Doppler Institute

for Mathematical Physics and Applied Mathematics

2008 List of Publications

(a) Monographs, textbooks, edited volumes

1. Jiří Blank, Pavel Exner, Miloslav Havlíček: *Hilbert-Space Operators in Quantum Physics*, 2nd edition, revised and extended, xviii+666 p.; Springer, Dordrecht 2008.

2. Pavel Exner, Jonathan P. Keating, Peter Kuchment, Toshikazu Sunada, Alexander Teplyaev, eds.: *Analysis on Graphs and Applications*, Proceedings of an Isaac Newton Institute programme, January 8 – June 29, 2007; 670 p.; "Proceedings of Symposia in Pure Mathematics" Series, vol.77, Providence, R.I., 2008

3. Andreas Fring, Hugh Jones, Miloslav Znojil, eds.: Proceedings of the 6th International Workshop on Pseudo-Hermitian Hamiltonians in Quantum Physics, *J. Phys. A: Math. Theor.* **41** (2008), No. 24.

(b) Patents

1. Goce Chadzitaskos: *An Optical term for Roentgen Microscopy*, Patent CZ 299759. 2008-10-03., 2008

(c) Research papers in journals

(c1) Accepted and published in 2008

1. Miloslav Znojil: Horizons of stability, *J. Phys. A: Math. Theor.* **41** (2008), 244027.
2. Miloslav Znojil: On the role of the normalization factors κ_n and of the pseudo-metric $P \neq P^+$ in crypto-Hermitian quantum models, *SIGMA* **4** (2008), 001.

3. Andreas Fring, Miloslav Znojil: $\mathcal{PT}$-symmetric deformations of Calogero models, *J. Phys. A: Math. Theor.* **41** (2008), 194010.

4. Miloslav Znojil: Quantum knots, *Phys. Lett.* **A372** (2008), 3591–3596.

5. Ľubomíra Balková, Jean-Pierre Gazeau, Edita Pelantová: Asymptotic behavior of β-integers, *Lett. Math. Phys.* **84** (2008), 179–198.

6. Petra Kocábová, Pavel Šťovíček: Generalized Bloch analysis and propagators on Riemannian manifolds with a discrete symmetry, *J. Math. Phys.* **49** (2008), 033518.

7. Petr Novotný, Jiří Hrivnák: On the (α, β, γ)-derivations of Lie algebras and corresponding invariant functions, *J. Geom. Phys.* **58** (2008), 208–217.

8. A.M. Grundland, A.J. Hariton: Supersymmetric version of a hydrodynamic system in Riemann invariants and its solutions, *J. Math. Phys.* **49** (2008), 043502.

9. Martin Štefanák, Tamás Kiss, Igor Jex: Recurrence properties of unbiased coined quantum walks on infinite d-dimensional lattice, *Phys. Rev.* **A78** (2008), 032306.

10. Pierre Duclos, Pavel Exner, Ondřej Turek: On the spectrum of a bent chain graph, *J. Phys. A: Math. Theor.* **41** (2008), 415206

11. Michal Lawniczak, Oleh Hul, Szymon Bauch, Petr Šeba, Leszek Sirko: Experimental and numerical investigation of the reflection coefficient and the distributions of Wigner's reaction matrix for irregular graphs with absorption, *Phys. Rev.* **E77** (2008), 056210.

12. Miloslav Znojil: Identification of observables in quantum toboggans, *J. Phys. A: Math. Theor.* **41** (2008), 215304.

13. Miloslav Znojil: Scattering theory with localized non-Hermiticities, *Phys. Rev.* **D78** (2008), 02502.

14. Miloslav Znoji: Discrete $\mathcal{PT}$-symmetric models of scattering, *J. Phys. A: Math. Theor.* **41** (2008), 292002.

15. L. Háková, M. Larouche, J. Patera: The rings of n-dimensional polytopes, *J. Phys. A: Math. Theor.* **41** (2008), 495202.

16. Taksu Cheon, Pavel Hejčík: Anomalous relativistic tunneling and exotic point interactions, *Europhys. Lett.* **81** (2008), 50001.

17. Petr Siegl: Supersymmetric quasi-Hermitian Hamiltonians with point interactions on a loop, *J. Phys. A: Math. Theor.* **41** (2008), 244025.

18. M. Štefaňák, D. Haase, W. Merkel, M.S. Zubairy, W.P. Schleich: Factorization with exponential sums, *J. Phys. A: Math. Theor.* **41** (2008), 304024.

19. T. Kiss, I. Jex, G. Alber, E. Kollar: Properties of complex chaos in conditional qubit dynamics, *Int. J. Quant. Inf* **6, supp. 1** (2008), 695–700.

20. Miloslav Znojil: Time-dependent version of cryptohermitian quantum theory, *Phys. Rev.* **D78** (2008), 085003.

21. Miloslav Znojil: Quantum toboggans: models exhibiting a multisheeted $\mathcal{PT}$-symmetry, *J. Phys.: Conf. Series* **128** (2008), 012046.

22. Miloslav Znojil: Conditional observability versus self-duality in a schematic model, *J. Phys. A: Math. Theor* **41** (2008), 304027.

(c2) Accepted earlier, published in 2008 or before

1. Ľubomira Balková, Zuzana Masáková: Palindromic complexity of infinite words associated with non-simple Parry numbers, *RAIRO: Theoretical Informatics and Applications* (2008), *doi: 10.1051/ita:2008005*.

2. Denis Kochan: Noncommutative Lagrange mechanic, *SIGMA* **4** (2008), 028.

3. David Krejčiřík, Hynek Kovařík: A Hardy inequality in a twisted Dirichlet-Neumann waveguide, *Math. Nachr.* **281** (2008), 1159–1168.

4. Tomas Ekholm, Hynek Kovařík, David Krejčiřík: A Hardy inequality in twisted waveguides, *Arch. Rat. Mech. Anal.* **188** (2008), 245–264.

5. Petr Ambrož, Zuzana Masáková, Edita Pelantová: Matrices of 3iet preserving morphisms, *Theoret. Comp. Sci.* **400** (2008), 113–136.

6. Martin Štefanák, Igor Jex, Tamás Kiss: Recurrence and Pólya number of quantum walks, *Phys. Rev. Lett.* **100** (2008), 020501.

7. David Krejčiřk: Calculation of the metric in the Hilbert space of $\mathcal{PT}$-symmetric model via the spectral theorem, *J. Phys. A: Math. Theor.* **41** (2008), 244012.

8. Pavel Exner, Petr Šeba: A Markov process associated with plot-size distribution in Czech Land Registry and its number-theoretic properties, *J. Phys. A: Math. Theor.* **41** (2008), 045004.

9. Ľubomira Balková, Edita Pelantová, Wolfgang Steiner: Sequences with constant number of return words, *Monatshefte fur Mathematik* **155** (2008), 25–263.

10. Milena Svobodová: Fine gradings of low-rank complex Lie algebras and their real form, *SIGMA* **4** (2008), 039.

11. Petr Baláži, Zuzana Masáková, Edita Pelantov: Characterization of substitution invariant 3iet words, *Integers – Electronic Journal of Combinatorial Number Theory* **8** (2008), no. A20, 21pp.

12. P. Arnoux, V. Berthé, Z. Masáková, E. Pelantová: Sturm numbers and substitution invariance of 3iet words, *Integers – Electronic Journal of Combinatorial Number Theory* **8** (2008), no. A14, 17pp.

13. Jan Kříž, Petr Šeba: Force plate monitoring of human hemodynamics, *Nonlinear Biomedical Physics* **2** (2008), 1.

14. Miloslav Znojil: Quantum toboggans with two branch points, *Phys. Lett.* **A372** (2008), 584–590 .

15. Petr Šeba: Markov chain of distances between parked cars, *J. Phys. A: Math. Theor.* **41** (2008), 122003.

16. Jun-Hua Chen, Edita Pelantová, Miloslav Znojil: Classification of the conditionally observable spectra exhibiting central symmetry, *Phys. Lett.* **A372** (2008), 1986–1989.

17. Pavel Exner, Andrea Mantile: On the optimization of the principal eigenvalue for single-centre point-interaction operators in a bounded region, *J. Phys. A: Math. Theor.* **41** (2008), 065305.

18. Pedro Freitas, David Krejčiřík: A sharp upper bound for the first Dirichlet eigenvalue and the growth of the isoperimetric constant of convex domains, *Proc. Amer. Math. Soc.* **136** (2008), 2997–3006.

19. David Krejčiřík, Miloš Tater: Non-Hermitian spectral effects in a PT-symmetric waveguid, *J. Phys. A: Math. Theor.* **41** (2008), 244013.

20. Daniel Gebert, Oliver Kern, Gernot Alber, Igor Jex: Stabilization of quantum information by combined dynamical decoupling and detected-jump error correction, *Eur. Phys. J.* **D46** (2008), 381–394.

21. Pavel Exner, Sylwia Kondej: Hiatus perturbation for a singular Schrödinger operator with an interaction supported by a curve in $\mathbb{R}^3$, *J. Math. Phys.* **49** (2008), 032111.

22. Pedro Freitas, David Krejčiřík: Location of the nodal set for thin curved tubes, *Indiana Univ. Math. J.* **57** (2008), 343–376.

23. Pierre Duclos, Ondřej Lev, Pavel Štovíček: On the energy growth of some periodically driven quantum systems with shrinking gaps in the spectrum, *J. Stat. Phys.* **130** (2008), 169–193.

24. J. Dittrich, V. I. Inozemtsev: The commutativity of integrals of motion for quantum spin chains and elliptic functions identitie, *Regular and Chaotic Dynamics* **13** (2008), 19–26.

25. David Krejčiřík: Spectrum of the Laplacian in a narrow curved strip with combined Dirichlet and Neumann boundary conditions, *ESAIM: Control, Optimisation and Calculus of Variations* (2008); *doi: 10.1051/cocv:200803*

26. Denis Borisov: Distant perturbations of the Laplacian in a multi-dimensional space, *Ann. H. Poincaré* **8** (2007), 1371–1399.

27. A. Gabris, T. Kiss, I. Jex: Scattering quantum random-walk search with error, *Phys. Rev.* **A76** (2007), 062315.

28. PVít Jakubský: Pseudo-Hermitian operators in description of physical systems, *Acta Polytechnica* **47** (2007), 47–50.

29. Petr Ambrož: Matrices associated to 3-interval exchange transformation and their spectra, *Acta Polytechnica* **47** (2007), 68–70.

(d) Accepted for publication in 2008

1. Denis Borisov, David Krejčiří: $\mathcal{PT}$-symmetric waveguide, *Integral Equations and Operator Theory*, to appear

2. V. Geyler, P. Štovíček, M. Tušek: A quantum dot with impurity in the Lobachevsky plane, *Proceedings of the 6th Workshop Operator Theory*, Birkhäuser Operator Theory series, to appear

3. Claudio Cacciapuoti, Raffaele Carlone, Rodolfo Figari: Resonances in models of spin dependent point interactions, *J. Phys. A: Math. Theor.* **42** (2009), to appear

4. Petr Šeba, Daniel Vašata: Chaos in a one dimensional integrable quantum system, *Phys. Lett.* **A** (2009), to appear

(e) Other papers, published and accepted in 2008

1. Pavel Exner, Olaf Post: Quantum networks modelled by graphs, *Proceedings of the Joint Mathematics/Physics Workshop "Quantum Few-Body System" (Aarhus 2007)*, AIP Conf. Proc., vol. 998; Melville, NY, 2008, pp. 1–17.

2. Pavel Exner: Leaky quantum graphs: a review, *Proceedings of the INI programme "Analysis on Graphs and Applications" (Cambridge 2007)*,

AMS "Contemporary Mathematics" Series, vol. 77, Providence, R.I., 2008; pp. 523–564 – *cf. [a2]*

3. David Krejčiřík: Twisting versus bending in quantum waveguides, *Proceedings of the INI programme "Analysis on Graphs and Applications" (Cambridge 2007)*, AMS "Contemporary Mathematics" Series, vol. 77, Providence, R.I., 2008; pp. 617–636 – *cf. [a2]*

4. Denis Kochan: Quantization of Non-Lagrangian systems: some irresponsible speculations, *AIP Conference Proceedings* **956** (2007), 3–8.

5. Pavel Exner, Martin Fraas: Interlaced dense point and absolutely continuous spectra for Hamiltonians with concentric-shell singular interactions, *Proceedings of the* QMath10 *Conference (Moeciu 2007)*, World Scientific, to appear

6. Pavel Štovíček, Matěj Tušek: On the spectrum of a quantum dot with impurity in the Lobachevsky plane, *Proceedings of the 7th Workshop on Operator Theory in Krein Spaces*, to appear

7. S. Vymětal, T. Kiss, I. Jex, G. Alber, A. Gabris, T. Langrová: Complex chaos in the conditional dynamics of qubits, *AIP Conference Proceedings*, to appear

8. T. Kiss, L. Kecskes, M. Štefaňák, I. Jex: Recurrence in coined quantum walks, *Physica Scripta*, to appear

9. J. Hrivnák, P. Novotný: Twisted cocycles of Lie algebras and corresponding invariant functions, *Linear Algebra and its Applications*, to appear; *doi: 10.1016/j.laa.2008.11.003*

10. Jan Kříž, Petr Šeba: Mechanical monitoring of human cardiovaskular system, *Analysis of Biomedical Signals Images, Proceedings of Biosignal 2008* (Brno 2008, ISSN 1211-412X), 165

11. Čestmír Burdík, Severín Pošta, Ondřej Navrátil: The adjoint representation of quantum algebra $U_q(sl(2))$, *Nonlinear Math. Phys.*, to appear

12. Oleh Hul, Petr Šeba, Leszek Sirko: Investigation of parameter-dependent properties of quantum graphs, *Phys. Scripta*, to appear

(f) Submitted in 2008 or before, not yet accepted

1. Angela Mestre: Generating connected and biconnected graphs, `arXiv:0710.5711v2`

2. Miloslav Znojil: Time-dependent quasi-Hermitian Hamiltonians and the unitarity of quantum evolution, `arXiv: 0710.5653`

3. Miloslav Znojil: Reply to Comment on "Time-dependent quasi-Hermitian Hamiltonians and the unitary quantum evolution", `arXiv: 0711.0514`

4. Miloslav Znojil: Which operator generates time evolution in Quantum Mechanics?, `arXiv: 0711.0535`

5. Miloslav Znojil: Matrix Hamiltonians with an algebraic guarantee of unbroken $\mathcal{PT}$-symmetry, `arXiv: 0801.0359`

6. Miloslav Znojil: $\mathcal{PT}$-symmetric knotting of coordinates: a new, topological mechanism of quantum confinement, `arXiv: 0801.0517`

7. P. Hájíček, J. Tolar: Intrinsic and extrinsic properties of quantum systems, `arXiv: 0802.0750`

8. Ľubomira Balková, Edita Pelantová: Palindromic saturation, `arXiv: 0802.4235`

9. Claudio Cacciapuoti, Domenico Finco: Graph-like models for thin waveguides with Robin boundary conditions, `arXiv: 0803.4314`

10. Miloslav Znojil: Two-step identification of observables in PT-symmetric quantum-toboggan models, `arXiv: 0803.0403`

11. Petr Šeba: Parking in the city: an example of limited resource sharing, `arXiv:0804.1676`

12. Miloslav Znojil: $\mathcal{PT}$-symmetric Sturmians, `arXiv: 0804.3857`

13. V. Potoček, A. Gabris, T. Kiss, I. Jex: Optimized quantum random walk search algorithms, `arXiv:0805.4347`

14. P. Hájíček, J. Tolar: Intrinsic properties of quantum systems, `arXiv: 0806.4437`

15. Miloslav Znojil: The complete menu of eligible metrics for a family of toy Hamiltonians $H \neq H^{\dagger}$ with real spectra, `arXiv: 0806.4295`

16. Emil Doležal, Petr Šeba: Spectral density of sample covariance matrices of colored noise, `arXiv:0807.2378`

17. Zuzana Masáková, Edita Pelantová: Relation between powers of factors and recurrence function characterizing Sturmian words, `arXiv:0809.0603`

18. Angela Mestre, Robert Oeckl: Hopf algebras and the combinatorics of connected graphs in quantum field theory, `arXiv:0808.1070`

19. Libor Šnobl, Pavel Winternitz: All solvable extensions of a class of nilpotent Lie algebras of dimension n and degree of nilpotency $n - 1$, `arXiv: 0809.3259`

20. I. Marzoli, P. Tombesi, G. Ciaramicoli, G. Werth, P. Bushev, S. Stahl, F. Schmidt-Kaler, M. Hellwig, C. Henkel, G. Marx, I. Jex, E. Stachowska, G. Syawiola, A. Walaszyk: Experimental and theoretical challenges for the trapped electron quantum computer, `arXiv:0810.440`

21. Pavel Exner, Olaf Post: Approximation of quantum graph vertex couplings by scaled Schrödinger operators on thin branched manifolds, `arXiv: 0811.3707`

22. Petr Ambrož, Zuzana Masáková, Edita Pelantová: Morphisms fixing words associated with exchange of three intervals, `arXiv:0811.2147`

23. S. Twareque Ali, Ľ. Balková, E.M.F. Curado, J.-P. Gazeau, M.A. Rego-Monteiro, Ligia M.C.S. Rodrigues, K. Sekimoto: Non-commutative reading of the complex plane through Delone sequences, `arXiv: 0811.4400`

24. Milan Krbálek, Petr Šeba: Spectral rigidity of vehicular streams (Random Matrix Theory approach), `arXiv: 0812.1106`

25. Karel Klouda, Edita Pelantová: Factor complexity of infinite words associated with non-simple Parry numbers, `arXiv: 0812.0164`

26. A.M. Grundland, I. Yurdusen: On certain geoetric aspects of surfaces associated with CP^{N-1} sigma models;
    http://doppler.ujf.cas.cz/DIpubl/DI08-020.pdf

27. M. Grundland, J. Patera, Z. Masáková, N. Dodgson: Image sampling with quasicrystals,
    http://www.cl.cam.ac.uk/ mg290/Rendering/QuasicrystalSampling.pdf

28. Thomas Brougham, Erika Andersson, Stephen M. Barnett: Entropic uncertainties for joint quantum measurements, submitted to *Phys.Rev.* **A**

29. V. Potoček, A. Gabris, T. Kiss, I. Jex: Optimized quantum random walk search algorithm on a hypercube, submitted to *Phys. Rev.* **A**

30. C.S. Hamilton, H. Lavička, E. Andersson, J. Jeffers, I. Jex: Quantum public key distribution with imperfect device components, submitted to *Phys. Rev.* **A**

31. M. Havlíček, J. Patera, E. Pelantová, J. Tolar: Lie algebras compatible with a grading, submitted to *J. Math. Phys.*

32. Boris Shapiro, Miloš Tater: On spectral polynomials of the Heun equation I, submitted to *Lett. Math. Phys.*

33. Ľubomira Balková, Karel Klouda, Edita Pelantov: Repetitions in β-integers, *preprint*

34. Denis Borisov, Pedro Freitas: Asymptotics of Dirichlet eigenvalues and eigenfunctions of the Laplacian in thin domains, *preprint*