

# Michael Borinsky

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## Curriculum vitae

### Experience

- 09/2018– **Nikhef, Amsterdam - Netherlands.**  
present Postdoctoral researcher at the Nikhef Theory group
- 04/2014– **Humboldt Universität, Berlin - Germany.**  
04/2018 Research assistant in Dirk Kreimer's Alexander von Humboldt group
- 09/2018– **freelancing consultant, Amsterdam - Netherlands.**  
present Consulting for artificial intelligence and machine learning solutions in computer vision
- 04/2018– **did a GmbH, Berlin - Germany.**  
09/2018 Design and implementation of artificial intelligence and machine learning solutions
- 06/2012– **CERN, Geneva - Switzerland.**  
09/2012 CERN Summer Student Programme
- 10/2007– **Fraunhofer Institute for Integrated Circuits, Erlangen - Germany.**  
10/2008 Undergraduate assistant

### Education

- 04/2018 **PhD in Theoretical Physics, Humboldt Universität, Berlin - Germany.**  
Grade: summa cum laude
- 08/2013 **Master of Science in Physics, Humboldt Universität, Berlin - Germany.**  
Major: Theoretical Particle Physics - Grade 1.1 (distinction)
- 09/2011 **Bachelor of Science in Physics, Humboldt Universität, Berlin - Germany.**  
Major: Physics with minor Mathematics
- 08/2008 **Abitur, Emil-von-Behring-Gymnasium, Erlangen - Germany.**  
Secondary school

### Scholarships and Awards

- 07/2019 **Lise Meitner Award (from Humboldt-Universität).**  
Awarded by the Physics Institute of the Humboldt University for my PhD thesis.
- 08/2018 **Springer Thesis Award.**  
Awarded by Springer Nature for my PhD thesis.
- 04/2015– **Scholarship: German National Merit Foundation (Studienstiftung).**  
02/2018 Conceptual support, additional to my PhD position at Humboldt Universität.
- 10/2013– **Scholarship: Humboldt Research Track Scholarship.**  
03/2014 Full scholarship covering living costs.

- 07/2010– **Scholarship: German National Merit Foundation (Studienstiftung).**  
09/2013 German scholarship providing conceptual and financial support.

## Teaching and further engagement

- 02/2019– **University of Amsterdam, Amsterdam - Netherlands.**  
07/2019 Field Theory in Particle Physics: Assisting Eric Laenen, Wouter Waalewijn and Bernard de Wit with their course on gauge theories and their applications in particle physics.
- 09/2018– **Nikhef, Amsterdam - Netherlands.**  
present Co-organization of the Nikhef theory journal club.
- 10/2016– **Humboldt Universität, Berlin - Germany.**  
04/2017 Research seminar on Eynard-Oratin topological recursion.
- 10/2015– **Humboldt Universität, Berlin - Germany.**  
04/2016 Research seminar on infrared and collinear divergences in perturbative QFT.
- 10/2010– **Humboldt Universität, Berlin - Germany.**  
04/2011 Supervision of freshman students in a biweekly workshop.

## Research stays

- 10/2017 **Erwin Schrödinger International Institute for Mathematics and Physics, Vienna - Austria.**  
Participant in the Programme 'Algorithmic and Enumerative Combinatorics'
- 03/2017 **University of Waterloo, Waterloo - Canada.**  
Visitor in Karen Yeats' group at the Combinatorics and Optimization Department
- 03/2016 **Simon Fraser University, Vancouver - Canada.**  
Visitor in Karen Yeats' group
- 11/2013– **Radboud University, Nijmegen - Netherlands.**  
01/2014 Visiting researcher in Walter van Suijlekom group

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## Publications

### Journal Articles

- [1] MB and Karen Vogtmann. “The Euler characteristic of  $\text{Out}(F_n)$ ”. In: *preprint: submitted* (2019). arXiv: 1907.03543 [math.GR].
- [2] MB. “Renormalized asymptotic enumeration of Feynman diagrams”. In: *Annals of Physics* 385 (2017), pp. 95–135.
- [3] MB. “Generating asymptotics for factorially divergent sequences”. In: *Electronic Journal of Combinatorics* 25.4 (2018), P4–1.
- [4] MB. “Algebraic Lattices in QFT Renormalization”. In: *Letters in Mathematical Physics* 106.7 (2016), pp. 879–911.
- [5] MB. “Feynman graph generation and calculations in the Hopf algebra of Feynman graphs”. In: *Computer Physics Communications* 185.12 (2014), pp. 3317–3330.

### Conference Proceedings

- [1] MB. “Generating asymptotics for factorially divergent sequences”. In: *Séminaire Lotharingien de Combinatoire*. Vol. 78B. 2017, 12pp.
- [2] MB and Dirk Kreimer. “Feynman diagrams and their algebraic lattices”. In: *Resurgence, Physics and Numbers*. Springer, 2017, pp. 91–107.
- [3] MB. “Computations and generation of elements on the Hopf algebra of Feynman graphs”. In: *Journal of Physics: Conference Series*. Vol. 608. 1. IOP Publishing. 2015, p. 012065.

### Other

- [1] MB. “Graphs in perturbation theory: Algebraic structure and asymptotics (PhD thesis)”. Springer, 2018.
- [2] MB. “Algorithmization of the Hopf algebra of Feynman graphs (Master thesis)”. 2013.

## Talks and other contributions

- 01/2019 **Humboldt-Universität - Structure of Local Quantum Field Theories, Berlin - Germany.**  
Talk on 'The Euler characteristic of  $\text{Out}(F_n)$ '
- 11/2018 **Friedrich-Alexander-Universität - Emmy-Noether-Seminar, Erlangen - Germany.**  
Talk on 'Deriving asymptotics for factorially divergent power series'
- 09/2018 **Nikhef Theory - HPP meeting, Amsterdam - Netherlands.**  
Talk on 'Asymptotics and algebraic structure in perturbation theory'
- 06/2018 **Summer school on structures in local quantum field theory, Les Houches - France.**  
Talk on 'Graphs in Perturbation Theory'
- 04/2018 **Combinatorial structures in perturbative QFT, Waterloo - Canada.**  
Talk on 'Counting graphs without given edge-induced subgraphs'
- 05/2018 **University of Waterloo: Algebraic Combinatorics Seminar, Waterloo - Canada.**  
Talk on 'Hopf algebra of graphs for restricted graphical enumeration'
- 10/2017 **Workshop on Enumerative Combinatorics, Vienna - Austria.**  
Talk on 'Hopf algebras and factorial divergent power series: Algebraic tools for graphical enumeration'
- 10/2017 **ALEA in Europe, Vienna - Austria.**  
Talk on 'Generating Asymptotics for factorially divergent sequences'
- 07/2017 **Formal Power Series and Algebraic Combinatorics (FPSAC), London - UK.**  
Poster about 'Generating Asymptotics for factorially divergent sequences'
- 06/2017 **Algebraic Combinatorics, Resurgence, Moulds and Applications (CARMA), Luminy - France.**  
Invited talk on 'Flag decompositions of graphs and their Hopf algebraic structure'
- 06/2017 **International school of subnuclear Physics, Erice - Italy.**  
Talk on 'Bounds and estimates for Feynman-perturbative expansions'
- 03/2017 **University of Waterloo: Algebraic Combinatorics Seminar, Waterloo - Canada.**  
Invited talk on 'Zero-dimensional quantum field theory or counting classes of graphs using Gaussian integrals and Hopf algebras'
- 07/2016 **Resurgence in Gauge and String Theories, Lisbon - Portugal.**  
Talk on 'Asymptotic Calculus for Combinatorial Dyson-Schwinger Equations'
- 06/2016 **Kolleg Mathematik Physik Berlin (KMPB-Day), Berlin - Germany.**  
Talk on 'Factorially divergent expansions from a QFT perspective'
- 03/2016 **Combinatorial Structures in Perturbative Quantum Field Theory, Vancouver - Canada.**  
Talk on 'Generating functions' asymptotics' generating functions'
- 02/2016 **Paths to, from and in renormalization, Potsdam - Germany.**  
Talk on 'Asymptotic expansions and combinatorial Dyson-Schwinger equations'

- 05/2015 **Resurgence, Physics and Numbers**, *Pisa - Italy*.  
Talk on 'Combinatorics of Feynman diagrams and the algebraic lattice structure in QFT'
- 09/2014 **Dyson-Schwinger Equations in Modern Mathematics and Physics**, *Trento - Italy*.  
Talk on 'The Hopf-Algebra of Feynman graphs as the foundation of Dyson-Schwinger equations'
- 09/2014 **16th International workshop on Advanced Computing and Analysis Techniques in Physics research (ACAT)**, *Prague - Czech Republic*.  
Talk on 'Computations and generation of elements on the Hopf algebra of Feynman graphs'
- 06/2014 **Summer school on structures in local quantum field theory**, *Les Houches - France*.  
Talk on 'The Hopf algebra of Feynman graphs as foundation for Dyson Schwinger equations'
- 08/2012 **CERN Summer Student Lecture Programme**, *CERN - Switzerland*.  
Talk on 'Low and High Performance Computing in HEP'