Curriculum Vitæ – Prof. Dr. Boris Vertman

Research Interests

Mathematical Physics:

mean curvature flow and index theory in Lorentzian space-times, discretized Quantum field theories, discrete determinants.

Geometric PDE, calculus of variations:

Ricci flow, Perelman entropies, Yamabe flow on singular spaces, index theory, symplectic geometry, Bergman kernel asymptotics.

Spectral Geometry:

rho invariants and positive scalar curvature on singular spaces, analytic torsion, Cheeger-Müller theorem, discrete determinants regular-singular Sturm-Liouville operators.

Numerical Analysis:

hp-FEM on singular spaces, Allen-Cahn PDE and phase transition.

Academic Career

from 2026	**Technical University Berlin** (*W3 Professorship*)
2017-2026	**University of Oldenburg** (*W2 Professorship*)
summer 2016	**University of Bonn** (*W3 substitute Professorship*)
2014-2017	**University of Münster** (*non-tenure track W2 Professorship*)
2012-2014	**University of Bonn** (*Assistant Professorship, Habilitation*) Assistant Professor (Akademischer Rat auf Zeit) Habilitation on "Spectral geometry on edge spaces"
2009-2010	**Stanford University** (Postdoctoral fellow) Postdoctoral advisor Prof. Rafe Mazzeo
2006-2008	**University of Bonn** (*Ph.D. studies*) thesis on "Analytic Torsion on Manifolds with Boundary and Conical Singularities", advisor Prof. Matthias Lesch
2004-2005	**University of Cambridge** (*M.Sc. studies*) Masters in Mathematics (Part III of Mathematical Tripos), **Distinction**, awarded *"Scholar of the Downing College"*
2001-2006	**University of Cologne** (*Diplom* (*M.Sc.*) *studies*) thesis on "Dirac Operators and weak unique continuation property", Vordiplom in Physics *and* Mathematics.

Honours, Awards and Grants

Planned applications

- DFG Research group "Singular Analysis"
- DFG International Research Training Group "Beyond regular"

2025	**DFG "Cartan geometric description of gravity"** Grant for a 3 year Ph.D. position and Mercator Fellowship for Prof. Hohmann, as well as travel grants.
2023	**DAAD "Algebraic, Geom. and Diff. Topology"** DAAD (Germany) and CAPES (Brazil) travel grants for a cooperation between Sao Paulo and Oldenburg
2022	**Visiting Professorship Sapienza University, Rome** "National Group for the Algebraic and Geometric). Structures and their Applications" (GNSAGA- INDAM)
2017	**DFG Priority Programm "Geometry at Infinity"** Grant for a 3 year Postdoctoral Position and a 3 year Ph.D. position, including travel grants
2017	**DFG Grant for conference in Geometric Analysis** DFG Grant for an international conference at Oldenburg University in September 2018, SPP 2026
2016	**Mittag Leffler Institute, Stockholm, Sweden** Grant for organizing an international conference on Geometric Analysis and Mathematical Physics
2017-2018	**Sao Paolo Research Foundation FAPESP, Brazil** grant for joint research with Prof. Hartmann
2012	**Excellence Cluster for the Hausdorff Center Bonn** involved in the second period grant application
2011	**Berkeley & Hausdorff Center Cooperation Grant** for Postdoctoral Research at Berkeley University, joint research cooperation with Prof. Reshetikhin
2009-2010	**DFG Research Scholarship at Stanford** for Postdoctoral Research at Stanford University (Feodor Lynen, DAAD Scholarships offered)

2006-2008	**Scholarship of the "Graduiertenkolleg Köln"** for Ph.D. Research at University of Cologne, Bonn
June 2005	**Scholar of the Downing College at Cambridge** in recognition of Distinction at the Certificate of Advanced Studies in Mathematics (Masters)
2004-2005	**DAAD Excellence Programm Cambridge** for the Mathematical Tripos Part III at Cambridge
2004-2005	**Kölner Gymnasial- und Stiftungsfonds** for the Mathematical Tripos Part III at Cambridge
2001-2005	**Studienstiftung des Deutschen Volkes** for academic studies in Cologne and Cambridge

Organized conferences

June 2026	**Interfaces of Spectral Theory, Operator Algebras and Noncommutative Geometry** at the University Bonn, (funding by the Hausdorff center secured), organized jointly with Dr. Oliver Fürst
September 2018	**Geometric Singular Analysis and Math. Physics** at the Carl von Ossietzky University Oldenburg, jointly with Daniel Grieser and Rafe Mazzeo
September 2018	**Ricci flow, mean curvature and related singular flows** at the University Hamburg, jointly with Miles Simon, Oliver Schnürer and Klaus Kröncke
February 2018	**Geometric Evolution Equations** at the University Konstanz, jointly with Miles Simon, Oliver Schnürer and Klaus Kröncke
May 2018	**Interfaces between Geometric Analysis and Mathematical Physics II** Mittag Leffler Institute in Stockholm, Sweden jointly with Bernhelm Booss, Matthias Lesch, and George Marinescu
February 2018	**Geometric and Singular Analysis** at Potsdam University, jointly with Bert-Wolfgang Schulze, Wolfgang Bauer, Sandro Coriasco, Sara Azzali, Kenro Furutani , Sylvie Paycha, Rene Schulz, Ingo Witt.

June 2016	**Interfaces between Geometric Analysis and Mathematical Physics I** Mittag Leffler Institute in Stockholm, Sweden jointly with Bernhelm Booss, Matthias Lesch, Nicolai Reshetikhin and George Marinescu
February 2015	**Geometric and Singular Analysis** at Potsdam University, jointly with Schulze, Bauer Coriasco, Azzali, Furutani , Paycha, Rodino, Witt.

Academic long-time research visits

2020, 2021, 2023	Sapienza University, Rome, Italy cooperation with Prof. Paolo Piazza and Francesco Bei
2017, 2018, 2022	Sao Carlos University, Brazil cooperation with Prof. Luiz Hartmann
summer 2011	Berkeley University, United States cooperation with Prof. Reshetikhin
spring 2011	Université Paris-Sud, France, cooperation with Prof. Rafe Mazzeo and Prof. Bismut

A choice of 10 selected publications

51 papers in total (including 3 preprints)
2 papers in final stage preparation

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10. *Spectral zeta function on discrete tori and Epstein-Riemann conjecture*
jointly with Alexander Meiners, **J. Number Theory 244**, 418-461 (2023)

9. *Signatures of Witt spaces with boundary*
jointly with Paolo Piazza, **Advances Math. 405** (2022)

8. *Eta and rho invariants on manifolds with edges*
with Paolo Piazza, **Annales Inst. Fourier 69**, no. 5, 1955–2035 (2019)

7. *Stability of Ricci de Turck flow on Singular Spaces*
with Klaus Kröncke, **Calc. Var. PDE 58**, no. 2, Paper No. 74 (2019)

6. *Combinatorial Quantum Field Theory and Gluing Formula for Determinants*, with Nicolai Reshetikhin
Letters in Math. Physics 105, Issue 3, pp 309-340 (2015)

5. *Regularizing infinite sums of zeta-determinants*
with Matthias Lesch, **Math. Annalen 361** 3-4, pp 835-862 (2015)

4. *The Metric Anomaly of Analytic Torsion on Spaces with Conical Singularities*
with Werner Müller, **Communications in PDE. 39**, (1) pp 146-191 (2014)

3. *Elliptic theory of differential edge operators, II*
Boundary value problems, with Rafe Mazzeo
Indiana Math. Journal 63, No. 6, pp 1911-1955 (2014)

2. *Analytic torsion on manifolds with edges*
with Rafe Mazzeo, **Advances in Math. 231** (2012) pp 1000-1040

1. *Refined analytic torsion on manifolds with boundary*
Geometry and Topology 13, no. 4, 1989–2027 (2009)

Selected invited presentations

September 2025	***Microlocal analysis and discrete geometry*** University of Hannover, in honour of Prof. Schrohe
September 2023	***Positive Einstein metrics on singular spaces*** University of Tokyo, Prof. Akutagawa
September 2022	***Yamabe flow on stratified spaces*** Colloquium at Sapienza University
February 2019	***Perelman entropies on singular spaces*** Australian-German Workshop on Differential Geometry
September 2018	***Resolvent trace asymptotics on stratified spaces*** Conference in honor of Prof. Sternin, Moscow
February 2018	***Stability of Ricci de Turck flow on conical spaces*** Colloquium at Sao Paolo University, Sao Carlos
November 2016	***Geometric flows on edge manifolds*** lecture course, invited by Prof. Akutagawa, Tokyo
April 2016	***Ricci flow on singular manifolds*** Conference on *Evolution eq. on singular spaces*, Lumini
February 2014	***Combinatorial gluing formula and Gaussian QFT*** Workshop on *Modern Trends in Topological QFT*, ESI Wien
September 2012	***Summer School on Singular Analysis*** lecture course, organized by Göttingen & Hannover
April 2012	***Yamabe flow on singular spaces*** Spring Lecture Series, University of Arkansas
July 2010	***Recent Advances on Analytic Torsion of Singular Spaces*** Oberwolfach Workshop on Geometric Singularities
February 2010	***Heat Kernel and Analytic Torsion on Edges Spaces*** Santa Barbara Geometry Seminar, Santa Barbara
October 2009	***The regular-singular Sturm-Liouville operators*** Stanford Geometry Seminar

References

Prof. Rafe Mazzeo
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Prof. Nicolai Reshetikhin
Berkeley University, CA 94720
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Prof. Richard Melrose
MIT, Massachusetts, MA 02139
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Prof. Paolo Piazza
Sapienza University, 00185 Roma
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Prof. Werner Müller
Universität Bonn, 53115 Bonn
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Prof. Matthias Lesch
Universität Bonn, 53115 Bonn
lesch@math.uni-bonn.de

Reviewer for mathematical journals

Duke, Journal of Functional Analysis, Mathematische Annalen, Comm. PDE, Journal of Geometry and Physics, Communications in Analysis and Geometry, Communications in Mathematical Physics, etc.

Further professional activities

Summer 2006 — **Visiting Associate at the Boston Consulting Group**
Retail segment reconstruction for a bank

Summer 2004 — **Internship as an Actuary in Gerling Insurance**
Monte-Carlo Simulations, Risc Assessment

Winter 2003/04 — **Scientific Assistant at the Nuclear Institute, Cologne**
digital measuring technology in nuclear desintegration