

Jens Boos

Curriculum Vitae

My interests are the description of space and time; classically, in the framework of General Relativity and more general theories, as well as in the domain of quantum field theory in curved spacetime. I am particularly interested in methods from effective field theory and modern differential geometry, and how they can help us to understand quantum effects and new physics involving gravity.

Education

- 2016–present **Doctor of Philosophy (Ph.D.)**, *University of Alberta*, Canada.
Vanier scholar; expected completion: Sept. 2020
- 2015–2016 **Master of Science**, *University of Waterloo*, Canada.
Perimeter Scholars International, *Perimeter Institute for Theoretical Physics*, Waterloo, Canada.
- 2012–2015 **Master of Science**, *University of Cologne*, Cologne, Germany.
GPA – 1.0 (honor’s branch)*
- 2009–2012 **Bachelor of Science**, *RWTH Aachen University*, Aachen, Germany.
GPA – 1.1 excellent*
- 2000–2009 **Abitur**, *Heinrich-Heine Gymnasium*, Oberhausen, Germany.
*GPA – 1.0**

*German grading system: 1.0 corresponds to the highest possible grade.

Publications

7. J.B., “Gravitational Friedel oscillations in higher-derivative and infinite-derivative gravity?,” arXiv:1804.00225 [gr-qc].
6. J.B., Valeri P. Frolov, and Andrei Zelnikov, “The gravitational field of p -branes in linearized ghost-free gravity,” arXiv:1802.09573 [gr-qc].
5. J.B. and Valeri P. Frolov, “Principal Killing strings in higher-dimensional Kerr–NUT–(A)dS spacetimes,” *Phys. Rev. D* **97** (2018) 084015; arXiv:1801.00122 [gr-qc].
4. J.B. and Valeri P. Frolov, “Stationary black holes with stringy hair,” *Phys. Rev. D* **97** (2018) 024024; arXiv:1711.06357 [gr-qc].
3. J.B. and Alberto Favaro, “Kerr principal null directions from Bel–Robinson and Kummer surfaces,” arXiv:1703.10791 [gr-qc].
2. J.B. and Friedrich W. Hehl, “Gravity-induced four-fermion contact interaction implies gravitational intermediate W and Z type gauge bosons,” *Int. J. Theor. Phys.* **56** (2017) 751; arXiv:1606.09273 [gr-qc].

1. J.B., “Plebański–Demiański solution of general relativity and its expressions quadratic and cubic in curvature: analogies to electromagnetism,” *Int. J. Mod. Phys. D* **24** (2015) 1550079; arXiv:1412.1958 [gr-qc].

Awards and Prizes

- 2017–2020 Vanier Canada Graduate Scholarship
Natural Sciences and Engineering Research Council of Canada
President’s Doctoral Prize of Distinction
University of Alberta
- 2016–2018 Golden Bell Jar Graduate Scholarship in Physics
University of Alberta
- 2016–2017 Dean’s Excellence Recruitment Scholarship Award
University of Alberta Doctoral Recruitment Scholarship
University of Alberta
- 2015–2016 Perimeter Scholars International Award
Perimeter Institute for Theoretical Physics
- 2013–2015 Member of Bonn–Cologne Graduate School Honor’s Branch
University of Cologne
- 2013 Selected for Dean’s List 2013
RWTH Aachen University
- 2012 becoMINT graduate prize
Robert Bosch corporation
- 2009 State distinction for best Abitur graduates
Patron: prime minister of North Rhine-Westfalia, Germany
- 2009 Manfred Lennings medal for best Abitur grade
Rotary Club Oberhausen

Master’s Theses

- Title *Symplectic boundary degrees of freedom in Poincaré gauge theory of gravity*
Supervisors Prof. Lee Smolin & Prof. Laurent Freidel
- Title *Quasi-normal modes of the the BTZ black hole solution of (2+1)-dimensional Poincaré gauge theory of gravity*
Supervisors Prof. Friedrich W. Hehl & Prof. Claus Kiefer

Bachelor’s Thesis

- Title *Physics inside the Schwarzschild radius*
Supervisor Prof. Yvonne Y. Wong

Teaching Experience

- 2015 Geometry in Physics

teaching assistant, graduate course, University of Cologne, Prof. Alexander Altland

2014 Advanced Seminar on General Relativity & Cosmology

teaching assistant, graduate course, University of Cologne, Prof. Claus Kiefer

2014 General Relativity & Cosmology II

teaching assistant, graduate course, University of Cologne, Prof. Claus Kiefer

Attended Conferences and Schools

2018 Hundred Years of Gauge Theory

Physikzentrum German Physical Society, Bad Honnef, Germany

2018 Prospects in Theoretical Physics – From Qubits to Spacetime

Institute for Advanced Study, Princeton, USA

2018 Joint Canada-Asia Pacific Conf. on General Relativity and Relativistic Astrophysics

University of Alberta, Edmonton, Canada

2017 Geometric Foundations of Gravity

University of Tartu, Estonia

2017 Mathematical Physics and General Relativity Symposium in Honor of Professor Ivor Robinson

University of Texas at Dallas, USA

2016 Time in Cosmology

Perimeter Institute for Theoretical Physics, Waterloo, Canada

2016 Black Holes' New Horizons

Casa Matemática Oaxaca, Mexico

2015 14th Marcel Grossmann Meeting

University of Rome (La Sapienza), Italy

2015 DPG (German Physical Society) Spring Meeting

Technical University Berlin, Germany

2014 569th Wilhelm and Else Heraeus Seminar on Quantum Cosmology

Physikzentrum German Physical Society, Bad Honnef, Germany

2014 Graduate School “From Classical to Quantum GR: Applications to Cosmology”

University of Sussex, United Kingdom

2013 Second Erlangen Fall School on Quantum Geometry

University of Erlangen–Nuremberg, Germany

2013 Jürgen Ehlers Spring School “Gravitational Physics”

Max Planck Institute for Gravitational Physics, Potsdam, Germany

Talks and Invited Seminars

Jun 2018 Principal Killing strings in higher-dimensional Kerr–NUT–(a)dS spacetimes

University of Alberta, Canada

Jan 2018 Cosmic strings in stationary BH geometries: stringy matter, principal Killing strings

- Invited talk, University of Cologne, Germany*
- Aug 2017 Curvature tensors in a 4D Riemann–Cartan space: decompositions and superenergy
Geometric Foundations of Gravity, University of Tartu, Estonia
- May 2017 The Bel–Robinson tensor as an irreducible piece of the Bel tensor
Mathematical Physics and General Relativity Symposium in Honor of Professor Ivor Robinson, University of Texas at Dallas, USA
- Sep 2016 Quasi-normal modes: what can ringing black holes tell us about quantum gravity?
Symposium for Graduate Physics Research, University of Alberta, Canada
- May 2016 Quasi-normal modes of the BTZ black hole and (2+1)D Poincaré gauge theory of gravity
Invited talk, Black Holes’ New Horizons, Casa Matemática Oaxaca, Mexico
- Mar 2016 Gauge structures in gravity
Gravity seminar, University of Alberta, Canada
- Dec 2015 Poincaré gauge theory and its deformed Lie algebra – mass-spin classification of elementary particles
PSI seminar, Perimeter Institute for Theoretical Physics, Canada
- Nov 2015 Classical aspects of Poincaré gauge theory of gravity
Quantum gravity seminar, Perimeter Institute for Theoretical Physics, Canada
- Sep 2015 Differential forms: from classical force to the Wilson loop
PSI seminar, Perimeter Institute for Theoretical Physics, Canada
- Jul 2015 Plebański–Demiański solution of general relativity and its expressions quadratic and cubic in curvature: analogies to electromagnetism
14th Marcel Grossmann Meeting, University of Rome (La Sapienza), Italy
- Mar 2015 Plebański–Demiański solution of general relativity and its expressions quadratic and cubic in curvature: analogies to electromagnetism
DPG (German Physical Society) Spring Meeting, Berlin, Germany
- Apr 2015 Poincaré gauge theory of gravity — an introduction
Invited talk, BCGS seminar, Physikzentrum German Physical Society, Bad Honnef, Germany
- Feb 2015 Quasi-normal modes of the BTZ black hole with torsion
Gravitation and Relativity seminar, University of Cologne, Germany
- Nov 2014 Second order curvature invariants for the Plebański–Demiański solution
Gravitation and Relativity seminar, University of Cologne, Germany
- Jun 2014 Poincaré gauge theory of gravity
Gravitation and Relativity seminar, University of Cologne, Germany
- Jun 2014 Exterior calculus and Einstein–Cartan theory
Gravitation and Relativity seminar, University of Cologne, Germany

Memberships

2014–present DPG (German Physical Society), Division of Gravitation and Relativity

Department of Physics, University of Alberta
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- 2018–present CAP (Canadian Association of Physicists), Division of Theoretical Physics
2018–present APS (American Physical Society), Division of Gravitation, Division of Astrophysics

Computer Skills

- algebra Reduce with Excalc, Maple, Mathematica
data analysis ROOT data analysis framework
media \LaTeX , GIMP, Inkscape, Adobe InDesign, Adobe Premiere Pro
programming BASIC, C, Java, Python
web HTML, CSS, PHP, JavaScript, Ajax, MySQL, Typo3, webdesign

Work Experience

- 2014–2015 teaching assistant for various graduate-level courses
Institute for Theoretical Physics, University of Cologne
- 2014 Development and implementation of registration interface for the conference
“569th Wilhelm and Else Heraeus Seminar on Quantum Cosmology” (see above)
Institute for Theoretical Physics, University of Cologne, Prof. Claus Kiefer
- 2013–2014 Development of website content management system (www.loosdrecht.net)
II. Physical Institute, University of Cologne, Prof. Paul van Loosdrecht
- 2013–2014 Graphic design and poster supervision for the Physical Colloquium
Department of Physics, University of Cologne
- 2013 Supervision of physics department website (physik.uni-koeln.de)
Department of Physics, University of Cologne

Other Interests

electronics & programming (see personal website www.jb-electronics.de), webdesign, piano (Boogie Woogie, Rock'n'Roll), ballroom dancing

Other Projects

- 2012 Development of data analysis software optoScale, RWTH Aachen University
2011–2012 Undergraduate Fund Project, RWTH Aachen University
Study and construction of gas discharge electron tubes at the I. Physical Institute B, Prof. Lutz Feld

Languages

English (fluent), German (native), French (basic), Latin (basic)

References

- Prof. Valeri P. Frolov
University of Alberta, Canada
Prof. David Kubiznak

Perimeter Institute for Theoretical Physics, Canada

Prof. Friedrich W. Hehl

Institute for Theoretical Physics, University of Cologne, Germany

Department of Physics and Astronomy, University of Missouri, Columbia, United States

Further information available upon request. Last update: April 2018

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