

## Personal Information

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## Professional Experience

02/18 - 03/18 Long-term visitor at *Warwick EPSRC Symposium on Geometry, Topology and Dynamics in Low Dimensions 2017-2018*, Warwick, UK  
01/15 - Postdoc at Humboldt Universität zu Berlin, Germany  
05/11 - 12/14 Scientific assistant (PhD) at Humboldt Universität zu Berlin, Germany  
06/10 - 04/11 Freelancer at Interserv Logistics and Consulting, Guadalajara, Mexico

## Education

02/15 PhD in mathematics (Grade: Magna cum laude) at Humboldt Universität zu Berlin.  
Title of thesis: *Wonderful Renormalization*  
01/10 Diploma in mathematics with minor subject physics (Grade: Excellent) at Humboldt Universität zu Berlin. Title of thesis:  *$S^1$ -equivariant Morse Cohomology*

## Preprints & Publications

*Graph complexes and Feynman rules* with D. Kreimer (2020), preprint

*On the homology of independence complexes* (2020), preprint

*Complexes of marked graphs in gauge theory* with A. Knispel (2019), accepted in Letters in mathematical physics, 2020

*Moduli spaces of colored graphs* with M. Mühlbauer (2018), Topology and its Applications, Vol. 268, 2019

*Feynman amplitudes on moduli spaces of graphs* (2017), Ann. Inst. Henri Poincaré Comb. Phys. Interact. 7, no. 2, 2020

*Wonderful compactifications in quantum field theory* (2015), Commun. Num. Theor. Phys. 09, no. 3, 2015

*Wonderful renormalization* (2015), PhD thesis

*S*<sup>1</sup>-equivariant Morse cohomology (2010), Diploma thesis

## Selected Talks

*Singularity theory of Feynman integrals*, Elliptics '19, Potsdam (Sept 2019)

*Moduli spaces of colored graphs*, Geometry and Topology Seminar, University of Warwick (May 2019)

*Feynman integrals and graph complexes*, Talks in mathematical physics, ETH Zürich (March 2019)

*Moduli spaces of colored graphs*, Kis-Seminar of SFB "Discretization in Geometry and Dynamics" , Technische Universität Berlin (July 2018)

*Complexes and moduli spaces of Feynman diagrams*, Summer School on Structures in Local Quantum Field Theory, Les Houches (June 2018)

*Spaces of Feynman diagrams*, Research Seminar Quantum Field and String Theory, Humboldt-Universität zu Berlin (May 2018)

*Why you shouldn't be scared of integrals*, Junior Geometry and Topology, University of Warwick (March 2018)

*Feynman amplitudes and moduli spaces of graphs*, Geometry and Topology Seminar, University of Warwick (March 2018)

*Mathematische Physik: Von elementaren Teilchen zu sonderbaren Zahlen*, PSG UniLab, HU Berlin (December 2017)

*Wonderful compactifications in QFT*, ALTA Oberseminar, University of Bremen (September 2016)

*Wonderful renormalization*, Workshop "Paths to, from and in renormalisation", Potsdam (February 2016)

*Wonderful compactifications in QFT*, Workshop on New Trends in Algebraic Quantum Field Theory, INFN Laboratori Nazionali di Frascati (February 2015)

*Wonderful renormalization*, Summer School on Structures in Local Quantum Field Theory, Les Houches (June 2014)

*Physics and geometry, I & II*, QFT and Algebraic Geometry Seminar, Freie Universität Berlin (December 2013 and January 2014)

## Schools, Workshops & Conferences

*KMPB day*, online (July 14 2020)

*A Gauge Summer with BV*, online (June 24 & 26 2020)

*Einstein Workshop on Polytopes and Algebraic Geometry*, Berlin (Dec. 2-4 2019)  
*Varieties, Polyhedra, Computation*, Berlin (Oct. 7-11 2019)  
*Elliptics '19*, Potsdam (Sept. 17-20 2019)  
*Graph complexes in algebraic geometry and topology*, Manchester (Sept. 9-13 2019)  
*Network Games, Tropical Geometry, and Quantum Communication*, Berlin (June 3-7 2019)  
 *$c_2$  invariant meets rook theory*, Berlin (April 10 2019)  
*Groups, geometries, and spaces in honour of Alessandra Iozzi*, Zürich (Jan. 22-25 2019)  
*Einstein Workshop Geometric and Topological Combinatorics*, Berlin (Oct. 29-31 2018)  
*Summer School on Structures in Local Quantum Field Theory*, Les Houches (June 4-15 2018)  
*Introductory Workshop: Geometric and Topological Combinatorics*, Berkeley (Sept. 05-08 2017)  
*KMPB day*, Berlin (July 3 2017)  
*Hot Topics: Galois Theory of Periods and Applications*, Berkeley (March 27-31 2017)  
*KMPB day*, Berlin (February 20 2017)  
*KMPB day*, Berlin (June 20 2016)  
*Paths to, from and in renormalisation*, Potsdam (February 8-12 2016)  
*Algebraic structures of Hochschild complexes*, Copenhagen (October 12-16 2015)  
*Workshop on New Trends in Algebraic Quantum Field Theory*, Frascati (February 11-13 2015)  
*Summer School on Structures in Local Quantum Field Theory*, Les Houches (June 9-20 2014)  
*Renormalization. From Quantum Field Theory to Random and Dynamical Systems*, Potsdam (Oct. 7-9 2013)  
*Multiple Zeta Values in Mathematics and Physics, KOSMOS Summer University*, Berlin (Oct. 1-5 2013)  
*Feynman Graphs and Motives*, Bingen (March 18-22 2013)  
*Quantum Field Theory, Periods and Polylogarithms III*, Berlin (June 25-29 2012)  
*Symmetries, Fundamental Interactions and Cosmology*, Frauenchiemsee (Sept. 11-16 2011)

### **(Co-)Organization**

Mini conference *Tropical methods in quantum field theory*, Berlin (2021)  
 Workshop *Graph complexes and quantum field theory*, Berlin (2021)

## Other qualifications

Member of the central council for the KMPB, mathematical physics interdisciplinary research center Berlin

Member of the planning committee for the IMP, a degree program combining computer science, mathematics and physics, at Humboldt-Universität zu Berlin

## Teaching experience

*Singularity theory*, Lecture, HU Berlin, Summer term 20

*Tropical geometry*, Seminar, HU Berlin, Summer term 20

*Analysis I für PhysikerInnen*, Lecture, HU Berlin, Winter term 19/20

*Structure of local field theories*, Research seminar, HU Berlin, Winter term 19/20

*Analysis II*, Tutorial, HU Berlin, Summer term 19

*Parametric integrals*, Lecture, HU Berlin, Winter term 18/19

*Graph theory in physics*, Seminar, HU Berlin, Winter term 17/18

*Mathematische Physik*, Lecture, HU Berlin, Summer term 17

*Lineare Algebra für PhysikerInnen*, Lecture, HU Berlin, Winter term 16/17

*Quantum field theory and Outer space II*, Research seminar, HU & FU Berlin, Summer term 16

*Quantum field theory and Outer space I*, Research seminar, HU & FU Berlin, Winter term 15/16

*Analysis III*, Tutorial, HU Berlin, Winter term 13/14

*Analysis II*, Tutorial, HU Berlin, Summer term 13

*Analysis I*, Tutorial, HU Berlin, Winter term 12/13

*Analysis II*, Tutorial, TU Darmstadt, Summer term 06

*Analysis I*, Tutorial, TU Darmstadt, Winter term 05/06

## Supervision/Referee

Jonas Lautenschläger, BSc 2020, *tbd*

Jule Budnick, BSc 2020, *Ein Renormierungsverfahren mit der Hopf-Algebra von Wurzelbäumen*

Nicolas Grube, MSc 2019, *Critical Exponents and Invariant Charges*

Lukas Harlan, MSc 2019, *Moduli spaces of gluon graphs - A tale of suns and bananas*

Jens Lücke, BSc 2019, *Non-perturbative physics and combinatorial Dyson-Schwinger equations*

Max Mühlbauer, MSc 2018, *Moduli spaces of colored Feynman graphs*

Andre Knispel, MSc 2017, *Combinatorial BRST homology and graph differentials*