

# Doppler Institute

*for Mathematical Physics and Applied Mathematics*

## 2024 List of Publications

### (a) Research papers in journals

#### (a1) Papers accepted and published in 2024

1. Bijan Bagchi, Aritra Ghosh, Miloslav Znojil: A reappraisal of Lagrangians with non-quadratic velocity dependence and branched Hamiltonians, *Symmetry* **16** (2024), 860
2. Marzieh Baradaran, Pavel Exner: Cairo lattice with time-reversal non-invariant vertex couplings, *J. Phys. A: Math. Theor.* **57** (2024), 265202
3. Marzieh Baradaran, Luis-Miguel Nieto, Saber Zarrinkamar: On some quantum correction to the Coulomb potential in generalized uncertainty principle approach, *Phys.Lett.* **B852** (2024), 138603
4. Jussi Behrndt, Iveta Semorádová, Petr Siegl: The imaginary Airy operator with a one-center delta-interaction, *Pure Appl. Funct. Anal.* **9** (2024), 915–934
5. Hao Chen; Shi-Hai Dong, Elham Maghsoodi, Sommayeh Hassanabadi, Jan Kříž, Soroush Zare; Hassam Hassanabadi: Gup-corrected black holes: thermodynamic properties, evaporation time and shadow constraint from EHT observations of M87\* and Sgr A\*, *Eur. Phys. J. Plus* **139** (2024), 759

6. Charlotte Dietze, Ayman Kachmar, Vladimir Lotoreichik: Isoperimetric inequalities for inner parallel curves, *J. Spect. Theory* **14** (2024), 1537–1562
7. Francisco Correa, Luis Inzunza, Vít Jakubský: Lorentzian quantum wells in graphene: the role of shape invariance in zero-energy states trapping, *Phys. Rev.* **B110** (2024), 075120
8. Lubomíra Dvořáková, Veronika Hendrychová: String attractors of Rote sequences, *Discr. Math. Theor. Comp. Sci.* **26** (2024), 3
9. Lubomíra Dvořáková, Pascal Ochem, Daniela Opočenská: Critical exponent of binary words with few distinct palindromes, *The Electr. J. Combinat.* **31** (2024), P2.29
10. Lubomíra Dvořáková, Edita Pelantová: The repetition threshold of episurmian sequences, *Eur. J. Combin.* **120** (2024), 104001
11. Jaroslav Dittrich, Saparboy Rakmanov, Davron Matrasulov: Dirac particle under dynamical confinement: Fermi acceleration, trembling motion and quantum force, *Phys. Lett.* **A503** (2024), 129408
12. Pavel Exner, Jan Pekař: Vertex coupling interpolation in quantum chain graphs, *J. Math. Phys.* **65** (2024) 092102
13. Pavel Exner, David Spitzkopf: Tunneling in soft waveguides: closing a book, *J. Phys. A: Math. Theor.* **57** (2024), 125301
14. Adailton Azevêdo Araújo Filho, Hassan Hassanabadi, Narges Heidari, Jan Kříž, Soroush Zare: Gravitational traces of bumblebee gravity in metric-affine formalism, *Class. Quantum Gravity* **41** (2024), 055003
15. Pedro Freitas, Jiří Lipovský: The spectral determinant for second-order elliptic operators on the real line, *Lett. Math. Phys.* **114** (2024), 65
16. Dhruva Jyoti Gogoi, Narges Heidari, Jan Kříž, Hassan Hassanabadi: Quasinormal Modes and Greybody Factors of de Sitter Black Holes Surrounded by Quintessence in Rastall Gravity, *Fortschritte der Physik* **72** (2024), 2300245
17. Craig S. Hamilton, Igor Jex: Boson sampling from non-Gaussian states, *Phys. Rev.* **A109** (2024), 052427
18. Dale Frymark, Markus Holzmann, Vladimir Lotoreichik: Spectral analysis of the Dirac operator with a singular interaction on a broken line, *J. Math. Phys.* **65** (2024), 083514
19. Toshitaka Hayashi, Dalibor Cimr, Filip Studnička, Hamido Fujita, Damián Bušovský, Richard Cimler: Patient deterioration detection using

- one-class classification via cluster period estimation subtask, *Information Sciences* **657** (2024), 119975
20. Narges Heidari, Hassan Hassanabadi, Adailton Azevêdo Araújo Filho, Jan Kříž: Exploring non-commutativity as a perturbation in the Schwarzschild black hole: quasinormal modes, scattering, and shadows, *Eur. Phys. J.* **C84** (2024), 566
  21. Narges Heidari, Hassan Hassanabadi, Adailton Azevêdo Araújo Filho, Jan Kříž, Soroush Zare, Paulo J. Porfírio: Gravitational signatures of a non-commutative stable black hole, *Physics of the Dark Universe* **43** (2024), 101382
  22. Lukáš Heriban, Matěj Tušek: Non-local relativistic  $\delta$ -shell interactions, *Lett. Math. Phys.* **114** (2024), 79
  23. Md Fazlul Hoque, Antonella Marchesiello, Libor Šnobl: Integrable systems of the ellipsoidal, paraboloidal and conical type with magnetic field, *J. Phys. A: Math. Theor.* **57** (2024), 225201
  24. Vít Jakubský, Kevin Zelaya: Flat-band engineering of quasi-one-dimensional systems via supersymmetric transformations, *Phys. Rev.* **B109** (2024), 245406
  25. Ayman Kachmar, Vladimir Lotoreichik: A geometric bound on the lowest magnetic Neumann eigenvalue via the torsion function, *SIAM J. Math. Anal.* **56** (2024), 5723–5745
  26. Ondřej Kubů, Antonella Marchesiello, Libor Šnobl: Integrable systems in magnetic fields: the generalized parabolic cylindrical case, *J. Phys. A: Math. Theor.* **57** (2024), 235203
  27. Antonella Marchesiello, Daniel Reyes, Libor Šnobl: Superintegrable families of magnetic monopoles with non-radial potential in curved background, *J. Geom. Phys.* **203** (2024), 105261
  28. Zuzana Masáková, Edita Pelantová: Periodicity and pure periodicity in alternate base systems, *Research in Number Theory* **10** (2024), 1
  29. Magdalena Parýzková, Martin Štefaňák, Jaroslav Novotný, Bálint Kollár, Tamás Kiss: Two-particle Hadamard walk on dynamically percolated line and circle, *Physica Scripta* **99** (2024), 035112
  30. Atilla Portik, Orsolya Kálmán, Igor Jex, Tamás Kiss: Robustness of chaotic behavior in iterated quantum protocols, *Phys. Rev.* **A109** (2024), 052410

31. Alexander Pushnitski, František Štampach: An inverse spectral problem for non-self-adjoint Jacobi matrices, *Int. Math. Res. Notes* **2024** (2024), 6106–6139
32. Saparboy Rakhmanov, Carsten Trunk, Miloslav Znojil, Davron Matrasulov:  $\mathcal{PT}$ -symmetric dynamical confinement: Fermi acceleration, quantum force, and Berry phase, *Phys. Rev.* **A109** (2024), 053519
33. Stanislav Skoupý, Martin Štefaňák: Search and state transfer between hubs by quantum walks, *Phys. Rev.* **A110** (2024), 022422
34. Pavel Štoviček: Coulomb Green's function and an addition formula for the Whittaker functions, *J. Math. Phys.* **65** (2024), 023503
35. Karel Tesař, Jaroslava Luňáčková, Michal Jex et al.: In vivo and in vitro study of resorbable magnesium wires for medical implants: Mg purity, surface quality, Zn alloying and polymer coating, *Journal of Magnetism and Alloys* **12** (2024), 2472–2488
36. Miloslav Znojil: Discrete-coordinate crypto-Hermitian quantum system controlled by time-dependent Robin boundary conditions, *Physica Scripta* **99** (2024), 035250
37. Miloslav Znojil: Calogero model without rearrangement symmetry, *Symmetry* **16** (2024), 27
38. Miloslav Znojil: Anisotropy and asymptotic degeneracy of the physical-Hilbert-space inner-product metrics in an exactly solvable unitary quantum model, *Symmetry* **16** (2024), 353
39. Miloslav Znojil: Features, paradoxes and amendments of perturbative non-Hermitian Quantum Mechanics, *Symmetry* **16** (2024), 629
40. Miloslav Znojil: Non-Hermitian-Hamiltonian-induced unitarity and optional physical inner products in Hilbert space, *Phys. Lett.* **A523** (2024), 129782

**(a2) Accepted earlier, published in 2024, or shortly before**

1. Biagio Cassano, Vladimir Lotoreichik: Self-adjointness for the MIT bag model on an unbounded cone, *Math. Nachr.* **297** (2024), 1006–1041
2. Ľubomíra Dvořáková: String attractors of episturmian sequences, *Theor. Comput. Sci.* **986** (2024), 114341
3. Ľubomíra Dvořáková, Edita Pelantová: An upper bound on asymptotic repetitive threshold of balanced sequences via colouring of the Fibonacci sequence, *Theoret. Comput. Sci.* **995** (2024), 114490

4. Pavel Exner: Geometry effects in quantum dot families, *Pure Appl. Funct. Anal.* **9** (2024), 1065–1080
5. Pavel Exner: Geometrically induced spectral properties of soft quantum waveguides and layers, *Rev. Math. Phys.* **36** (2024), 2360003
6. Pavel Exner, Sylwia Kondej, Vladimir Lotoreichik: Bound states of weakly deformed soft waveguides, *Asympt. Anal.* **138** (2024), 151–174
7. Pavel Exner, Semjon Vugalter: Bound states in bent soft waveguides, *J. Spect. Theory* **14** (2024), 427–457
8. David Krejčířík, Vladimir Lotoreichik: Quasi-conical domains with embedded eigenvalues, *Bull. London Math. Soc.* **56** (2024), 2969–2981
9. David Krejčířík, Vladimir Lotoreichik: Optimisation and monotonicity of the second Robin eigenvalue on a planar exterior domain, *Calc. Var. Part. Diff. Eqs* **63** (2024), 223
10. Jiří Lipovský, Tomáš Macháček: The role of the branch cut of the logarithm in the definition of the spectral determinant for non-selfadjoint operators, *Acta Physica Polonica* **A144** (2023), 462–468

**(b) Accepted for publication in 2024**

1. Emmanouil Bizas, Mariliena Mitrouli, Ondřej Turek: Efficient estimates for matrix-inverse quadratic forms, *Appl. Numer. Math.*, to appear
2. Ľubomíra Dvořáková, Zuzana Masáková, Edita Pelantová: 2-balanced sequences coding rectangle exchange transformation, *Theory of computation systems*, to appear
3. Michal Jex, Mathiew Lewin, Peter S. Madsen: Classical density functional theory: the local density approximation, *Rev. Math. Phys.*, to appear
4. Vladimir Lotoreichik: Improved inequalities between Dirichlet and Neumann eigenvalues of the biharmonic operator, *Proc. Amer. Math. Soc.*, to appear
5. Alexander Pushnitski, František Štampach: A functional model and tridiagonalisation for symmetric anti-linear operators, *J. Spect. Theory*, to appear

**(c) Submitted in 2024, not yet accepted**

1. K. Ando, E. Blasten, P. Exner, H. Isozaki, E. Korotyaev, M. Lassas, J. Lu, H. Morioka: Inverse problems for quantum graph associated with square and hexagonal lattices, [arXiv:2409.02605](#) [[math-ph](#)]
2. Adam Blažek, Edita Pelantová, Milena Svobodová: Optimal representations of Gaussian and Eisenstein integers using digit sets closed under multiplication, [arXiv:2410.02418](#) [[math.NT](#)]
3. Goce Chadzitaskos: Coherent states of the asymmetric harmonic oscillator, [arXiv:2406.03509](#) [[quant-ph](#)]
4. Emilia Charlier, Célia Cisternino, Zuzana Masáková, Edita Pelantová: Substitutions and Cantor real numeration systems, [arXiv:2312.13767](#) [[math.CO](#)]
5. Ľubomíra Dvořáková, Karel Klouda, Edita Pelantová: The asymptotic repetition threshold of sequences rich in palindromes, [arXiv:2409.06849](#) [[math.CO](#)]
6. Pavel Exner, Hynek Kovařík: Optimizing the ground of a Robin Laplacian: asymptotic behavior, [arXiv:2408.11636](#) [[math.SP](#)]
7. Pavel Exner, Jan Pekař: Spectral properties of hexagonal lattices with the  $-R$  coupling, [arXiv:2409.03538](#) [[math-ph](#)]
8. Pavel Exner, Jonathan Rohleder: Optimization of quantum graph eigenvalues with preferred orientation vertex conditions, [arXiv:2410.21820](#) [[math-ph](#)]
9. Pavel Exner, David Spitzkopf: Magnetic transport due to a translationally invariant potential obstacle, [arXiv:2410.16036](#) [[math-ph](#)]
10. Michal Jex, František Štampach: On the ground state of lattice Schrödinger operators, [arXiv:2312.08081](#) [[math.SP](#)]
11. Ayman Kachmar, Vladimir Lotoreichik, Mikael Sundqvist: On the Laplace operator with a weak magnetic field in exterior domains, [arXiv:2405.18154](#) [[math.SP](#)]
12. Orsolya Kálmán, Aurél Gábris, Igor Jex, Tamás Kiss: Unambiguous preparation of Bell pairs, [arXiv:2402.16752](#) [[quant-ph](#)]
13. Andrii Khrabustovskyi: The Neumann sieve problem revisited, [arXiv:2402.16451](#) [[math.AP](#)]
14. Andrii Khrabustovskyi, Vladimir Lotoreichik: Homogenization of the Dirac operator with position-dependent mass, [arXiv:2405.09949](#) [[math.AP](#)]

15. David Krejčířík, Jiří Lipovský: Spectral determinant for the wave equation on an interval with Dirac damping, [arXiv:2404.11992](#) [[math.SP](#)]
16. Orsolya Kálmán, Aurél Gábris, Igor Jex, Tamás Kiss: Unambiguous preparation of Bell pairs, [arXiv:2402.16752](#) [[quant-ph](#)]
17. Christos Koukouvinos, Mariliena. Mitrouli, Ondřej Turek: Using direct versus regularized solvers for realistic statistical models
18. Vladimir Lotoreichik: Inequalities between Dirichlet and Neumann eigenvalues of the magnetic Laplacian, [arXiv:2405.120774](#) [[math.SP](#)]
19. Vladimir Lotoreichik, Thomas Ourmières-Bonafos: Spectral asymptotics of the Dirac operator in a thin shell, [arXiv:2307.09033](#) [[math.SP](#)]