

CURRICULUM VITAE

CAMPBELL WHEELER

CONTENTS

1. Contact Details	1
2. Education	1
3. Research	2
4. Thesis	2
5. Preprints	2
6. Publications	2
7. Talks (since starting the PhD)	2
8. Events (since starting the PhD)	3
9. Teaching	4
10. Interests	4

1. CONTACT DETAILS

<https://guests.mpim-bonn.mpg.de/cjwh/>

cjwh@mpim-bonn.mpg.de

+49 162 4236 210

Max Planck Institute for Mathematics

Office 404

Vivatsgasse 7

53111 Bonn

Germany

2. EDUCATION

- 2012-2014 Bachelor of Science at the University of Melbourne.
- 2015-2016 Master of Science (Mathematics) at the University of Melbourne. Supervised by Paul Norbury.
- 2018-Present Doctor of Philosophy at the University of Bonn (Max Planck Institute for Mathematics). Supervised by Don Zagier, co-supervised by Stavros Garoufalidis.

Date: 27th of August 2022.

3. RESEARCH

My research is concerned with in the interaction between low dimensional topology, mathematical physics, and number theory. More specifically: field theories, hypergeometric sums, modular forms, moduli spaces, q -difference equations, re-summation, and topological recursion.

4. THESIS

My thesis will be a selection of the work I have completed on quantum modular forms. In particular, I give some of the first interesting examples of quantum Jacobi forms and use them to construct quantum modular forms. Moreover, the work provides what can be thought of as mock quantum modular (Jacobi) forms and a novel perspective on mock modular forms. This is crucially used in questions coming from quantum topology that have previously remained open. This will also help bridge the gap between recent developments in physics on q -series invariants of 3-manifolds. Importantly, this will give a clear and unified set of conjectures for the asymptotic behaviour of quantum invariants of closed manifolds, which are proved in examples.

5. PREPRINTS

- Periods, the meromorphic 3d-index and the Turaev-Viro invariant, with Stavros Garoufalidis, Jie Gu. To appear.
- Modular q -holonomic modules, with Stavros Garoufalidis. ([arXiv:2203.17029](https://arxiv.org/abs/2203.17029))
- Resurgence of Chern-Simons theory at the trivial flat connection, with Stavros Garoufalidis, Jie Gu, Marcos Mariño. ([arXiv:2111.04763](https://arxiv.org/abs/2111.04763))
- On the Kontsevich geometry of the combinatorial Teichmüller space, with Jorgen Andersen, Gäetan Borot, Séverin Charbonnier, Alessandro Giacchetto, Danilo Lewanski. ([arXiv:2010.11806](https://arxiv.org/abs/2010.11806))

6. PUBLICATIONS

- Around the combinatorial unit ball of measured foliations on bordered surfaces, with Gäetan Borot, Séverin Charbonnier, Vincent Delecroix, Alessandro Giacchetto ([arXiv:2110.12538](https://arxiv.org/abs/2110.12538)), International Mathematics Research Notices.
- Topological recursion for Masur-Veech volumes, with Jorgen Andersen, Gäetan Borot, Séverin Charbonnier, Vincent Delecroix, Alessandro Giacchetto, Danilo Lewanski ([arXiv:1905.10352](https://arxiv.org/abs/1905.10352)) to appear in the Journal of the London Mathematical Society.

7. TALKS (SINCE STARTING THE PHD)

- q -Borel resummation and modularity, July 2022, Early number theory research seminar, University of Darmstadt and University of Köln.
- Quantum modularity of quantum invariants: bringing \tilde{q} to q -difference equations, June 2022, Enumerative geometry seminar, University of Sorbonne.
- Equidistribution and L-functions, May 2022, PhD student seminar, Max Planck Institute for mathematics.

- Resurgence of quantum invariants: bringing \tilde{q} to q -difference equations, May 2022, AMS Special Session on q -series, Number Theory and Quantum Topology, University of Denver.
- From q -difference equations to quantum modular forms, January 2022, PhD student seminar, Max Planck Institute for mathematics.
- [Quantum modularity of invariants of 3-manifolds](#), March 2021, $(GT)^2$, MATRIX.
- Quantum modular forms, February 2021, Course on modular forms, Humboldt-Universität zu Berlin.
- Geometry of Integrable systems, February 2021, PhD student seminar, Max Planck Institute for mathematics.
- Bivariant Intersection Theory, December 2020, Stacks reading group, Max Planck institute for mathematics.
- Vector Bundles and Chern Classes, November 2020, Stacks reading group, Max Planck institute for mathematics.
- Definition of a stack, August 2020, Stacks Reading group, Max Planck institute for mathematics.
- Stability conditions from quadratic differentials, May 2020, DT invariants seminar, Max Planck Institute for mathematics.
- Introduction to the Bridgeland stability conditions, April 2020, DT invariants seminar, Max Planck Institute for mathematics.
- Introduction to the Hitchin System, January 2020, PhD student seminar, Max Planck Institute for mathematics.
- On the Kontsevich geometry of the combinatorial moduli space. Curve counting theories and related algebraic structures, University of Leeds.
- Introduction to Gromov–Witten theory, May 2019, PhD student seminar, Max Planck Institute for mathematics.
- Extended Bloch group, January 2019, PhD student seminar, Max Planck Institute for mathematics.
- [The definition of geometric recursion](#), December 2018, Geometric recursion reading group, Max Planck Institute for mathematics.
- Belyi’s theorem, December 2018, Grothendieck–Teichmüller reading group, Max Planck Institute for mathematics.

8. EVENTS (SINCE STARTING THE PHD)

- Conference and summer school, ‘Modular Forms in Number Theory and Beyond’, August 2022, Bielefeld University, Bielefeld, Germany.
- Research stay, June 2022, Sorbonne University, hosted by Prof. E. Garcia-Failde, Paris, France.
- Conference, ‘Quantum topology and geometry in honor of Vladimir Turaev’, June 2022, IHP Paris, Paris, France.
- Research stay, May 2022, Humboldt-University, hosted by Prof. G. Borot, Berlin, Germany.
- Conference, ‘Arithmetic Groups and 3-Manifolds’, May 2022, Max Planck Institute for Mathematics, Bonn, Germany.

- Conference, ‘AMS Special Session on q -series, Number Theory and Quantum Topology’, May 2022, University of Denver, Denver, United States of America.
- Conference, ‘Algebra, Geometry and Physics: a mathematical mosaic’, March 2022, Max Planck Institute for Mathematics, Bonn, Germany.
- Conference, ‘Quantum Curves, Integrability and Cluster Algebras’, December 2021, MATRIX, Creswick, Australia.
- Workshop, ‘Enumerative Geometry of Surfaces’, June 2021, MFO, Oberwolfach, Germany.
- Workshop, ‘Combinatorics of Moduli Spaces, Cluster Algebras, and Topological Recursion’, June 2021, HSE, Steklov, Skoltech, Moscow, Russia.
- Workshop ‘Low-Dimensional Topology and Number Theory’, August 2020, MFO, Oberwolfach, Germany.
- Conference, ‘Resurgence @ KITP 2020 - Online Reunion Conference’, July 2020, UC Santa Barbara, Kavli Institute for Theoretical Physics.
- Research stay, December 2019, Centre for Quantum Mathematics, hosted by Prof. J.E. Andersen, Odense, Denmark.
- Workshop, ‘BPS states, topological recursion, exact WKB and abelianisation’, November 2019, DESY, Hamburg, Germany.
- Conference, ‘Curve counting theories and related algebraic structures’, September 2019, University of Leeds, Leeds, United Kingdom.
- Conference, ‘Integrability, Geometry and Moduli’, July 2019, MPIM, Bonn, Germany.

9. TEACHING

From semester 2 2015 to semester 1 2018, I tutored on average around 2 subjects a semester for the University of Melbourne. The subjects included

- Calculus 1 (first year B.S. subject)
- Calculus 2 (first year B.S. subject)
- Linear Algebra (first year B.S. subject)
- Real analysis (second year B.S. subject)
- Complex analysis (third year B.S. subject)

10. INTERESTS

- Arts and crafts, climbing, music, table top games.
- I played saxophone in the Melbourne based-band [The Cactus Channel](#).