

Sergiu MOROIANU

Contact

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Research interests

Index theory, pseudodifferential calculus on singular spaces, hyperbolic manifolds, spectral and geometric zeta functions, Einstein manifolds.

Diplomas

2013 Abilitare, IMAR.

2010 Qualification à la fonction de Professeur des universités (France).

2004 Habilitation à diriger des recherches, Université Paul Sabatier, Toulouse, France.

1999 PhD in Mathematics, dissertation: *Residue functionals on the algebra of adiabatic pseudo-differential operators*, MIT, USA.

1996 Licențiat în matematică, Universitatea București, România.

1994 DEA de Mathématiques, École Polytechnique, Palaiseau, France.

1991 Bacalaureat, Liceul de Informatică, București, România.

Work experience

- Since Oct. 2013: Professor, IMAR, Bucharest, Romania.
 - Jul. 2005 – Sep. 2013: Associate professor, IMAR.
 - Apr.–Jun. 2012 Visiting Professor, École Polytechnique, Palaiseau, France.
 - Dec. 2011: Visiting Professor, École Polytechnique, Palaiseau.
 - Apr.–Jun. 2011: CNRS Visiting Professor, École Polytechnique, Palaiseau.
 - Sep.–Nov. 2010: CNRS Visiting Professor, École Normale Supérieure, France.
 - Apr. 2006 – Oct. 2008: Director, SNSB Mathematics department.
 - Oct. 2007 Visiting Assistant Professor, Université Paul Sabatier, Toulouse, France.
 - Sep. 2004 – July 2005: Assistant professor, IMAR.
 - Oct. 2002 – Sep. 2004: Post-doc, Université Paul Sabatier, Toulouse.
 - Oct. 2001 – Sep. 2002: Post-doc, Universität Hamburg, Germany.
 - Aug. 1999 – Sep. 2001: Researcher, IMAR.
 - Sep. 1994 – Jul. 1999: Teaching Assistant, MIT, USA.
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Publications

- (1) *Fredholm Theory for degenerate pseudodifferential operators on manifolds with fibered boundaries*, (with Robert Lauter), *Comm. Partial Diff. Equat.* **26** (2001), 233–285.
- (2) *Homology of pseudo-differential operators on manifolds with fibered boundaries*, (with Robert Lauter), *J. Reine Angew. Math.* **547** (2002), 207–234.
- (3) *The index of cusp operators on manifolds with corners*, (with Robert Lauter), *Ann. Global Anal. Geom.* **21** (2002), 31–49.
- (4) *Sur la limite adiabatique des fonctions η et ζ* , *Comptes Rendus Math.* **334** (2002), 131–134.
- (5) *K-Theory of suspended pseudo-differential operators*, *K-Theory* **28** (2003), 167–181.
- (6) *Homology of pseudodifferential operators on manifolds with fibered cusps*, (with Robert Lauter), *T. Am. Mat. Soc.* **355** (2003), 3009–3046.

- (7) *Heat Kernel Asymptotics for Roots of Generalized Laplacians*, (with Christian Bär), *Int. J. Math.* **14** (2003), 397–412.
- (8) *Adiabatic limits of eta and zeta functions of elliptic operators*, *Math. Z.* **246** (2004), 441–471.
- (9) *Homology of adiabatic pseudo-differential operators*, *Nagoya Math. J.* **175** (2004), 171–221.
- (10) *An index formula on manifolds with fibered cusp ends*, (with Robert Lauter), *J. Geom. Analysis* **15** (2005), 261–283.
- (11) *Cusp geometry and the cobordism invariance of the index*, *Adv. Math.* **194** (2005), 504–519.
- (12) *Gravitational and axial anomalies for generalized Euclidean Taub-NUT metrics* (with Ion Cotăescu and Mihai Vişinescu), *J. Phys. A – Math. Gen.* **38** (2005), 7005–7019.
- (13) *On the L^p index of spin Dirac operators on conical manifolds*, (with André Legrand), *Studia Math.* **177** (2006), 97–112.
- (14) *On Carvalho’s K -theoretic formulation of the cobordism invariance of the index*, *P. Am. Math. Soc.* **134** (2006), 3395–3404.
- (15) *L^2 -index of the Dirac operator of generalized Euclidean Taub-NUT metrics* (with Mihai Vişinescu), *J. Phys. A - Math. Gen.* **39** (2006), 6575–6581.
- (16) *On the structure of quantum permutation groups* (with Teodor Banica), *P. Am. Mat. Soc.* **135** (2007), 21–29.
- (17) *Fibered cusp versus d -index theory*, *Rendiconti Semin. Math. Padova.* **117** (2007), 193–203.
- (18) *The Dirac spectrum on manifolds with gradient conformal vector fields*, (with Andrei Moroianu), *J. Funct. Analysis.* **253** nr. 1 (2007), 207–219.
- (19) *Weyl laws on open manifolds*, *Math. Annalen* **340**, nr. 1 (2008), 1–21.
- (20) *Index and homology of pseudodifferential operators on manifolds with boundary* (with Victor Nistor), *Perspect. Operat. Algebras Math. Phys.* (2008), 123–148.
- (21) *Spectral analysis of magnetic Laplacians on conformally cusp manifolds* (with Sylvain Golénia), *Ann. H. Poincaré* **9** (2008), 131–179.
- (22) *Adiabatic limit of the eta invariant over cofinite quotients of $PSL(2, R)$* (with Paul Loya and Jinsung Park), *Compositio Mat.* **144** (2008), 1593–1616.
- (23) *Quasi-fuchsian manifolds with particles* (with Jean-Marc Schlenker), *J. Differ. Geom.* **83** (2009), 75–129.
- (24) *The spectrum of k -form Schrödinger Laplacians on conformally cusp manifolds* (with Sylvain Golénia), *Trans. Amer. Math. Soc.* **364** (2012), 1–29.
- (25) *Regularity of the eta function on manifolds with cusps*, (with Paul Loya and Jinsung Park), *Math. Zeitschrift* **269** (2011), no. 3–4, 955–975.
- (26) *Eta invariant and Selberg Zeta function of odd type over convex co-compact hyperbolic manifolds*, (with Colin Guillarmou and Jinsung Park), *Advances in Math.* **225** (2010), no. 5, 2464–2516.
- (27) *The Dirac operator on generalized Taub-NUT spaces*, (with Andrei Moroianu), *Commun. Math. Phys.* **305** (2011), 641–656.
- (28) *On the Singularities of the Zeta and Eta functions of an Elliptic Operator*, (with Paul Loya and Raphael Ponge), *Int. J. Math.* **23**, No. 6 (2012), 1250020.
- (29) *Bergman and Calderón projectors for Dirac operators*, (with Colin Guillarmou and Jinsung Park), *J. Geom. Analysis* **24**, no. 1 (2014), 298–336.
- (30) *Uniformization of S^2 and flat singular surfaces*, preprint arXiv:1101.2355
- (31) *Chern-Simons line bundle on Teichmüller space*, (with Colin Guillarmou), *Geometry & Topology* **18** (2014), 327–377.

- (32) *The Cauchy problem for Einstein metrics and parallel spinors*, (with Bernd Ammann and Andrei Moroianu), *Commun. Math. Phys.* **320**, 173–198 (2013).
- (33) *Ricci surfaces*, (with Andrei Moroianu), *Ann. Sc. Norm. Super. Pisa Cl. Sci.* **14**, no. 4 (2015), 1093–1118.
- (34) *The renormalized volume and uniformisation of conformal structures*, (with Colin Guillarmou and Jean-Marc Schlenker), arXiv:1211.6705.
- (35) *Positivity of the renormalized volume of almost-Fuchsian hyperbolic 3-manifolds* (with Corina Ciobotaru), *Proc. AMS.* **144** (2016), 151–159.
- (36) *A Spinorial Approach to Riemannian and Conformal Geometry* (book in collaboration with Jean-Pierre Bourguignon, Oussama Hijazi, Jean-Louis Milhorat, and Andrei Moroianu, 458 pages), EMS Monographs in Mathematics, 2015.
- (37) *Convexity of the renormalized volume of hyperbolic 3-manifolds*, arXiv:1503.07981.
- (38) *Renormalized volume on the Teichmüller space of punctured surfaces*, (with Colin Guillarmou and Frédéric Rochon), arXiv:1503.07981, to appear in *Ann. Sc. Norm. Super. Pisa, Cl. Sci.*
- (39) *Boundaries of locally conformally flat manifolds in dimensions $4k$* , arXiv:1506.05968.
- (40) *The Cotton tensor and Chern-Simons invariants in dimension 3: an introduction*, arXiv:1509.05156, *Buletinul Academiei de Științe a Republicii Moldova. Matematica* **78**, no. 2 (2015), 3–20.
- (41) *On pluricanonical locally conformally Kähler manifolds*, (with Andrei Moroianu), preprint arXiv:1512.04318.

Courses and talks

- *Courses*:
 - “Introduction to de Rham cohomology”, SNSB, 2015–2016.
 - “The Selberg trace formula”, SNSB, 2014–2015.
 - “Introduction to Chern-Simons invariants in dimension 3”, doctoral course, University of Bucharest, 2014.
 - “Riemann surfaces from the geometric and analytic viewpoint”, SNSB, 2013–2014.
 - Reading course on Riemann surfaces, IMAR, 2013.
 - “Braid groups and mapping class groups”, SNSB, 2013.
 - “Riemann surfaces”, Școala Normală Superioară Bucharest, 2009.
 - Mini-course “Spectral asymptotics for Dirac operators”, Korea Institute of Advanced Studies summer school, 2007.
 - “Hyperbolic manifolds in dimensions 2 and 3”, Școala Normală Superioară Bucharest, 2007 (with Jean-Marc Schlenker).
 - “ K -theory and differential operators”, Școala Normală Superioară, 2005.
 - “Algebraic Topology”, University of Bucharest, 2005.
 - Mini-course “Introduction to Global Analysis”, Instituto Superior Tecnico, Lisbon, Feb. 2002.
 - “Differential geometry”, University of Pitești, 2001.
 - “Mathematical methods for engineers”, MIT, 1999.
 - “Differential equations”, MIT, 1998.
 - “Linear Algebra”, MIT, 1997.
- *Conference talks*:
 - *Geometry and PDE's*, Timișoara, Jun. 2016.
 - *MITRE 2015*, Chișinău, Jul. 2015.
 - *Géométrie spinorielle et analyse sur les variétés*, Marsilia, Oct. 2014.
 - *CAIM 2013*, Bucharest, Sep. 2013.

- 150 years Conference of the Science Faculty, Bucharest, Aug. 2013.
- WYRM 3, Constanța, May 2013.
- Conference in honor of Cabiria Andreian-Cazacu, Bucharest, Feb. 2013.
- Analysis and Geometric Singularities, Oberwolfach, May 2012.
- Analysis, Geometry and Surfaces, Autrans, Jan. 2012.
- CAIM 20, Iași, Sep. 2011.
- Microlocal Methods in Math. Physics and Global Analysis, Tübingen, Jun. 2011.
- Analysis, Geometry and Surfaces, Autrans, Mar. 2011.
- Lectures on Spectral invariants and Moduli spaces, Seoul, Jun. 2010.
- IMAR 60 International Conference, Jun. 2009.
- Geometric Applications of Microlocal Analysis, Luminy, Jun. 2008.
- Workshop on Analysis and Geometry, Hannover, Sep. 2007.
- Spectral problems for Dirac and Laplace operators, Paris, Jan. 2007.
- Spectral theory and Global Analysis, Oldenburg, Aug. 2006.
- PDE's on noncompact and singular manifolds, Potsdam, Aug. 2006.
- KIAS Workshop on Spectral Invariants and Related Topics, Seoul, May 2006.
- 7th Intl. Workshop on Differential Geometry and Applications, Deva, Sept. 2005.
- Analysis and Geometric Singularities, Oberwolfach, Aug. 2005.
- Second joint meeting of AMS, DMV, ÖMV, Mainz, Jun. 2005.
- Degenerate PDE's and Singular Geometries, Potsdam, Aug. 2004.
- Analyse Géométrique, CIRM Marseille, March 2004.
- Operator Algebras, Singularities, Deformation Quantisation, Potsdam, Mar. 2004.
- Operator algebras on manifolds with singularities, Potsdam, Mar. 2003.
- Journées Nancéiennes de Géométrie, Nancy, Jan. 2003.
- Geometric analysis and singular spaces, Oberwolfach, June 2002.
- 5th Intl. Workshop on Diff. Geometry and Applications, Timișoara, Sept. 2001.
- Ellipticity and Parabolicity in Analysis and Geometry, Potsdam, Aug. 2001.
- Geometric Analysis, Potsdam, Oct. 2000.
- L^2 -Methods in Geometry, Sarasota, Jan. 2000.
- 4th Intl. Workshop on Differential Geometry and Applications, Brașov, Sept. 1999.
- Operator Algebras and Asymptotics on Manifolds with Singularities, Warsaw, April 1999.
- *Seminar invited talks*
 - 2016: Fribourg.
 - 2014: IMAR.
 - 2013: University of Bucharest; IMAR.
 - 2012: IHP Paris.
 - 2011: Regensburg; Nantes.
 - 2010: Toulouse; IHP Paris.
 - 2009: Bucharest.
 - 2007: Chișinău; Toulouse.
 - 2006: Toulouse.
 - 2005: Potsdam.
 - 2004: Bucharest.
 - 2003: Ecole Polytechnique; HU Berlin; Ecole Normale Lyon; Clermont-Ferrand.
 - 2002: IST Lisbon; Paris 6.
 - 2001: Paris 11; Mainz.

- Premiul Ad Astra pentru “Excelența în cercetare – afiliere în România”, 2014.
- Romanian Academy prize “Simion Stoilow”, 2003 (awarded in 2005).
- National Foundation for Science and Arts prize, 2004.
- International Mathematical Olympiads
 - 1991: first prize (42 pts.).
 - 1990: second prize.

Community work

- 2016– Member of the Mathematics commission CNATDCU of the Ministry of Research.
- 2016 Special Session on Algebra, Geometry and Topology Dedicated to the 150th Anniversary of the Romanian Academy, Constanța.
- 2014 Co-organizer of the “4th Workshop for Young Researchers in Mathematics”, Constanța.
- 2014 Co-organizer of the meeting “Real and Complex Differential Geometry”, University of Bucharest.
- 2011–2012 Member of the Mathematics commission CNATDCU of the Ministry of Research.
- 2007–2011 Co-organizer of three International Workshops on Differential Geometry and its Applications: Cluj-Napoca (2007), Iași (2009) and Constanța (2011).
- 2006–2008 Director of the Mathematics Department of Școala Normală Superioară Bucharest.
- Editor of three proceedings volumes for the International Workshops on Differential Geometry and its applications: Deva 2005, Cluj-Napoca 2007, Iași 2009.
- 2006–2012 Member of the Users Committee SCUC for Zentralblatt Math.

Grants

- Principal investigator, Grant PNII-TE-0053/2011 “Quantum invariants in hyperbolic geometry”, 2012–2014, budget 705.00 lei.
- Principal investigator, Grant PNII-ID-1188/2009 “Geometric and quantum invariants of 3-manifolds and applications”, 2009-2011, budget: 1.000.000 lei.
- Principal investigator, CNRS – Romanian Academy grant, 2006–2007.
- Principal investigator, Marie Curie European reintegration grant MERG-006375, 2004-2005, budget: 40.000 euro.

Languages

- Romanian: native.
- English, French: fluent.
- German: advanced.
- Italian, Portuguese, Spanish: beginner.