Paweł Biernat

Curriculum Vitae

Life & Medical Sciences Institute,
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Field of expertise

Nonlinear partial differential equations; numerical methods; high–performance computing; computer–assisted proofs; Bayesian modeling; variational inference; single–cell genomics.

Education

2014 PhD in Mathematics, Jagiellonian University, Kraków, Poland,
Advisor: Prof. Dr. Piotr Bizoń

2010 MSc in Physics, Jagiellonian University, Kraków, Poland
Advisor: Prof. Dr. Piotr Bizoń

Professional appointments

2016– Senior Postdoctoral Researcher, LIMES–Institute, University of Bonn

2014–2016 Postdoctoral Researcher, Mathematical Institute, University of Bonn

Grants, honors & awards

2017 NVIDIA GPU Grant, hardware donation from NVIDIA

2012,–13,–14 Deans research grants, Institute of Mathematics, Jagiellonian University, Kraków

2011 Financial prize for publishing in a high–ranking journal, Institute of Mathematics, Jagiellonian University, Kraków

2010 Geometry and Topology in Physical Models, 4–year PhD scholarship, Foundation for Polish Science

Publications

Journal articles

2017 Biernat P., Seki Y., *Type II blow-up mechanism for supercritical harmonic map heat flow*, International Mathematics Research Notices (2017) rnx122

2017 Biernat P., Bizoń P., Maliborski M., *Threshold for blowup for equivariant wave maps in higher dimensions*, Nonlinearity (2017) 30.4

2015 Biernat P., Bizoń P., *Generic Self-Similar Blowup for Equivariant Wave Maps and Yang–Mills Fields in Higher Dimensions*, Communications in Mathematical Physics (2015) 338.3

2014 Biernat P., *Non-self-similar blow-up in the heat flow for harmonic maps in higher dimensions*, Nonlinearity (2014) 28.1

2011 Biernat P., Bizoń P., *Shrinkers, expanders, and the unique continuation beyond generic blowup in the heat flow for harmonic maps between spheres*, Nonlinearity (2011) 24.8

Submitted & Preprints

2017 Biernat P., Donninger R., Schörkhuber B., *Hyperboloidal similarity coordinates and a globally stable blowup profile for supercritical wave maps*

2016 Biernat P., Donninger R., Schörkhuber B., *Stable self-similar blowup in the supercritical heat flow of harmonic maps*, Calculus of Variations and Partial Differential Equations

2016 Biernat P., Donninger R., *Construction of a spectrally stable self-similar blowup solution to the supercritical harmonic map heat flow*, SIAM Journal on Mathematical Analysis

Ongoing work

Biernat P. et al., *GPU accelerated Bayesian matrix factorization for single–cell genomics*
Biernat P. et al., *Modular and fast single–cell demultiplexer in Julia*
Biernat P. et al., *FASTGenomics: A modular ecosystem for single–cell RNA sequencing data*

Talks

Conferences & Invited

2016 *Construction of a spectraly stable self-similar solution to harmonic map heat flow*, 7th Euro-Japanese Workshop on Blow-up, Będlewo, Poland

2013 *Overcoming singularities in the heat flow for harmonic, maps*, Tokyo Institute of Technology, Tokyo, Japan

2011 *Blow-up for harmonic map flow between spheres of dimensions 3 to 6*, 2nd European Young and Mobile Workshop, Granada, Spain

2011 *Numerical procedures for solving partial differential equations with singularities*, Erwin Schrödinger International Institute, Vienna, Austria

Upcoming

2017 *Bayesian matrix factorization for single–cell genomics*, Institute of Computational Biology, Helmholtz Zentrum München & Mathematics, TU München, Munich, Germany

Posters

2015 *Generic blow-up for supercritical equivariant wave maps*, Panorama of Mathematics, Mathematical Institute, University of Bonn, Bonn, Germany

Selected Seminars

2017 *Bayesian matrix factorization for single cell data*, Comma Soft, Bonn, Germany
2016 *Blow-up mechanism for harmonic map heat flow*, Advanced Topics in PDEs, Mathematical Institute, University of Bonn, Bonn, Germany
2015 *Formal construction of singular solutions to harmonic map heat flow*, Advanced Topics in PDEs, Mathematical Institute, University of Bonn, Bonn, Germany
2014 *Constructing solutions via matched asymptotic*, MPD Seminar, Institute of Mathematics, Jagiellonian University, Kraków, Poland

Professional training

Conferences & Workshops

2016 *17th International Symposium on Scientific Computing, Computer Arithmetic and Verified Numerics*, Uppsala Universitet, Uppsala, Sweden
2016 *7th Euro-Japanese Workshop on Blow-up*, Institue of Mathematics, Polish Academy of Sciences, Będlewo, Poland
2016 *IHES Summer School on Nonlinear Waves*, Institut des Hautes Études Scientifiques, Orsay, France
2016 *JuliaCon 2016*, Massachusetts Institute of Technology, Boston, United States
2016 *Singularity formation and long-time behavior in dispersive PDEs*, Bonn University, Bonn, Germany
2015 *Longtime Behaviour of Nonlinear Waves*, Bielefeld University, Bielefeld, Germany
2015 *Oberwolfach Seminar, Singularity Analysis for Geometric Flows*, Mathematisches Forschungsinstitut Oberwolfach, Oberwolfach, Germany
2013 *LIII Cracow School of Theoretical Physics*, Jagiellonian University, Zakopane, Poland
2010 *Geometry and Physics in Cracow*, Jagiellonian University, Kraków, Poland
2010 *Quantiative Studies of Nonlienar Wave Phenomena*, Erwin Schrödinger Institute, Vienna, Austria
2009 *XLIX Cracow School of Theoretical Physics*, Jagiellonian University, Zakopane, Poland
2009 *Geometric Flows and Geometric Operators*, Centro di Ricerca Matematica Ennio De Giorgi, Pisa, Italy
2008 *Ricci Flow and the Poincare conjecture*, Mathematisches Forschungsinstitut Oberwolfach, Oberwolfach, Germany

Research on leave

2013, 2014 one month at Albert Einstein Institute, Gölm, Germany
2013 one month at Tokyo Institute of Technology, Tokyo, Japan
2011 four months at Bonn University, Bonn, Germany

Teaching

2017 Supervising a lab–rotation bachelor student.

2010 One–semester course in *Computer Algebra*, Institute of Physics, Jagiellonian University, Kraków, Poland

Service to the profession

Member and active contributor to open source organizations.

2010 Assisted in organizing a conference *Geometry and Physics in Cracow*

Languages

Polish (native), English (fluent), German (intermediate)

References

Prof. Dr. med. Joachim L. Schultze
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Prof. Dr. Roland Donninger
Universität Wien
Fakultät für Mathematik
Oskar-Morgenstern-Platz 1
A-1090 Vienna, Austria
email: `roland.donninger@univie.ac.at`

Prof. Dr. Juan L.L. Velázquez
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53115 Bonn, Germany
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Prof. Dr. Piotr Bizoń
Institute of Physics
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30-348 Kraków, Poland
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