Dr Sergey Morozov

CURRICULUM VITAE

PROFILE

I am a mathematician working in Analysis and Spectral Theory. My research is mostly dedicated to the study of spectral properties of operators arising in Mathematical Physics and Quantum Mechanics. I have experience of research and teaching in 4 countries and languages, including a temporary professorship in Mathematics at Ludwig-Maximilians University of Munich. I teach as Privatdozent at Ludwig-Maximilians University of Munich.

PERSONAL DATA

- **Mailing Address:**
  Deidesheimer Str. 36
  80797 Munich
  Germany
- **Phone (mobile):** +49 176 38679598
- **E-mail:** morozov@math.lmu.de
- **Born:** March 1, 1980

EDUCATION AND QUALIFICATIONS

- **Habilitation** in Mathematics
  Ludwig-Maximilians University of Munich, Germany, October 2018
- **Doctor of Science** in mathematics with honours (summa cum laude)
  Ludwig-Maximilians University of Munich, Germany, May 2008
  Doctoral thesis: Multiparticle Brown-Ravenhall operators in external fields
  Supervisor: Prof. Heinz Siedentop
- **Master of Physics** with distinction
  St. Petersburg State University, Russia, January 2005
  Thesis adviser: Prof. M. Sh. Birman
- **Master of Science** in Mathematics with distinction
  Ludwig-Maximilians University of Munich, Germany, August 2004
  Thesis adviser: Prof. Heinz Siedentop
- **Bachelor of Physics** with distinction
  St. Petersburg State University, Russia, June 2001

EMPLOYMENT

- **Since March 2019:** Prvatdozent, Ludwig-Maximilians-University of Munich, Germany
- **October 2019 – March 2020:** Researcher, Ludwig-Maximilians-University of Munich, Germany
- **October 2012 – March 2019:** Research Associate (Akademischer Rat auf Zeit), Ludwig-Maximilians-University of Munich, Germany
- **October 2016 – March 2017:** Professor (temporary), Ludwig-Maximilians-University of Munich, Germany
- **May 2011 – September 2012:** Post-doctoral researcher,
  Aarhus University, Denmark

- **June 2008 – April 2011:** Research Associate (full time post-doctoral position), supplemented with a part-time teaching position
  University College London, UK
- **August 2005 – May 2008:** Researcher (3/4 of full time, as PhD student), supplemented with several part-time teaching positions
  Ludwig-Maximilians-University of Munich, Germany
- **March – July 2005:** Assistant (1/2 of full time, as PhD student)
  Ludwig-Maximilians-University of Munich, Germany
- **September 2001 – February 2005:** Part time teaching positions (as master student)
  St. Petersburg State University, Russia and LMU Munich, Germany

TEACHING EXPERIENCE

- **Lecturer in Spectral Theory of Periodic Operators,** LMU Munich, 2019
- **Assistant in Partial Differential Equations I,** LMU Munich, 2018/19
- **Assistant in Mathematics for Physicists II,** LMU Munich, 2018
- **Assistant in Partial Differential Equations I,** LMU Munich, 2017/18
- **Assistant in Partial Differential Equations II,** LMU Munich, 2017
- **Lecturer in Analysis I for Computer Scientists and Statisticians,** LMU Munich, 2016/17
- **Assistant in Mathematical Quantum Mechanics II,** LMU Munich, 2016
- **Assistant in Analysis I-III,** LMU Munich, 2014 – 2016
- **Lecturer in Spectral Theory of Periodic Operators,** LMU Munich, 2014
- **Assistant in Mathematical Quantum Mechanics I and II,**
  LMU Munich, 2013 – 2014
- **Assistant in Partial Differential Equations,** LMU Munich, 2012/13
- **Tutor at the Mathematical Laboratory,** Aarhus University, 2011 – 2012
- **Lecturer in Evolutionary Games,** University College London, 2009 – 2011
- **Tutor in Pure Mathematics,** University College London, 2009 – 2010
- **Tutor in Applied Mathematics,** University College London, 2008 – 2009
- **Tutor in Mathematical Quantum Mechanics,** LMU Munich, 2007
- **Marker in Many Body Quantum Mechanics,** LMU Munich, 2007
- **Tutor in Complex Analysis,** LMU Munich, 2007
- **Assistant in Ordinary Differential Equations,** LMU Munich, 2005
- **Teacher in Advanced Physics,**
  St. Petersburg City Palace of Youth Creativity, 2004/05
- **Marker in Numerics,** LMU Munich, 2004
- **Marker in Functional Analysis,** LMU Munich, 2003/04
- **Teacher in Physics,**
  Summer School of Physic-Mathematical Lyceum 30, St. Petersburg, 2003
- **Tutor in Mathematical Analysis,** St. Petersburg State University, 2001 – 2003

GRANTS AND SCHOLARSHIPS

- Participation in RSF grant 18-11-00032 “Research on actual problems of Mathematical Physics”, 2018 – 2019
- Participation in RSF grant 15-11-30007 “Research on actual problems of Mathematical Physics”, 2016 – 2017
- Employment under ERC Framework 7 grant 202859, 2011-2012
- Employment under Lundbeck research grant 495763 “Mathematical Problems in Superconductivity and Bose-Einstein Condensation”, 2011
- Employment under EPSRC research grant EP/F029721/1 “Periodic spectral problems”, 2008-2011
- Scholarship of DAAD STIBET Program (teaching and research assistantship), 2007
- Stipend of DAAD STIBET Program (German courses for international PhD students), 2006-2007
- Employment under German Research Foundation's (DFG) research grant SI 348/12-2 “Relativistic Matter and Its Interaction”, 2005-2008
- Support from Quality Network of DAAD, 2003-2004
- S. P. Merkurjev's stipend of St. Petersburg State University, 2001

CONFERENCE TALKS

- **On the eigenvalues in the gap of Dirac operators with a Coulomb type singularity.** Density Functionals for Many-Particle Systems, National University of Singapore, 2019
- **The spectral representation for massless Coulomb-Dirac operators.** Dirac-2019: Waves, Particles, Spectra; St. Petersburg Branch of Steklov Institute of Mathematics of the Russian Academy of Sciences, St. Petersburg, 2019
- **Self-adjoint realisations of supercritical Coulomb-Dirac operators.** Nonlinear dynamics and long-time asymptotics, St. Petersburg Branch of Steklov Institute of Mathematics of the Russian Academy of Sciences, St. Petersburg, 2019
- **Lower bounds on the moduli of Coulomb-Dirac operators and their applications.** 3rd joint annual meeting of the German Mathematical Society (DMV) and Society for Didactics in Mathematics (GDM), University of Paderborn, 2018
- **Dirac operators with Coulomb potentials.** Mathematical Challenges in Quantum Mechanics, "Sapienza" Università di Roma, Rome, 2018
- **Fourier-Mellin theory of the relativistic massless Coulomb operator.** Effective equations for many particle Coulomb system, University of Mannheim, 2017
- **On the eigenvalues of perturbed projected Coulomb-Dirac operators.** Linear and Nonlinear Dirac Equation: advances and open problems, University of Insubria, Como, 2017
- **Lower bound on the moduli of Coulomb-Dirac operators by fractional Laplacians.** Effective one-particle equations for fermionic many-particle Coulomb system, University of Mannheim, 2016
- **Estimates on the eigenvalues of perturbed projected massless Coulomb-Dirac operators.** Operator theory, Analysis and Applications, Euler International Mathematical Institute, St. Petersburg, 2016
- **On the eigenvalues of perturbed positively projected Dirac-Coulomb operator**

in two dimensions. Joint Annual Meeting of German Mathematical Society (DMV) and International Association of Applied Mathematics (GAMM), Technische Universität Braunschweig, 2016

- **High energy asymptotics of the integrated density of states of almost periodic pseudo-differential operators.** Almost-periodic and other ergodic problems, Isaac Newton Institute, Cambridge, 2015
- **High energy behaviour of the density of states of multidimensional periodic operators.** Spectral Theory of Coulomb Systems, Symposium in honour of Heinz Siedentop on the occasion of his 60th birthday, Institute Henry Poincare, Paris, 2013
- **On the density of states of multidimensional periodic operators.** Analysis of Partial Differential Equations and Their Applications, German-Sino Workshop, Göttingen, 2013
- **Complete asymptotic expansion of the integrated density of states of multidimensional almost-periodic pseudo-differential operators.** New Developments in Relativistic Quantum Mechanics and Applications, Isaac Newton Institute, Cambridge, 2012
- **Exponential decay of eigenfunctions of Brown-Ravenhall operators.** Workshop on the theory of large Coulomb systems, National University of Singapore, 2010
- **Lower bound on the density of states for periodic Schrödinger operators.** Second South-West Regional PDE Winter School, Swansea, 2010
- **Weakly coupled bound states of Pauli operator.** Spectral Theory and Partial Differential Equations, ESF-Workshop, Erwin Schrödinger Institute, Vienna, 2007
- **The spectrum of the many-particle Brown-Ravenhall operator.** Foundations and constructive aspects of Quantum Field Theory, 20th LQP Workshop, University of Leipzig, 2007
- **On the many particle Brown-Ravenhall operator.** Joint annual conference of the German Mathematical Society (DMV) and Society for Didactics in Mathematics (GDM), Humboldt University, Berlin, 2007
- **On the ground state energy of some magnetic Schrödinger operators in the weak coupling limit.** Vth Meeting of the GDRE Mathematics and Quantum Physics, CIRM Luminy, Marseille, 2007
- **The spectrum of the many-particle Brown-Ravenhall operator.** Pan-American Advanced Studies Institute on Analysis and Probability in Quantum Physics, Pontificia Universidad Catolica de Chile, Santiago de Chile, 2006
- **On the many-particle Brown-Ravenhall operator.** First workshop of complex quantum and classical systems and effective equations program, Erwin Schrödinger Institute, Vienna, 2006
- **Stability of atoms in the Brown-Ravenhall model.** 5th meeting of EU network “Analysis and Quantum”, Erwin Schrödinger Institute, Vienna, 2006

LANGUAGE SKILLS

- **Russian:** Mother tongue
- **English:** IELTS score 8.0, May 2010
- **German:** Mark 2+ on the level C2, February 2007
- **Danish:** Level 4 of Danish Education 3, May 2012

Dr Sergey Morozov

LIST OF PUBLICATIONS

ARTICLES

[1] S. V. Morozov. **Some properties of solutions to a second order elliptic equation with principal part of divergence form with potential concentrated on a hyper-surface.** *Journal of Mathematical Sciences (New York)*, 132(4): 404-418, 2006. *Problems in mathematical analysis.* No. 31.
Online: http://www.springerlink.com/content/p1047766752g1066/.

[2] Sergey Morozov and Semjon Vugalter. **Stability of atoms in the Brown-Ravenhall model.** *Annales Henri Poincaré*, 7(4): 661-687, 2006.
Online: http://www.springerlink.com/content/7j45834l46q58444/.

[3] Sergey Morozov. **Essential spectrum of multiparticle Brown-Ravenhall operators in external field.** *Documenta Mathematica*, 13: 51-79, 2008.
Online: http://www.mathematik.uni-bielefeld.de/documenta/vol-13/03.html.

[4] Sergey Morozov. **Exponential decay of eigenfunctions of Brown-Ravenhall operators.** *Journal of Physics A: Mathematical and Theoretical*, 42(47): 475206, 2009.
Online: http://iopscience.iop.org/1751-8121/42/47/475206/.

[5] Sergey Morozov, Leonid Parnovski, and Irina Pchelintseva. **Lower bound on the density of states for periodic Schrödinger operators.** *Operator Theory and Its Applications: In Memory of V. B. Lidskii (1924-2008). AMS Translations - Series 2* (231), *Advances in the Mathematical Sciences,* 161-172, 2010.
Preprint: http://arxiv.org/abs/0907.4465.

[6] Rupert Frank, Sergey Morozov, and Semjon Vugalter. **Weakly coupled bound states of Pauli operators.** *Calculus of Variations and Partial Differential Equations,* 40(1-2): 253-271, 2011.
Online: http://www.springerlink.com/content/2758152628140555/.

[7] Sergey Morozov, Leonid Parnovski, and Roman Shterenberg. **Complete asymptotic expansion of the integrated density of states of multidimensional almost-periodic pseudo-differential operators.** *Annales Henri Poincaré,* 15(2): 263-312, 2014.
Online: http://link.springer.com/article/10.1007%2Fs00023-013-0246-8.

[8] Sergey Morozov and David Müller. **On the minimax principle for Coulomb-Dirac operators.** *Mathematische Zeitschrift,* 280(3-4): 733-747, 2015.
Online: http://link.springer.com/article/10.1007/s00209-015-1445-4.

[9] Sergey Morozov and David Müller. **On the virtual levels of positively projected massless Coulomb-Dirac operators.** *Annales Henri Poincaré,* 18(7): 2467-2497, 2017.
Online: https://link.springer.com/article/10.1007/s00023-017-0570-5.

[10] Sergey Morozov and David Müller. **Lower bounds on the moduli of three-dimensional Coulomb-Dirac operators via fractional Laplacians with applications.** *Journal of Mathematical Physics,* 58: 072302, 2017.
Online: http://aip.scitation.org/doi/full/10.1063/1.4995406.

[11] Sergey Morozov and David Müller. **Lieb-Thirring and Cwickel-Lieb-Rozenblum inequalities for perturbed graphene with a Coulomb impurity.** *Journal of Spectral Theory*, 8(3): 987-1017, 2018.
Online: https://www.ems-ph.org/journals/show_abstract.php?issn=1664-039X&vol=8&iss=3&rank=8&srch=searchterm%7CMorozov.

DOCTORAL DISSERTATION

[1] Sergey Morozov. **Multiparticle Brown-Ravenhall operators in external fields.** *Dissertation,* LMU Munich, 2008.
Online: https://edoc.ub.uni-muenchen.de/8539/.

MASTER THESIS

[1] Sergey Morozov. **Extension of a minimax principle for Coulomb-Dirac operators.** *Master thesis,* LMU Munich, 2004.
Online: http://www.mathematik.uni-muenchen.de/~morozov/Morozov_Master_LMU.pdf.

OTHER PUBLICATIONS

[1] Sergey Morozov. **Eigenwerte des Laplace-Operators in beschränkten Mengen und die Weyl-Asymptotik.** *Mathe-LMU.de, Zeitschrift der Carathéodory-Gesellschaft an der LMU München,* 36: 21-27, 2018.
Online: https://caratheodory-gesellschaft-lmu.de/content/03-zeitschrift/ausgabe36.pdf.