

Hynek Kovařík: curriculum vitae

Personal data

Date of birth: June 16th 1975

Place of birth: Valašské Meziříčí, Czechoslovakia.

Marital status: married.

Contact

Dipartimento di Ingegneria Civile, Architettura, Territorio, Ambiente e Matematica (DICATAM), Sezione di Matematica.

Università degli studi di Brescia

Via Branze, 38 - 25123, Brescia, Italy

Phone: +390303715742

Email: hynek.kovarik@unibs.it

Homepage: <http://hynek-kovarik.unibs.it>

Education

- **Master degree in physics:** September 1998 at the Charles University in Prague.
- **PhD degree:** September 2001 at the Charles University in Prague, in theoretical physics. Title of the PhD thesis: ‘Magnetic transport in two-dimensional electron systems’

Scientific Habilitation

- in April 2008 I obtained the (German) Habilitation für Mathematik at the University Stuttgart, Germany. Title of the habilitation thesis: ‘Spectral Properties of Schrödinger Operators’.
- in December 2013 I obtained the (Italian) Abilitazione Scientifica Nazionale as Professore di Seconda Fascia in Analisi Matematica (01/A3);
- in November 2014 I obtained the (Italian) Abilitazione Scientifica Nazionale as Professore di Prima Fascia in Analisi Matematica (01/A3).

- in August 2018 I obtained the (Italian) Abilitazione Scientifica Nazionale as Professore di Prima Fascia in Analisi Matematica (01/A3).

Positions

- October 2001-April 2002: post-doc at the Institute for Theoretical Physics, EPF Lausanne, Switzerland.
- April 2002-March 2008: research and teaching assistant at the Institute for Analysis, Dynamics and Modeling of the Stuttgart University, Germany.
- March 2008 - November 2008: research fellow of the German Research Foundation (DFG) at the Department of Mathematics, University of Modena, Italy.
- November 2008 - December 2011: assistant professor at the Department of Mathematics, Politecnico di Torino, Italy.
- December 2011 - December 2015: assistant professor at the “Sezione di Matematica” of the Department DICATAM, Università degli studi di Brescia, Italy.
- December 2015 - present date: associate professor at the “Sezione di Matematica” of the Department DICATAM, Università degli studi di Brescia, Italy.

Talks in Conferences and Workshops

1. Sfb288: Differential Geometry and Quantum Physics, Berlin, Germany, March 2000. Contributed talk.
2. ICMP 2000: XIII International Congress on Mathematical Physics, London, UK, July 2000. Contributed talk.
3. Workshop: Guided Quantum Particles, Prague, Czech Republic, June 2002. Contributed talk.
4. Mathematical Problems in Quantum Mechanics, Lisbon, Portugal, July 2003. Contributed talk.
5. QMath9: Mathematical Results in Quantum Mechanics, Giens, France, September 2004, Contributed talk.

6. Spectral Analysis of Partial Differential Equations, Oberwolfach, Germany, November-December 2004. Plenary talk.
7. Workshop: Mathematical Methods in Quantum Mechanics, Bressanone, Italy, February 2005. Contributed talk.
8. Workshop: The Mathematics of Quantum Systems: Spectral Theory, Warwick, UK, April 2005. Invited talk.
9. OTAMP 2006: Operator Theory, Analysis and Mathematical Physics, Lund, Sweden, June 2006. Contributed talk.
10. OTQP: Operator Theory in Quantum Physics; Prague, Czech Republic, 9-14 September 2006. Contributed talk.
11. Waves 2007: Reading, UK, 23-27 July 2007. Contributed talk.
12. Low lying eigenvalues of Laplace and Schrödinger operators: Oberwolfach, 8-14 February 2009. Plenary talk.
13. Transport in nano-structure devices: 9-12 August 2009. Aalborg, Denmark. Invited talk.
14. Analysis on graph and its applications: 25-31 July 2010. Isaac Newton Institute, Cambridge UK. Invited talk.
15. QMath 11: 6-10 September 2010. University of Hradec Králové, Czech Republic. Contributed talk.
16. JMK 2: 4-6 November 2010. University of Kairouan, Tunis. Invited talk.
17. Selected topics in spectral theory: 17-27 January 2011. Erwin Schrödinger Institute, Vienna, Austria. Invited talk.
18. Spectral Theory and Schrödinger Operators, workshop at Politecnico di Milano, March 13, 2011. Invited talk.
19. Convegno Nazionale di Calcolo delle Variazioni, Levico Terme, Italy. February 7, 2012. Contributed talk.
20. QMath12: 9-13 September 2013, Humboldt University of Berlin, Germany. Invited talk.

21. KAM theory and dispersive PDEs: September 8-11 2014, University SAPIENZA, Rome. Invited talk.
22. Spectral Theory and Mathematical Physics: 24-28 November 2014, Pontificia Universidad Catolica de Chile, Santiago. Invited talk.
23. Magnetic fields and semi-classical analysis: 19-22 May 2015, Université de Rennes 1, France. Invited talk.
24. Mathematics of Novel Materials: 1-5 June 2015, Istitute Mittag-Leffler, Stockholm, Sweden. Invited talk.
25. Trails in Quantum Mechanics and Surroundings, 8-10 July 2015, Università degli Studi dell'Insubria, Como. Invited talk.
26. ICMP, July 27 -August 1, 2015, Santiago de Chile. Invited session talk.
27. Proprietà analitico geometriche di soluzioni di EDP, January 25-27, 2016, Naples. Invited talk.
28. Geometric aspects of PDE's and functional inequalities, April 28-30 2016, Cortona, Italy. Invited talk.
29. Spectral Days, April 3 - 7, 2017. Stuttgart, Germany. Invited talk.
30. Phase Transitions Models, April 30 - May 5, 2017. Banff, Canada. Invited talk.
31. Brescia Trento Nonlinear Day, May 25 , 2018. Brescia. Invited talk.
32. Spectral Methods in Mathematical Physics, January 17, 2019. Mittag-Leffler Institute, Stockholm. Invited talk.
33. On mathematical aspects of interacting systems in low dimension, June 25. 2019. University of Hagen, Germany. Invited talk.
34. XXI Congresso dell'Unione Matematica Italiana, September 2-6, 2019. Pavia, Italy. Invited session talk.
35. Workshop on Spectral Geometry and Analysis of Differential Operators, September 9-11, 2019. Padova, Italy. Invited talk.
36. Workshop on Quantum Mechanics of Artificial Material Structures, February 16-22 2020. Sochi, Russia. Invited talk.

Talks in Seminars

1. *Magnetic transport along a one-dimensional perturbation in the plane.* Department of Mathematics, Royal Institute of Technology, Stockholm, Sweden. September 2000.
2. *Magnetic transport in a straight parabolic channel.* Institut Fourier, Grenoble, France. March 2001.
3. *Magnetic transport in a straight parabolic channel.* Department of Mathematics, Royal Institute of Technology, Stockholm, Sweden. November 2001.
4. *Resonances width in crossed electric and magnetic fields.* Doppler Institute, Czech Technical University, Prague, Czech Republic. March 2003.
5. *On the discrete spectrum of the magnetic Schrödinger operator in a waveguide.* Doppler Institute, Czech Technical University, Prague, Czech Republic. April 2004.
6. *Stability of Schrödinger operator in twisted tubes.* Doppler Institute, Czech Technical University, Prague, Czech Republic. March 2005.
7. *Resonances in crossed electric and magnetic fields.* Department of Mathematics, Università di Modena e Reggio Emilia, Modena, Italy. October 2005.
8. *Stark Resonances in electro-magnetic field.* Institut Fourier, Université Grenoble, France. November 2005.
9. *On the number of bound states of a Schrödinger operator on regular metric trees.* Doppler Institute, Czech Technical University, Prague, Czech Republic. March 2006.
10. *Eigenvalue estimates for Schrödinger operators on regular metric trees.* Department of Mathematics, University of Pavia, Italy. January 2007.
11. *Spectral estimates for two-dimensional Schrödinger operators.* Centre de Physique Theorique, Luminy, Marseille, France. March 2007.
12. *Eigenvalue estimates for Schrödinger operators on metric trees.* Department of Mathematics, Stuttgart University, Germany. October 2007.

13. *Two-dimensional Berezin-Li-Yau inequalities with a correction term.* Department of Mathematics, Università di Modena e Reggio Emilia, Modena, Italy. March 2008.
14. *Le disuguaglianze di Berezin-Li-Yau e le loro generalizzazioni.* Department of Mathematics, Università di Pavia, Pavia, Italy. June 2008.
15. *Berezin-Li-Yau inequalities.* Centre de Physique Theorique, Marseille, France. June 2008.
16. *Propriétés spectrales des guides d'ondes quantiques.* Département de Mathématique, Université du Sud Toulon-Var, Toulon, France. Septembre 2008.
17. *Autovalori del Laplaciano su domini limitati.* Department of Mathematics, Politecnico di Torino, Torino, Italy. December 2008.
18. *Proprietà spettrali della guide d'onda quantistiche,* Department of Physics, University of Modena, Modena, Italy. January 2009.
19. *Eigenvalue asymptotic of Robin Laplace operators on two-dimensional domains with cusps.* Department of Mathematics, Stuttgart University, Germany. April 2009.
20. *Heat kernel estimates for Laplace operators in twisted tubes.* Centre Bernoulli, Ecole Polytechnique Fédérale de Lausanne, Switzerland. January 2010.
21. *Large time behavior of the heat kernel of two-dimensional magnetic Schrödinger operators.* Department of Mathematics, Stuttgart University, Germany. April 2010.
22. *Heat kernel of two-dimensional magnetic Schrödinger operators.* Department of Mathematics, Université de Provence, Marseille, France. June 2010.
23. *Eigenvalue asymptotic of Robin Laplace operators on two-dimensional domains.* Department of Mathematics, Royal Institute of Technology, Stockholm, Sweden. September 29, 2010.
24. *Two-dimensional magnetic Hamiltonians.* Department of Mathematics, Royal Institute of Technology, Stockholm, Sweden. October 4, 2010.
25. *Eigenvalue asymptotic of Robin Laplace operators on two-dimensional domains with cusps.* Department of Mathematics, Università di Milano Bicocca, Milano, Italy. February 15, 2011.

26. *Eigenvalue bounds for two-dimensional Schrödinger operators with magnetic field.* Doppler Institute, Czech Technical University, Prague, Czech Republic. April 5, 2011.
27. *Heat kernel estimates of twisted tubes.* Department of Mathematics, Stuttgart University, Germany. May 2, 2011.
28. *Heat semigroups of Two-dimensional Schrödinger and Pauli operators.* Faculty of Mathematics, Ponticia Universidad Catolica de Chile, Santiago, May 12, 2011.
29. *Heat kernel estimates of twisted tubes.* Department of Mathematics, Royal Institute of Technology, Stockholm, Sweden. September 29, 2011.
30. *Weakly perturbed p -Laplacian.* Department of Mathematics, Brescia University, Italy. February 22, 2012.
31. *Weak coupling behavior of the perturbed p -Laplacian.* Department of Mathematics, Technion, Israel Institute of Technology, Haifa, Israel. May 1, 2012.
32. *Heat semigroups of regular metric trees.* Faculty of Mathematics and Computer Science, Weizmann Institute of Science, Rehovot, Israel. May 2, 2012.
33. *Hardy inequality for Robin Laplacians.* Department of Mathematics, Ulm University, Germany. April 30, 2013.
34. *Weak coupling behavior of the perturbed p -Laplacian.* Department of Mathematics, Stuttgart University, Germany. May 6, 2013.
35. *Weak perturbations of the p -Laplacian.* Department of Mathematics, Politecnico di Milano, Italy. October 16, 2013.
36. *Time decay of two-dimensional magnetic Schrödinger operators.* Institut Fourier, Grenoble, France. November 4, 2013.
37. *Hardy inequality for Robin Laplacians.* Department of Mathematics, University of Lisbon, Portugal. February 4, 2014.
38. *Hardy inequality for Robin Laplacians on convex domains.* Department of Mathematics, Università degli Studi di Napoli Federico II, Italy. May 15, 2014.
39. *Time decay of two-dimensional magnetic Schrödinger operators.* Department of Mathematics, Stuttgart University, Germany. June 10, 2014.

40. *Improved Berezin-Li-Yau inequality with magnetic field.* Department of Mathematics, Fern-Universität Hagen, Germany. January 15, 2015.
41. *Optimizing the first eigenvalue of some quasilinear operators with respect to boundary conditions.* Department of Mathematics, Stuttgart University, Germany. June 2, 2016.
42. *Absence of eigenvalues of two-dimensional magnetic Schrödinger operators.* Department of Mathematics, LMU Munich, Germany. July 22, 2017.
43. *Absence of eigenvalues of two-dimensional magnetic Schrödinger operators.* Department of Mathematics, Technion, Israel Institute of Technology, Haifa, Israel. June 6, 2018.
44. *Resolvent expansion at threshold of two-dimensional Pauli operators.* Department of Mathematics, Karlsruhe Institute of Technology, Germany. May 14, 2019.
45. *Robin eigenvalues on domains with cusps.* Department of Mathematics, Politecnico di Milano, Italy. June 6, 2019.
46. *Eigenvalues of magnetic Schrödinger operators.* Lisbon WADE - Webinar in Analysis and Differential Equations. November 16, 2020. (through zoom).
47. *Absence of eigenvalues of magnetic Schrödinger operators.* Analysis Seminar - Hebrew University, Jerusalem, Department of Mathematics. November 18, 2020. (through zoom).
48. *On embedded eigenvalues of magnetic Schrödinger operators.* Quantum Circle - Doppler Institute, Prague. December 15, 2020. (through zoom).

Experience in organization of conferences and workshops

- Co-organizer of the Mini-Workshop "Eigenvalue Problems in Surface Superconductivity", Oberwolfach Mathematical Institute, 30 November - 6 December 2014. (Together with V. Bonnaillie-Noel and K. Pankrashkin).
- Co-organizer of the Workshop "Eigenvalues and Inequalities", Mittag-Leffler Mathematical Institute, Stockholm. May 14-May 18, 2018. (Together with R. Benguria and T. Weidl).

Teaching Experience

At the **Stuttgart University** I held tutorials of the following courses:

- 2001-2002: *Functional analysis* for undergraduate students of Mathematics, II. semester (in English).
- 2002-2003: *Analysis 1* for undergraduate students of Mathematics, I. semester; *Analysis 2* for undergraduate students of Mathematics, II. semester (in German).
- 2003-2004: *Analysis 3* for undergraduate students of Mathematics, I. semester; *Higher analysis* for undergraduate students of Mathematics, II. semester (in German).
- 2004-2005: *Functional analysis* for undergraduate students of Mathematics, I. semester; *Higher analysis* for undergraduate students of Mathematics, II. semester (in German).
- 2005-2006: *Higher mathematics I* for undergraduate students of Physics, I. semester; *Higher mathematics II* for undergraduate students of Physics, II. semester (in German).
- 2006-2007: *Higher mathematics III* for undergraduate students of Physics, I. semester; *Higher Analysis* for undergraduate students of Mathematics, II. semester (in German).
- 2007-2008: *Mathematics I* for undergraduate students of Computer Sciences, I. semester (in German).

At the **Stuttgart University** I taught the following course:

- 2006-2007: “Problems of quantum mechanics from the mathematical point of view” for undergraduate students of Mathematics, II. semester (in German).

At the **Politecnico di Torino** I held tutorials of the following courses:

- 2008-2009: *Analysis II* for undergraduate students of Engineering, II. semester, (in Italian).
- 2009-2010: *Analysis II* for undergraduate students of Engineering, II. semester (in Italian).

- 2010-2011: *Analysis I* for the foreign undergraduate students of Engineering, I. semester (in English).
- 2011-2012: *Analysis I* for the foreign undergraduate students of Engineering, I. semester (in English).
- 2011-2012: *Mathematical Analysis II* for the foreign undergraduate students of Engineering, I. semester (in English).

At the **University of Brescia** I held tutorials of the following courses:

- 2011-2012: *Mathematical Analysis B* for undergraduate students of Management Engineering, II. semester (in Italian).
- 2012-2013: *Mathematical Analysis II* for undergraduate students of Mechanical Engineering, I. semester (in Italian).

At the **University of Brescia** I taught the following courses:

- 2012-2013: *Mathematical Analysis I* for undergraduate students of Civil and Environmental Engineering, I. semester (in Italian).
- 2013-2014: *Mathematical Analysis B* for undergraduate students of Management Engineering, II. semester (in Italian).
- 2014-2015: *Mathematical Analysis B* for undergraduate students of Management Engineering, II. semester (in Italian).
- 2015-2016: *Mathematical Analysis B* for undergraduate students of Management Engineering, II. semester (in Italian).
- 2016-2017: *Mathematical Analysis A* for undergraduate students of Management Engineering, I. semester (in Italian).
- 2016-2017: *Mathematical Analysis II* for undergraduate students of Mechanical Engineering, I. semester (in Italian).
- 2017-2018: *Mathematical Analysis II* for undergraduate students of Mechanical Engineering, I. semester (in Italian).
- 2017-2018: *Mathematical Analysis I* for undergraduate students of Computer Engineering, I. semester (in Italian).

- 2018-2019: *Mathematical Analysis I* for undergraduate students of Computer Engineering, I. semester (in Italian).
- 2018-2019: *Mathematical Analysis II* for undergraduate students of Mechanical Engineering, I. semester (in Italian).
- 2019-2020: *Mathematical Analysis I* for undergraduate students of Computer Engineering, I. semester (in Italian).
- 2019-2020: *Mathematical Analysis II* for undergraduate students of Mechanical Engineering, I. semester (in Italian).
- 2018-2019: *Elements of Functional Analysis in Banach spaces* for graduate students in Mathematical Methods for Engineering, (in English).
- 2019-2020: *Elements of Functional Analysis in Banach spaces* for graduate students in Mathematical Methods for Engineering, (in Italian).
- 2020-2021: *Mathematical Analysis I* for undergraduate students of Computer Engineering, I. semester (in Italian).
- 2020-2021: *Mathematical Analysis II* for undergraduate students of Mechanical Engineering, I. semester (in Italian).

Fellowships and Prizes

- Fellowship of the Program Tempra from Région Rhône-Alpes, 2000-2001.
- Fellowship of the German Research Foundation, March 2008-September 2009.
- Vigevani Research Project Prize for the project "Resonances of the Pauli Operator with Anomalous Magnetic Moment". Together with Jonathan Breuer (Hebrew University, Jerusalem). 2020-2021.

Language skills

Fluent in English, German, French, Italian. Native language: Czech.

Scientific Interests

In my research I deal with the spectral theory of differential operators and mathematical methods of quantum physics. In particular, I'm interested in

1. **Magnetic transport in two-dimensional systems.**
2. **Existence of resonances in presence of magnetic and electric fields.**
3. **Hardy inequalities for magnetic Schrödinger and Laplace operators.**
4. **Spectral properties of Schrödinger operators on metric trees.**
5. **Lieb-Thirring inequalities for Schrödinger operators.**
6. **Spectral analysis of Laplace operators on bounded domains.**
7. **Laplacians and p -Laplacians with Robin boundary conditions. Weak perturbations.**
8. **Semi-groups and unitary groups generated by Schrödinger operators.**

Publications

Books:

1. P. Exner, H. Kovařík: *Quantum Waveguides*, 382 pp. Springer International Publishing AG Switzerland 2015.
2. *Functional analysis and operator theory for quantum physics. The Pavel Exner anniversary volume.* Edited by J. Dittrich, H. Kovařík and A. Laptev. EMS Series of Congress Reports. European Mathematical Society, Zürich, 2017.

Published Articles:

1. P. Exner, A. Joye, H. Kovařík: Edge currents in the absence of edges. *Phys. Lett. A* **264** (1999) 124–130.
2. P. Exner, H. Kovařík: Magnetic strip waveguides. *J. Phys. A* **33** (2000) 3297–3311.
3. P. Exner, A. Joye, H. Kovařík: Magnetic transport in a straight parabolic channel. *J. Phys. A* **34** (2001) 9733–9752.
4. Ch. Ferrari, H. Kovařík: Resonance Width in Crossed Electric and Magnetic Fields. *J. Phys. A.* **37** (2004) 7671-7697.

5. Ch. Ferrari and H. Kovařík: On the Exponential Decay of Magnetic Stark Resonances. *Rep. Math. Phys.* **56** no.2 (2005) 197–207.
6. T. Ekholm and H. Kovařík: Stability of the magnetic Schrödinger operator in a waveguide. *Comm. Partial Differential Equations* **30** (2005) 539–565.
7. D. Borisov, T. Ekholm, H. Kovařík: Spectrum of the magnetic Schrödinger operator in a waveguide with combined boundary conditions. *Ann. H. Poincaré* **6** (2005) 327–342.
8. P. Exner and H. Kovařík: Spectrum of the Schrödinger operator in a perturbed periodically twisted tube. *Lett. Math. Phys.* **73** (2005) 183–192.
9. H. Kovařík and A. Sacchetti: Resonances in twisted waveguides. *J. Phys. A: Math. Theor.* **40** (2007) 8371–8384.
10. H. Kovařík, S. Vugalter and T. Weidl: Spectral estimates for two-dimensional Schrödinger operators with application to quantum layers. *Comm. Math. Phys.* **275** (2007) 827–838.
11. H. Kovařík: Weakly coupled Schrödinger operators on regular metric trees. *SIAM J. Math. Anal.* **39** (2007) 1135–1149.
12. T. Ekholm, H. Kovařík and D. Krejčířík: A Hardy inequality in twisted waveguides. *Arch. Ration. Mech. Anal.* **188** (2008) 245–264.
13. H. Kovařík and D. Krejčířík: A Hardy inequality in a twisted Dirichlet-Neumann waveguide. *Math. Nachr.* **281** (2008) 1159–1168.
14. H. Kovařík and S. Vugalter: Estimates on trapped modes in deformed quantum layers. *J. Math. Anal. Appl.* **345** (2008) 566–572.
15. T. Ekholm, R.L. Frank and H. Kovařík: Remarks about Hardy inequalities on metric trees. *Proc. Sympos. Pure. Math.* **77** (2008) 369–379.
16. H. Kovařík, S. Vugalter and T. Weidl: Two-dimensional Berezin-Li-Yau inequalities with a correction term. *Comm. Math. Phys.* **287** (2009) 959–981.
17. Ph. Briet, H. Kovařík, G. Raikov and E. Soccorsi: Eigenvalue asymptotics in a twisted waveguide. *Comm. Partial Differential Equations* **34** (2009) 818–836.

18. T. Ekholm, A. Enblom, H. Kovařík: Schrödinger Operators on Regular Metric Trees with Long Range Potentials: Weak Coupling Behavior. *J. Differential Equations* **248** (2010) 850–865.
19. H. Kovařík, A. Sacchetti: A nonlinear Schrödinger equation with two symmetric point interactions in one dimension. *J. Phys. A. Math. Theor.* **43** (2010) 155205.
20. H. Kovařík: Eigenvalue asymptotic of Robin Laplace operators on two-dimensional domains with cusps. *J. London Math. Soc.* **83** (2011) 256-271.
21. T. Ekholm, R.L. Frank and H. Kovařík: Eigenvalue estimates for Schrödinger operators on metric trees. *Adv. Math.* **226** (2011) 5165-5197.
22. V. Grecchi, H. Kovařík, A. Martinez, A. Sacchetti, V. Sordani: Resonant states for a three-body problem under an external field. *Asymp. Anal.* **75** (2011) 37-77.
23. H. Kovařík: Eigenvalue bounds for two-dimensional magnetic Schrödinger operators. *J. Spectr. Theory* **1** (2011) 363-387.
24. H. Kovařík: Heat kernels of two-dimensional magnetic Schrödinger and Pauli operators. *Calc. Var. Partial Differential Equations.* **44** (2012) 351-374.
25. H. Kovařík, A. Laptev: Hardy inequalities for Robin Laplacians. *J. Funct. Anal.* **262** (2012) 4972-4985.
26. R. Frank, H. Kovařík: Heat kernels of metric trees and applications. *SIAM J. Math. Anal.* **45** (2013) 1027–1046.
27. Ph. Briet, H. Kovařík, G. Raikov: Scattering in twisted waveguides. *J. Funct. Anal.* **266** (2014) 1–35.
28. G. Grillo, H. Kovařík: Weighted dispersive estimates for two-dimensional Schrödinger operators with Aharonov-Bohm magnetic field. *J. Differential Equations* **256** (2014) 3889-3911.
29. H. Kovařík: On the lowest eigenvalue of Laplace operators with mixed boundary conditions. *J. Geom. Anal.* **24** (2014) 1509–1525.
30. G. Grillo, H. Kovařík and Y. Pinchover: Sharp two-sided heat kernel estimates of twisted tubes and applications. *Arch. Ration. Mech. Anal.* **213** (2014) 215-243.

31. H. Kovařík, F. Truc: Schrödinger operators on a half-line with inverse square potentials. *Math. Mod. Nat. Phen.: Spectral Problems* **9** Issue **5** (2014) 170–176.
32. H. Kovařík: Improved Hardy inequality in twisted tubes. Mathematical results in quantum mechanics, 139–149, World Sci. Publ., Hackensack, NJ (2015).
33. H. Kovařík, T. Weidl: Improved Berezin-Li-Yau inequalities with magnetic field. *Proc. Royal Soc. Edinburgh, Sect. A* **145** no. 1, (2015) 145–160.
34. T. Ekholm, R.L. Frank and H. Kovařík: Weak perturbations of the p-Laplacian. *Calc. Var. Partial Differential Equations.* **54** (2015) 781–801.
35. H. Kovařík: Resolvent expansion and time decay of the wave functions for two-dimensional magnetic Schrödinger operators. *Comm. Math. Phys.* **337** (2015) 681–726.
36. T. Ekholm, H. Kovařík, A. Laptev: Hardy inequalities for p-Laplacians with Robin boundary conditions. *Nonlinear Anal.* **128** (2015) 365–379.
37. L. Fanelli, G. Grillo, H. Kovařík: Improved time-decay for a class of scaling critical electromagnetic Schrödinger flows. *J. Funct. Anal.* **269** (2015) 3336–3346.
38. D. Barseghyan, P. Exner, H. Kovařík and T. Weidl: Semiclassical bounds in magnetic bottles. *Rev. Math. Phys.* **28** (2016) 1650002 (29 pages).
39. T. Ekholm, H. Kovařík, F. Portmann: Estimates for the Lowest Eigenvalue of Magnetic Laplacians. *J. Math. Anal. Appl.* **439** (2016) 330–346.
40. H. Kovařík, B. Ruszkowski, T. Weidl: Spectral estimates for the Heisenberg Laplacian on cylinders. Functional analysis and operator theory for quantum physics, 433–446, *EMS Ser. Congr. Rep.*. EMS, Zürich, 2017.
41. F. Della Pietra, N. Gavitone, H. Kovařík: Optimizing the first eigenvalue of some quasilinear operators with respect to the boundary conditions. *ESAIM Control Optim. Calc. Var.* **23** (2017) 1381–1395.
42. J. Have, H. Kovařík, T. Pedersen and H. Cornean: On the existence of impurity bound excitons in one-dimensional systems with zero range interactions. *J. Math. Phys.* **58** (2017) 052106, 16 pp.

43. H. Kovařík, K. Pankrashkin: On the p -Laplacian with Robin boundary conditions and boundary trace theorems. *Calc. Var. Partial Differential Equations*. **56** (2017) Art. 49, 29 pp.
44. H. Kovařík, D. Mugnolo: Heat kernel estimates for Schrödinger operators on exterior domains with Robin boundary conditions. *Potential Analysis* **48** (2018) 159–180.
45. H. Kovařík, B. Ruszkowski, T. Weidl: Melas-type bounds for the Heisenberg Laplacian on bounded domains. *J. Spect. Theory* **8** (2018) 413–434.
46. H. Kovařík, K. Pankrashkin: Robin eigenvalues on domains with peaks. *J. Differential Equations* **267** (2019) 1600–1630.
47. B. Helffer, H. Kovařík, M.P. Sundqvist: On the semi-classical analysis of the groundstate energy of the Dirichlet Pauli operator III: Magnetic fields that change sign. *Lett. Math. Phys.* **109** (2019) 1533–1558.
48. R. Frank, T. König, H. Kovařík: Energy asymptotics in the Brezis–Nirenberg problem. The higher-dimensional case. *Mathematics in Engineering* **2** (2020) 119–140.
49. H. Cornean, H. Kovařík, T. Pedersen: Impurity bound excitons in dimension one and two. *J. Spectr. Theory* **10** (2020) 1103–1138.
50. H. Kovařík, and Y. Pinchover: On minimal decay at infinity of Hardy-weights. *Commun. Contemp. Math.* **22** (2020), 1950046.
51. R. Frank, T. König, H. Kovařík: Energy asymptotics in the three-dimensional Brezis–Nirenberg problem. *Calc. Var. Partial Differential Equations*. **60** (2021) Art. 58, 46 pp.

Submitted Articles:

52. S. Avramška-Lukarska, D. Hundertmark, H. Kovařík: Absence of positive eigenvalues for magnetic Schrödinger operators. Submitted. arXiv:2003.07294.
53. H. Kovařík: Heat kernel estimates for two-dimensional relativistic Hamiltonians with magnetic field. Submitted. arXiv:2011.13828.
54. R. Frank, T. König, H. Kovařík: Blow-up of solutions of critical elliptic equation in three dimensions. Submitted. arXiv:2102.10525.

Last update: February 23, 2021