

Justin Kulp

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Education

- 2019–Present **PhD. Physics**, *University of Waterloo*, Canada.
Supervisors: Davide Gaiotto, Jaume Gomis.
- 2018–2019 **MSc. Physics**, *University of Waterloo*, Canada.
Essay Title: *Orbifolds, Anomalies, and Topological Field Theories*
Supervisor: Davide Gaiotto.
- 2018–2019 **Perimeter Scholars International**, *Perimeter Institute*, Canada.
Student in Perimeter Scholars International at the Perimeter Institute for Theoretical Physics.
- 2013–2017 **HBSc. Mathematics and Physics Minor**, *Lakehead University*, Canada.
Thesis Title: *Representation Theory and Quantum Mechanics*
Supervisor: Andrew J. Dean.
GPA: 99/100

Selected Honours and Awards

- 2020–2023 **NSERC Canada Graduate Scholarship - Doctoral** (\$35k/yr).
Nationally competitive doctoral research scholarship awarded by Natural Sciences and Engineering Research Council of Canada on recommendation of the University of Waterloo.
- 2019–2020 **Traditional Fulbright Canada Student Award** (\$20k).
Declined award. Nationally and cross-disciplinary competitive scholarship for Canadian graduate students or professionals, who wish to study and/or conduct research in the United States.
- 2018–2019 **NSERC Canada Graduate Scholarship - Master's** (\$17.5k).
Nationally competitive master's research scholarship awarded by NSERC of Canada on recommendation of the University of Waterloo.
- 2018–2019 **Perimeter Scholars International Award** (\$30k).
Awarded to attend Perimeter Scholars International at the Perimeter Institute.
- 2017 **Canadian Governor General's Academic Silver Medal**.
Awarded for having the highest average in an Honours Bachelor degree at a Canadian university.

Publications and Preprints

- [1] Davide Gaiotto and Justin Kulp. "Orbifold groupoids" (Aug. 2020). arXiv: 2008.05960 [hep-th].
- [2] Justin Kulp. "Two More Fermionic Minimal Models" (2020). arXiv: 2003.04278 [hep-th].

- [3] Hubert de Guise, Dylan Spivak, Justin Kulp, and Ish Dhand. “D-functions and immanants of unitary matrices and submatrices”. *Journal of Physics A: Mathematical and Theoretical* 49.9 (Jan. 2016). arXiv: 1511.01851 [math-ph].
- [4] Justin Kulp. “MurnaghanNakayama”. *GitHub Repository* (2017). <https://github.com/justinkulp/MurnaghanNakayama>
A Mathematica package for calculating characters of irreducible representations of S_n .

Presentations and Seminars

- 2020 **Harvard CMSA Condensed Matter Seminar**, *Harvard CMSA*, USA.
Orbifold groupoids. Talk on paper “Orbifold groupoids.” Also given at Perimeter Institute.
- 2020 **PI Quantum Fields and Strings Meeting**, *Perimeter Institute*, Canada.
Fermionization and Minimal Models. Talk on paper “Two More Fermionic Minimal Models.”
- 2019 **PSI Winter School**, *Perimeter Institute*, Canada.
Scattering in Chern-Simons Matter Theories. Crossing-symmetry violation and scattering in Chern-Simons matter theories. Presented with Lorenzo di Pietro, Diego García, Jingxiang Wu, Matthew Yu, and Keyou Zeng.
- 2018 **PSIminar: PSI Student Colloquium**, *Perimeter Institute*, Canada.
Aperiodic Tilings in Physics. Introduction to quasicrystals and applications to AdS/CFT, topological insulators, and string compactifications.
- 2017 **Lakehead University Mathematics Colloquium**, *Lakehead University*, Canada.
Aperiodic Tilings: An Introduction. Invited speaker. Overview of research on aperiodic tilings.
- 2016 **ATLAS Canada Summer Student Presentation**, *University of Toronto*, Canada.
Beta Testing ITk Modules. Overview of summer work testing semiconductor detector for ATLAS. Presented with Nicholas Zutt.
- 2016 **ATLAS Toronto Presentation**, *University of Toronto*, Canada.
Decays of the Higgs Boson. Overview of work investigating decays of the Higgs boson.

Additional Research Experience

- 2018 **Visiting Graduate Student**, *Perimeter Institute*, Canada.
Supervised by Dr. Latham Boyle, Perimeter Institute for Theoretical Physics
Studied AdS/CFT and “conformal quasicrystals.” Computed packing densities of quasicrystals.
- 2017 **Research Assistant**, *Lakehead University*, Canada.
Supervised by Dr. Hubert de Guise, Department of Physics, Lakehead University
Led research constructing $SU(N)$ “anticoherent states” and developed geometric representation for symmetrized $SU(N)$ states, generalizing known work on $SU(2)$.
- 2017 **Research Assistant**, *Waterloo*, Canada.
Supervised by Dr. Latham Boyle, Perimeter Institute for Theoretical Physics
Proved equivalencies between certain aperiodic tilings. Proved some important topological defects in quasicrystals cannot be classified by natural topological charges/invariants.

- 2016 **Student Researcher (NSERC USRA)**, *University of Toronto*, Canada.
Supervised by Dr. Robert Orr, Department of Physics, University of Toronto
 Tested trigger and detection system for semiconductor particle detector in ATLAS experiment.
 Prepared glue studies for ATLAS inner tracker.
- 2015 **Student Researcher (NSERC USRA)**, *University of Toronto*, Canada.
Supervised by Dr. Peter Krieger, Department of Physics, University of Toronto
 Analyzed faults in liquid argon forward calorimeter for the ATLAS experiment.
- 2014 **Research Assistant**, *Lakehead University*, Canada.
Supervised by Dr. Hubert de Guise, Department of Physics, Lakehead University
 Investigated “generalized determinants” of matrices and connections to Wigner D-functions.

Academic Work and Volunteer Experience

- 2017 **Project Assistant**, *Lakehead University*, Canada.
 Wrote labs and edited course notes for PHYS-2111 and PHYS-4113 at Lakehead University.
- 2016 **Lakehead University Annual Donor Reception**, *Lakehead University*, Canada.
 Invited speaker on behalf of student body, spoke on topic of external donations and funding.
- 2014–2015 **University Senator**, *Lakehead University*, Canada.
 Student representative on Lakehead University Senate.
- 2014–2015 **University Academic Appeals Committee Member**, *Lakehead University*, Canada.
 Student representative on Lakehead University Academic Appeals Committee.

Complete Honours and Awards

Graduate

- 2020–2023 **NSERC Canada Graduate Scholarship - Doctoral** (\$35k/yr).
- 2020–2023 **University of Waterloo President’s Graduate Scholarship** (\$5k/yr).
 Awarded to graduate students holding major federal or provincial competition-based scholarships.
- 2019–2020 **Traditional Fulbright Canada Student Award** (\$20k).
- 2018–2019 **NSERC Canada Graduate Scholarship - Masters** (\$17.5k).
- 2018–2019 **University of Waterloo President’s Graduate Scholarship** (\$10k).
- 2018–2019 **Perimeter Scholars International Award** (\$30k).

Undergraduate

- 2017 **Canadian Governor General’s Academic Silver Medal**.
- 2017 **Lakehead University Dean’s Medal for the Faculty of Science and Environmental Studies**.
 Awarded to the highest-ranking graduating student in Science and Environmental Studies.
- 2017 **Lakehead University Dean’s Scholar Award for Mathematics**.
 Awarded to the highest-ranking graduating student in Mathematics.

- 2013–2017 **Lakehead University Presidential Scholarship** (\$30k).
Awarded to up to two students each year for academic achievement and significant contributions to their school and community.
- 2013–2017 **C.D. Howe Scholarship Endowment Fund** (\$22k).
Awarded for academic achievement, community, and extracurricular activities.
- 2013–2017 **Lakehead University Presidents List**.
Awarded to eligible students who achieved a 90% or higher term average.
- 2013–2017 **Lakehead University Dean's List**.
Awarded to eligible students who achieved a 80% or higher term average.
- 2017 **Department of Mathematical Sciences Award** (\$500).
Awarded to a student for the highest average in mathematics at Lakehead University.
- 2016 **Quaestiones Naturales Article**.
Interview highlighting my research at Lakehead University on *D-functions and immanants of unitary matrices and submatrices*. Featured in *Quaestiones Naturales* Volume 4, 2016.
- 2016 **NSERC Undergraduate Student Research Award Recipient** (\$8k).
Nationally competitive undergraduate research scholarship awarded by NSERC of Canada on recommendation of the University of Toronto.
- 2016 **Department of Mathematical Sciences Award** (\$100).
- 2015 **Dr. S. Penny Petrone Scholarship** (\$2.1k).
- 2015 **NSERC Undergraduate Student Research Award Recipient** (\$7.6k).
Nationally competitive undergraduate research scholarship awarded by NSERC of Canada on recommendation of the University of Toronto.
- 2014 **Lakehead University Bora Laskin Memorial Scholarship in Physics** (\$650).
Awarded to a student based on academic performance and interest in physics.
- 2014 **Dr. S. Penny Petrone Scholarship** (\$2k).

High School

- 2013 **Canadian Governor General's Academic Bronze Medal**.
Awarded to the student graduating with the highest average from a high school.
- 2013 **OSSD Gold Medal Lakehead Public Schools**.
- 2013 **Canadian Suomi Foundation's Ontario Secondary School Scholarship** (\$200).
- 2013 **Canadian Suomi Foundation's Finlandia Club Award** (\$200).
- 2013 **TD Canada Trust Memorial Scholarship** (\$2k).
Awarded to eligible students with the ten highest averages in Northern Ontario.
- 2013 **Lakehead University Group Math Competition**.
2 wins and 4 honourable mentions in Lakehead University's high school math competition.
- 2013 **Ontario Power Generation Secondary School Achievement Award** (\$500).
- 2013 **Ontario Secondary Schools Teachers' Federation Award of Academic Excellence**.
- 2013 **Superior C.V.I. Science Award in Physics**.

- 2012 **Northwestern Ontario Regional Science Fair LU Engineering Award .**
- 2012 **Northwestern Ontario Regional Science Fair Entrance Scholarship (\$1k).**