

JOHANNES KLEINER

PERSONAL INFORMATION

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CURRENT POSITION

Postdoctoral Researcher, Leibniz University Hannover, Germany

AREA OF SPECIALIZATION

Mathematical & Theoretical Physics, Foundations

ACADEMIC CREDENTIALS

<i>Post-Doctoral Fellow</i>	<i>Since 2017</i>	<i>Institute for Theoretical Physics, Department of Mathematics and Physics, Leibniz University Hannover</i> <i>Group of Prof. Domenico Giulini.</i>
<i>Research Visit</i>	<i>April-June 2017</i>	<i>Department of Computer Science, Oxford University</i> <i>Group of Prof. Bob Coecke, University of Oxford, Oxford, UK</i>
<i>Research Visit</i>	<i>Sept.-Nov. 2016</i>	<i>Center of Mathematical Sciences and Applications, Harvard University</i> <i>Group of Prof. Shing-Tung Yau, Harvard University, Boston, USA</i>
<i>Research Visit</i>	<i>May-June 2016</i>	<i>Centre de Physique Théorique, Marseille</i> <i>Group of Prof. Carlo Rovelli, Aix-Marseille Université, Marseille, France</i>
<i>PhD</i>	<i>2013-2017</i>	<i>Department of Mathematics, Regensburg</i> <i>Title: Dynamics of Causal Fermion Systems - Field Equations and Correction Terms for a New Unified Physical Theory. (Received summa cum laude.)</i> <i>Advisor: Prof. Felix Finster, University of Regensburg, Germany</i> <i>Supported by the Studienstiftung des Deutschen Volkes.</i>
<i>Master's Thesis</i>	<i>2011-2012</i>	<i>University of Freiburg</i> <i>Carried out at the University of Freiburg and the University of Heidelberg.</i> <i>Title: The mathematical structure of measurements, observables and states on neural networks</i> <i>Advisors: Prof. Thomas Filk, Dr. Harald Atmanspacher, Prof. Ion-Olimpiu Stamatescu.</i> <i>Supported by the Studienstiftung des Deutschen Volkes and by the Institute for Frontier Areas of Psychology and Mental Health, Freiburg.</i>

Master of Science
Physics

2010-2012

University of Heidelberg

Specialization: Theoretical Physics: GR, QFT, QM, Cosmology, Theoretical Astrophysics, Neural Networks; Grade: 1.0 ("Excellent")

Thesis: *The mathematical structure of measurements, observables and states on neural networks* (cf. above)

Bachelor of Science
Physics

2007-2010

University of Regensburg

Specialization: Theoretical Physics and Philosophy; Grade: 1.2 ("Sehr gut" (A))

Thesis: *Dissipative dynamics of a driven quantum oscillator-qubit system*

Thesis Advisor: Prof. Milena Grifoni

GRANTS, HONORS & AWARDS

2014-2017 · Studienstiftung des Deutschen Volkes PhD Grant

2010-2012 · Studienstiftung des Deutschen Volkes Scholarship

2006 · Recognition of extraordinary achievements in mathematics and physics by the Günther-Uber-Foundation

2006 · Award for social commitment by the Hildegardis-Gymnasium Kempten

PUBLICATIONS

Dynamics of Causal Fermion Systems - Field Equations and Correction Terms for a New Unified Physical Theory

Johannes Kleiner

PhD Thesis, University of Regensburg, urn:nbn:de:bvb:355-epub-362894

A Hamiltonian Formulation of Causal Variational Principles

Felix Finster, Johannes Kleiner,

Calc. Var. (2017) 56:73, arXiv:1612.07192

Quantum Mathematical Physics - A Bridge between Mathematics and Physics

Eds. Felix Finster, Johannes Kleiner, Christian Rökén, Jürgen Tolksdorf

Birkhäuser Basel, 2015, ISBN 978-3-319-26902-3

Noether-Like Theorems for Causal Variational Principles

Felix Finster, Johannes Kleiner,

Calc. Var. (2016) 55:35, arXiv:1506.09076

Causal Fermion Systems as a Candidate for a Unified Physical Theory

Felix Finster, Johannes Kleiner,

2015 J. Phys.: Conf. Ser. 626 012020, arXiv:1502.03587

TALKS

2017 · *Dynamics of Causal Fermion Systems* (PhD Defence, Colloquium of Department for Mathematics, Regensburg University, September 2017)

2017 · *Correction Terms for Field Equations from Causal Fermion Systems* (Working Seminar Mathematical Physics, Regensburg University, July 2017)

2017 · *La cuisine différente. Impressions from a new approach to fundamental physics* (Quantum Lunch Seminar, University of Oxford, June 2017)

2017 · *Causal Variational Principles* (PDE CDT Student Seminar, University of Oxford, June 2017)

- 2017 · *Causal Fermion Systems as a Candidate for a Unified Physical Theory* (Lobster Lunch Seminar, University of Oxford, May 2017)
- 2017 · *Reductionism, ad absurdum?* (Rethinking Foundations of Physics Workshop 2017, Dorfgastein, Austria, March 2017)
- 2017 · *Naked Singularities and the Penrose Inequality II* (Working Seminar Mathematical Physics, Regensburg University, January 2017)
- 2016 · *Naked Singularities and the Penrose Inequality I* (Working Seminar Mathematical Physics, Regensburg University, December 2016)
- 2016 · *Hamiltonian Time Evolution for Causal Variational Principles* (McGill University, Montreal, Canada, November 2016)
- 2016 · *Hamiltonian Time Evolution for Causal Variational Principles* (Harvard University, Center of Mathematical Sciences and Applications, Members' Seminar, USA, September 2016)
- 2016 · *A New Candidate for a Unified Physical Theory* (Harvard University, Center of Mathematical Sciences and Applications, Mathematical Physics Seminar, USA, September 2016)
- 2016 · *Towards a Connection between Loop Quantum Gravity and Causal Fermion Systems* (Working Seminar Mathematical Physics, University of Regensburg, July 2016)
- 2016 · Lecturer of the *International Spring School on Causal Fermion Systems* (Regensburg, March 2016)
- 2015 · *The Jet Bundle Dynamics of Causal Fermion Systems* (Seminar Partial Differential Equations on Globally Hyperbolic Spacetimes and Working Seminar Mathematical Physics, Regensburg, October 2015)
- 2015 · *Physik und Transzendenz* (Doktorandentagung Studienstiftung des Deutschen Volkes, Bonn, November 2015)
- 2015 · *Noether-Like Theorems for Causal Variational Principles* (Seminar Partial Differential Equations on Globally Hyperbolic Spacetimes and Working Seminar Mathematical Physics, Regensburg, October 2015)
- 2015 · *The Jet Bundle Dynamics of Causal Fermion Systems* (Seminar Partial Differential Equations on Globally Hyperbolic Spacetimes and Working Seminar Mathematical Physics, Regensburg, October 2015)
- 2015 · *Causal Fermion Systems as a Candidate for a Unified Physical Theory* (Conference 'Quantum Theory: from Foundations to Technologies', Växjö, Sweden, 2015)
- 2015 · *Noether-like Theorems for Causal Variational Principles* (Working Seminar Mathematical Physics, Regensburg, June 2015)
- 2015 · *Imre Lakatos' Conception of Science* (Doktorandentagung Studienstiftung des Deutschen Volkes, Heidelberg, April 2015)
- 2015 · *Measuring measurement? and On finding new physics* (Rethinking Foundations of Physics Workshop 2015, Dorfgastein, Austria, March 2015)
- 2014 · *Physik und Transzendenz* (A series of three talks "Albert Einstein - Naturwissenschaft und Religion", "Arthur Eddington - Wissenschaft und Mystizismus", "Carl Friedrich von Weizsäcker - Naturgesetz und Theodizee", based on essays by these physicists, Neupfarrkirche Regensburg, October & November 2014)

- 2014 · *Causal Fermion Systems: A Dynamical Collapse Theory?* (Workshop DICE2014, Castiglioncello, Italy, September 2014)
- 2014 · *Introduction to the Theory of Causal Fermion Systems* (Seminar Mathematical Physics, Ludwig Maximilian University of Munich, July 2014)
- 2014 · *QT and GR united? An Introduction to Causal Fermion Systems* (Conference 'Quantum Roundabout', Nottingham UK, July 2014)
- 2014 · *Paradigms of Modern Physics and Causal Fermion Systems* (Lecture series "Zurück zu den Zusammenhängen", Erlangen, April 2014)
- 2014 · *QT and GR united? A Review of Causal Fermion Systems* (Working Seminar Mathematical Physics, Regensburg, May 2014)
- 2014 · *Causal Fermion Systems: Idea and Paradigms Behind* (Paradigms of Modern Physics Workshop, Dorfgastein, Austria, March 2014)
- 2013 · *Mass and Momentum of Asymptotically Flat Manifolds* (Seminar Recent mathematical progress in General Relativity, Regensburg, September 2013)
- 2013 · *The Measurement Problem in Linear (Quantum) Theories* (Working Seminar Mathematical Physics, Regensburg, May 2013)
- 2013 · *Locality in Quantum Theory - A Critical Analysis of Quantum No-Signaling Proofs* (Philosophy of Quantum Theory Cabin Workshop, Black Forest, March 2013)
- 2011 · *Experimental Status of Foundations of Gravity* (Seminar Modern Experiments in Special and General Relativity, Heidelberg University, May 2011)

ORGANIZATIONAL ACTIVITIES

- 2018 · Organization of the *Rethinking Foundations of Physics 2018 Workshop* (Dorfgastein, Austria) ([Link](#))
- 2018 · Organization of the *International Spring School on Causal Fermion Systems 2018* (Regensburg, Germany) ([Link](#))
- 2017 · Organization of the *Rethinking Foundations of Physics 2017 Workshop* (Dorfgastein, Austria) ([Link](#))
- 2016 · Foundation of the *Basic Research Community for Physics e.V.* ([Link](#))
- 2016 · Organization of the *International Spring School on Causal Fermion Systems* (Regensburg, Germany) ([Link](#))
- 2016 · Organization of the *Rethinking Foundations of Physics 2016 Workshop* (Dorfgastein, Austria) ([Link](#))
- 2015 · Organization of the *Rethinking Foundations of Physics 2015 Workshop* (Dorfgastein, Austria) ([Link](#))
- 2014 - 2015 · Speaker of the DFG Graduate School GRK 1692 *Curvature, Cycles, and Cohomology* ([Link](#))
- 2014-now · Organization of the public lecture-series *Was ist wirklich? - Expertengespräche aus dem Spannungsfeld von Naturwissenschaft, Kultur und Religion* (Invited speakers.) ([Link](#))
- 2014 · Organization of the workshop *Paradigms of Modern Physics* (Dorfgastein, Austria) ([Link](#))

2013 · Organization of the *Philosophy of Quantum Theory Cabin Workshop* (Hammerlochhäusle, Black Forest, Germany) ([Link](#))

2012/13 · Organization of the public lecture-series *Leben - Interdisziplinäre Zugänge zum Rätsel des Organischen* (Invited speakers.) ([Link](#))

TEACHING EXPERIENCE

2017/18 · Plenary Tutorial for *Analytical Mechanics and Special Relativity* at the Leibniz University Hannover. Lecturer: Prof. Domenico Giulini

2014-2016 · Seminar *Partial Differential Equations on Globally Hyperbolic Spacetimes* at the University of Regensburg, together with Jan-Hendrik Treude and Prof. Felix Finster

2015/16 · Assistant for the lecture *Functional Analysis* at the University of Regensburg. Lecturer: Prof. Felix Finster

2014 · Tutor for the lecture *Partial Differential Equations III: The Fermionic Projector and Causal Variational Principles* at the University of Regensburg. Lecturer: Prof. Felix Finster

2014 · Organization, layout and teaching of the seminar *Philosophy and Physics of Space and Time* at the University of Regensburg together with Dr. Holger Leuz

2013/14 · Organization, layout and teaching of the seminar *Foundational Problems of Quantum Theory* at the University of Regensburg. Co-organizers: Prof. Klaus Richter and Prof. Felix Finster

2013 · Tutor for the lecture *Probability Theory and Stochastics* at the University of Regensburg. Lecturer: Prof. Harald Garcke

2012 · Tutor for the lecture *Quantum Theory for Prospective Teachers* at the University of Freiburg. Lecturer: Prof. Thomas Filk (honorary/unsalaried)

ADMINISTRATION EXPERIENCE

2017 · Chairman of the Basic Research Community for Physics e.V.

2014 - 2015 · Speaker of the DFG Graduate School GRK 1692 'Curvature, Cycles, and Cohomology'

2013-2018 · Organization of several workshops and a spring school, cf. above.

2013-2017 · Scientific assistant at the Department of Mathematics of the University of Regensburg

2014/2015 · Co-editor and proof-reading of the book 'Quantum Mathematical Physics - A Bridge between Mathematics and Physics'

2009 - 2010 · Student assistant at the Department of Philosophy at the University of Regensburg, Institute for Practical Philosophy

2005-2011 · Small business for graphical design and web applications

2009-2010 · Honorary graphic design for several organizations, among those: Protestant Student-Community of Regensburg, Convent of Priests in Science, Johann Hiltner Hall of Residence

CONFERENCES AND SUMMER SCHOOLS

2017 · *Revising Foundations of Physics* (London, UK)

- 2017 · *Foundations of Quantum Mechanics and their Impact on Contemporary Society* (The Royal Society, London, UK)
- 2017 · *L'agape Workshop on Foundations of Physics* (Mézezac, France)
- 2017 · *Rethinking Foundations of Physics 2017 Workshop* (Dorfgastein, Austria)
- 2016 · *Foundations 2016 - The 18th UK and European Conference on Foundations of Physics* (London, UK)
- 2016 · *Carlofest – A Journey from Quantum Gravity to Philosophy* (Marseille, France)
- 2016 · *Rethinking Foundations of Physics 2016 Workshop* (Dorfgastein, Austria)
- 2016 · *International Spring School on Causal Fermion Systems* (Regensburg, Germany)
- 2015 · *Why Trust a Theory? Reconsidering Scientific Methodology in Light of Modern Physics* (Munich, Germany)
- 2015 · *New Spaces in Mathematics & Physics* (Paris, France)
- 2015 · *Mathematical Framework of External Field QED* (Munich, Germany)
- 2015 · *Quantum Theory: From Foundations to Technologies* (Växjö, Sweden)
- 2015 · *Rethinking Foundations of Physics 2015 Workshop* (Dorfgastein, Austria)
- 2014 · *Quantum Mathematical Physics* (Regensburg, Germany)
- 2014 · *DICE 2014 - Spacetime - Matter - Quantum Mechanics: Conference* (Castiglione, Italy)
- 2014 · *Quantum Roundabout Postgraduate Conference* (Nottingham, UK)
- 2014 · *Workshop Paradigms of Modern Physics* (Dorfgastein, Austria)
- 2013 · *Foundations of Physics* (Munich, Germany)
- 2013 · *Physics and Philosophy of Time Summer School* (Lenzkirch-Saig, Germany)
- 2013 · *Relativistic Fermion Systems Spring School* (Regensburg, Germany)
- 2012 · *Scientific Study of Consciousness* (Brighton, United Kingdom)
- 2012 · *Frühjahrsakademie 'Was ist Denken?'* Studienstiftung des Deutschen Volkes (Papenburg, Germany)
- 2011 · *Sommerakademie 'Gebote und Verbote in der Quantenmechanik'* Studienstiftung des Deutschen Volkes (Neubeuern, Germany)
- 2011 · *Cosmological Frontiers in Fundamental Physics* (Paris, France)
- 2010 · *International School for Young Astronomers* (Byurakan, Armenia)