: Finite β-expansions with negative bases, submitted

11. Vladimir Lotoreichik, Jonathan Rohleder: Eigenvalue inequalities for the Laplacian with mixed boundary conditions, submitted (`arXiv:1609.02890 [math.SP]`)

12. Boris Mityagin, Petr Siegl: Local form-subordination condition and Riesz basisness of root systems, submitted (`arXiv:1608.00224 [math.SP]`)

13. Wolfgang P. Schleich, Iva Bezděková, M.B. Kim, P.C. Abbott, H. Maier, H. Montgomery, J.W. Neuberger: Equivalent formulations of the Riemann hypothesis based on the lines of constant phase, submitted

14. Boris Shapiro, Miloš Tater: Asymptotics and monodromy of the algebraic spectrum of quasi-exactly solvable sextic oscillator, submitted (`arXiv:1611.06313 [math-ph]`)

15. Petr Siegl, František Štampach: Factorization of the characteristic function of a Jacobi matrix, submitted (`arXiv:1603.01052 [math.SP]`)

16. Martin Štefanák, Stanislav Skoupý: Perfect state transfer by means of discrete-time quantum walk on complete bipartite graphs, *Quantum Inf. Process.*, submitted

17. Ondřej Turek, Dardo Goyeneche: A generalization of circulant Hadamard and conference matrices, subm. (`arXiv:1603.05704 [math.CO]`)

18. Miloslav Znojil: Quasi-exact solvability of spiked harmonic oscillators, submitted (`arXiv:1607.01297 [math-ph]`)

19. Miloslav Znojil, Iveta Semorádová, František Růžicka, Hafida Moulla, Ilhem Leghrib: The problem of coexistence of several non-Hermitian observables in PT-symmetric quantum mechanics, submitted (`arXiv:1610.09396 [quant-ph]`)