

# Doppler Institute

*for Mathematical Physics and Applied Mathematics*

## 2010 List of Publications

### (a) Edited volume

1. Pavel Exner, ed.: *XVIth International Congress on Mathematical Physics*, Proceedings of the ICMP held in Prague, August 3-8, 2009; xvii+690 p.; World Scientific, Singapore 2010.

### (b) Research papers in journals

#### (b1) Accepted and published in 2010

1. Petr Ambrož: Tilings generated by Ito-Sadahiro and balanced  $(-\beta)$ -numeration systems, *Acta Polytechnica* **50** (5) (2010), 7-16
2. Petr Ambrož, Zuzana Masáková, Edita Pelantová: Morphisms fixing words associated with exchange of three intervals, *RAIRO: Theoretical Informatics and Applications* **44** (2010), 3-17
3. Thomas Brougham, Stephen M. Barnett, Igor Jex: Interference of composite bosons, *J. Mod. Phys.* **57** (2010), 587-594
4. Claudio Cacciapuoti, Domenico Finco: Graph-like models for thin waveguides with Robin boundary conditions, *Asympt. Anal.* **70** (2010), 199-230
5. Taksu Cheon, Pavel Exner, Ondřej Turek: Tripartite connection condition for quantum graph vertex, *Phys. Lett.* **A375** (2010), 113-118
6. Francisco Correa, Horacio Falomir, Vít Jakubský, Mikhail S. Plyushchay: Supersymmetries of the spin-1/2 particle in the field of magnetic vortex, and anyons, *Ann. Phys.* **325** (2010), 2653-2667
7. Francisco Correa, Horacio Falomir, Vít Jakubský, Mikhail S. Plyushchay: Hidden superconformal symmetry of spinless Aharonov-Bohm system, *J. Phys. A: Math. Theor.* **43** (2010), 075202

8. E. Brian Davies, Pavel Exner, Jiří Lipovský: Non-Weyl asymptotics for quantum graphs with general coupling conditions, *J. Phys. A: Math. Theor.* **43** (2010), 474013
9. Jaroslav Dittrich: Integer topological charges for finite energy fields in the  $O(3)$   $\sigma$ -model, *J. Phys. A: Math. Theor.* **43** (2010), 474016
10. Pierre Duclos, Pavel Šťovíček, Matěj Tušek: On the two-dimensional Coulomb-like potential with a central point interaction, *J. Phys. A: Math. Theor.* **43** (2010), 474020
11. Steven Duplij, Sergey Sinel'shchikov: On  $U_q(sl_2)$ -actions on the quantum plane, *Acta Polytechnica* **50** (5) (2010), 25-29
12. Pavel Exner, Peter Kuchment, Brian Winn: On the location of spectral edges in  $\mathbb{Z}$ -periodic media, *J. Phys. A: Math. Theor.* **43** (2010), 474022
13. Pavel Exner, Jiří Lipovský: Resonances from perturbations of quantum graphs with rationally related edges, *J. Phys. A: Math. Theor.* **43** (2010), 105301
14. Pavel Exner, Miloš Tater: Spectrum of Dirichlet Laplacian in a conical layer, *J. Phys. A: Math. Theor.* **43** (2010), 474023
15. Pavel Exner, Ondřej Turek: High-energy asymptotics of the spectrum of a periodic square-lattice quantum graph, *J. Phys. A: Math. Theor.* **43** (2010), 474024
16. Martin Fraas, David Krejčířík, Yehuda Pinchover: On some strong ratio limit theorems for heat kernels, *Discrete and Continuous Dynamical Systems* **A28** (2010), 495-509
17. Jean-Pierre Gazeau, Petr Siegl, Ahmed Youssef: Krein spaces in de Sitter quantum theories, *SIGMA* **6** (2010), 011, 23 pages
18. Miloslav Havlíček, Severín Pošta: The diamond lemma and the PBW Property in quantum algebras, *Acta Polytechnica* **50** (5) (2010), 40-45
19. Miloslav Havlíček, Edita Pelantová, Jiří Tolar: On representations of  $sl(n, \mathbb{C})$  compatible with a  $\mathbb{Z}_2$ -grading, *Acta Polytechnica* **50** (5) (2010), 30-39
20. Jiří Hrivnák, Jiří Patera, Lenka Motlochová, Jiří Patera: Two dimensional symmetric and antisymmetric generalizations of sine functions, *J. Math. Phys.* **51** (2010), 073509
21. Vít Jakubský: Aharonov-Bohm effect and the supersymmetry of identical anyons, *Acta Polytechnica* **50** (5) (2010), 46-50

22. Vít Jakubský, Luis-Miguel Nieto, Mikhail S. Plyushchay: The origin of the hidden supersymmetry, *Phys. Lett.* **B692** (2010), 51-56
23. Daniel Jezbera, David Kordek, Jan Kríž, Petr Šeba, Petr Šroll: Walkers on the circle, *Journal of Statistical Mechanics: Theory and Experiment* **2010** (2010), L01001
24. Denis Kochan: Does a functional integral really need a Lagrangian?, *Acta Polytechnica* **50** (2010), 57-61
25. B. Kollár, Martin Štefaňák, Tamás Kiss, Igor Jex: Recurrences in three-state quantum walks on a plane, *Phys. Rev.* **A82** (2010), 012303
26. Miroslav Korbelář, Jiří Tolar: Symmetries of the finite Heisenberg group for composite systems, *J. Phys. A: Math. Theor.* **43** (2010), 375302
27. Juraj Kostra: On correspondence between orders and ideals with a normal basis in cyclic subfields of  $Q(\zeta_p)$  of a prime degree  $l$ , *Math. Slovaca* **60** (2010), 786-791.
28. David Krejčířík, Petr Siegl:  $\mathcal{PT}$ -symmetric models in curved manifolds, *J. Phys. A: Math. Theor.* **43** (2010), 485204
29. David Krejčířík, Enrique Zuazua: The Hardy inequality and the heat equation in twisted tubes, *Journal de Mathématiques Pures et Appliquées* **94** (2010), 277-303.
30. Hynek Lavička, Lin Lin, Jaroslav Novotný: Employment, production and consumption model: patterns of phase transitions, *Physica* **A389** (2010), 1708-1720
31. Takuya Mine: Self-adjoint extensions of Schrödinger operators with  $\delta$ -magnetic fields on Riemannian manifolds, *Acta Polytechnica* **50** (5) (2010), 62-72
32. Jaroslav Novotný, Gerd Alber, Igor Jex: Asymptotic evolution of random unitary operations, *Central European J. Phys.* **8** (2010), 1001-1014
33. A. Schreiber, K.N. Cassemiro, V. Potoček, A. Gabris, P. Mosley, E. Andersson, I. Jex, Ch. Silberhorn: Photons walking the line, *Phys. Rev. Lett.* **104** (2010), 050502
34. Boris Shapiro, Miloš Tater: On spectral polynomials of the Heun equation I, *J. Approx. Theory* **162** (2010), 766-781
35. M. Štefaňák, B. Kollár, T. Kiss, I. Jex: Full-revivals in 2-D quantum walks, *Phys. Scripta* **T140** (2010), 014035
36. Miloslav Znojil: Gegenbauer-solvable quantum chain model, *Phys. Rev.* **A82** (2010), 052113

37. Miloslav Znojil: Anomalous real spectra of non-Hermitian quantum graphs in strong-coupling regime, *J. Phys. A: Math. Theor.* **43** (2010), 335303
38. Miloslav Znojil: Time-dependent and/or nonlocal representations of Hilbert spaces in quantum theory, *Acta Polytechnica* **50** (3) (2010), 62-68
39. Miloslav Znojil: Rectifiable  $\mathcal{PT}$ -symmetric quantum toboggans with two branch points, *Acta Polytechnica* **50** (5) (2010), 84-90

**(b2) Accepted earlier, published in 2010 or shortly before**

1. Ľubomíra Balková, Karel Klouda, Edita Pelantová: Repetitions in  $\beta$ -integers, *Lett. Math. Phys.* **87** (2009), 181-195
2. Denis Borisov, Pedro Freitas: Asymptotics of Dirichlet eigenvalues and eigenfunctions of the Laplacian in thin domains, *J. Funct. Anal.* **258** (2010), 893-912
3. Taksu Cheon, Pavel Exner, Ondřej Turek: Approximation of a general singular vertex coupling in quantum graphs, *Ann. Phys.* **325** (2010), 548-578
4. Denis Kochan: How to quantize forces: an academic essay how the strings could enter classical mechanics, *J. Geom. Phys.* **60** (2010), 219-229
5. Miloslav Znojil: Topology-controlled spectra of imaginary cubic oscillators in the large-L approach, *Phys. Lett.* **A374** (2010), 807-812
6. Miloslav Znojil: Complete set of inner products for a discrete  $\mathcal{PT}$ -symmetric square-well Hamiltonian, *J. Math. Phys.* **50** (2009), 122105

**(c) Accepted for publication in 2010**

1. Ľubomíra Balková, Edita Pelantová, Štěpán Starosta: Infinite words with finite defect, *Adv. Appl. Math.*, to appear
2. Ľubomíra Balková, Edita Pelantová, Štěpán Starosta: Sturmian jungle (or garden?) on multiliteral alphabets, *RAIRO: Theoretical Informatics and Applications*, to appear
3. Hervé Bergeron, Jean-Pierre Gazeau, Petr Siegl, Ahmed Youssef: Semi-classical behavior of Poeschl-Teller coherent states, *EPL*, to appear; [arXiv:1007.3876](https://arxiv.org/abs/1007.3876) [quant-ph]

4. Thomas Brougham, V. Košťák, Igor Jex, Erika Anderson, Tamás Kiss: Entanglement preparation using symmetric multiports, *Eur. J. Phys.*, to appear; arXiv:1010.2367 [quant-ph]
5. Raffaele Carlone, Pavel Exner: Dynamics of an electron confined to a “hybrid plane” and interacting with a magnetic field, *Rep. Math. Phys.* (2011), to appear; arXiv:1009.5252 [math-ph]
6. Goce Chadzitaskos: Optical element for X-ray microscopy, *Nucl. Instr. Meth. Phys. Research A* (2011), to appear
7. Pavel Exner, Jiří Lipovský: On the absence of absolutely continuous spectra for Schrödinger operators on radial tree graphs, *J. Math. Phys.* **52** (2011), to appear; arXiv:1004.1980 [math-ph]
8. Craig S. Hamilton, Aurél Gábris, Igor Jex, Stephen M. Barnett: Quantum walk with a four dimensional coin, *New J. Phys.*, to appear
9. Petra Košťáková, Pavel Šťovíček: Noncommutative Bloch analysis of Bochner Laplacians with nonvanishing gauge fields, *J. Geom. Phys.*, to appear; arXiv:1011.6536 [math-ph]
10. David Krejčířík, Enrique Zuazua: The asymptotic behaviour of the heat equation in a twisted Dirichlet-Neumann waveguide, *J. Diff. Eqs.*, to appear; arXiv:1006.2619 [math.AP]
11. Zuzana Masáková, Edita Pelantová, Tomáš Vávra: Arithmetics in number systems with negative base, *Theor. Comp. Sci.*, to appear; arXiv:1002.1009 [math.NT]
12. Zuzana Masáková, Tomáš Vávra: Arithmetics in numeration systems with negative quadratic base, *Kybernetika*, to appear
13. Peter P. Rohde, Andreas Schreiber, Martin Štefanák, Igor Jex, Christine Silberhorn: Multi-walker discrete time quantum walks on arbitrary graphs, their properties, and their photonic implementation, *New J. Phys.*, to appear; arXiv:1006.5556 [quant-ph]
14. Petr Siegl:  $\mathcal{PT}$ -symmetric square well – perturbations and the existence of metric operator, *Int. J. Theor. Phys.*, to appear
15. Štěpán Starosta: On theta-palindromic richness, *Theor. Comp. Sci.*, to appear
16. František Štampach, Pavel Šťovíček: On the eigenvalue problem for a particular class of finite Jacobi matrices, *Linear Alg. Appl.*, to appear
17. Miloslav Znojil: Cryptohermitian Hamiltonians on graphs, *Int. J. Theor. Phys.*, to appear; arXiv:1008.2082 [quant-ph]

18. Miloslav Znojil, Miloš Tater:  $CPT$ -symmetric discrete square well, *Int. J. Theor. Phys.*, to appear
19. Jakub Železný: Spectrum of the metric operator of a simple  $\mathcal{PT}$ -symmetric model, *Int. J. Theor. Phys.*, to appear

**(d) Other papers, published and accepted in 2010, or shortly before**

1. Jose M. Arrieta, David Krejčířík: Geometric versus spectral convergence for the Neumann Laplacian under exterior perturbations of the domain, *Proceedings of Proceedings of "Integral Methods in Science and Engineering"*, Birkhäuser, Boston 2009; pp.9-19
2. Christiane Frougny, Karel Klouda: Rational base number systems for p-adic numbers, *Proceedings of 13th Mons Theoretical Computer Science Days (2010)*, to appear
3. Pavel Exner: Vertex couplings in quantum graphs: approximations by scaled Schroedinger operators, in *Proceedings of the ICM satellite conference "Mathematics in Science and Technology" (New Delhi, August 15-17, 2010)*, to appear; [arXiv:1011.6019](https://arxiv.org/abs/1011.6019) [quant-ph]
4. Tomáš Hejda: Morphisms preserving the set of words coding three interval exchange, *Proceedings of 13th Mons Theoretical Computer Science Days (2010)*, to appear
5. Jan Smotlacha, Goce Chadzitaskos, Costas Daskaloyannis: Spectra of photon down conversion, in *Proceedings of "XXVIII International Workshop on Geometrical Methods in Physics" (Bialystok 2009; P. Kielanowski et al, eds.)*, AIP Conference Proceedings, vol. 1191, Springer 2010; pp. 166-171

**(e) Submitted in 2010, not yet accepted**

1. Petr Ambrož, Daniel Dombek, Zuzana Masáková, Edita Pelantová: Numbers with integer expansion in the numeration system with negative base, *Acta Arithmetica*, submitted; [arXiv:0912.4597](https://arxiv.org/abs/0912.4597) [math.NT]
2. Ľubomíra Balková, Karel Klouda, Edita Pelantová: Critical exponent of infinite words coding beta-integers associated with non-simple Parry numbers, *Proceedings of Numeration Workshop in Leiden (2010)*, submitted

3. Thomas Brougham, G.M. Nikolopoulos, Igor Jex: Perfect transfer of multiple excitations in quantum networks, *Phys. Rev. A*, submitted
4. Pavel Exner, Jiří Lipovský: Non-Weyl resonance asymptotics for quantum graphs in a magnetic field, *Phys. Lett. A*, submitted
5. Pavel Exner, Petr Šeba, Daniel Vašata: Built-up structure criticality, *Physica A*, submitted; [arXiv:1011.2704 \[soc-ph\]](#)
6. Petr Hájíček, Jiří Tolar: Survey of an approach to quantum measurement, classical properties and realist interpretation problems, submitted; [arXiv:1008.2524 \[quant-ph\]](#)
7. Miloslav Havlíček, Severín Pošta: Center of quantum algebra  $U'_q(\mathfrak{so3})$ , *J. Math. Phys.*, submitted
8. Hector Hernández-Coronado, David Krejčířík, Petr Siegl: Perfect transmission scattering as a  $\mathcal{PT}$ -symmetric spectral problem, submitted
9. Vít Jakubský, Luis-Miguel Nieto, Mikhail S. Plyushchay: Klein tunneling in carbon nanostructures: a free particle dynamics in disguise, submitted; [arXiv:1010.0569 \[cond-mat.mes-hall\]](#)
10. David Krejčířík, Aldo Pratelli: The Cheeger constant of curved strips, submitted; [arXiv:1011.3490 \[math.OA\]](#)
11. Zuzana Masáková, Edita Pelantová: Ito-Sadahiro numbers vs. Parry numbers, submitted
12. Miloslav Znojil: Planarizable supersymmetric quantum toboggans, *SIGMA*, submitted
13. Miloslav Znojil: Cryptohermitian Hamiltonians on graphs. II. Hermitizations, *Int. J. Theor. Phys.*, submitted
14. Miloslav Znojil: An exactly solvable quantum-lattice model with a tunable degree of nonlocality, *J. Phys. A: Math. Theor.*, submitted

**(f) Miscellanea:**

1. Hynek Lavička: *Simulations of Agents on Social Network*, Lambert Academic Publishing 2010, ISBN 978-3-8383-4412-6; published version of a PhD Thesis