Justin Kulp

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Education and Academic Positions

2026–Present **Associate – Natural Sciences**, *Institute for Advanced Study*, Princeton, USA

2026–Present **Postdoctoral Associate**, *New York University*, New York, USA
Ongoing research includes studies of non-relativistic conformal field theories, categorical symmetries, and quantization [1].

2023–2026 **Research Assistant Professor**, *Simons Center for Geometry and Physics & C.N. Yang Institute for Theoretical Physics*, Stony Brook, USA
Applied homotopy techniques to general QFTs [3, 8]. Studied discrete models of AdS/CFT correspondence [7]. Developed celestial and Carrollian CFT dictionary for multiparticle states [6]. Initiated study of lightlike conformal defects [5]. Proved state-operator correspondence for non-relativistic CFTs [4, 2].

2019–2023 **PhD. Physics**, *University of Waterloo*, Canada
Perimeter Institute for Theoretical Physics, Resident PhD. Student.
Thesis Title: *Topological Manipulations of Quantum Field Theories*
Supervisors: Davide Gaiotto, Jaume Gomis.
Developed SymTFT formalism and applied it to construction of non-invertible defects, and bosonization and fermionization dualities [12, 13, 14]. Applied CFT techniques to celestial amplitudes [11]. Studied BPS states and infinite dimensional symmetries of SQFTs [9, 10].

2018–2019 **MSc. Physics**, *University of Waterloo*, Canada
Master's student in the Department of Physics at the University of Waterloo.
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

2024–2026 **NSERC Canada Postdoctoral Fellowship** ($\$70\mathrm{k/yr}$)
Nationally competitive postdoctoral research fellowship awarded by Natural Sciences and Engineering Research Council of Canada.

2020–2023 **NSERC Canada Graduate Scholarship - Doctoral** ($\$35\mathrm{k/yr}$)
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)
Nationally and cross-disciplinary competitive scholarship for Canadian graduate students or professionals who wish to study and/or conduct research in the US. Declined award.

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

All authors are listed alphabetically by surname, except for [15].

[1] Justin Kulp. "Dear Quantizers, Stochastic ≈ Brane" (Sept. 2026). arXiv: 2609.38209 [hep-th].

[2] Mathieu Boisvert, Shehab Hossam Fadda, Justin Kulp, and Ramtin M. Yazdi. "Observables in Schrödinger CFTs: How Aliens Built the Pyramids" (June 2026). arXiv: 2606.29539 [hep-th].

[3] Kasia Budzik and Justin Kulp. "Loop Corrected Supercharges from Holomorphic Anomalies". *JHEP (Accepted, in press)* (Dec. 2025). arXiv: 2512.07771 [hep-th].

[4] Mathieu Boisvert, Shehab Hossam Fadda, Justin Kulp, and Ramtin M. Yazdi. "Revisiting Schrödinger CFTs: Factorization, Massless Particles, and a Path to the Bootstrap". *JHEP (Under review)* (Oct. 2025). arXiv: 2510.26872 [hep-th].

[5] Rajeev S. Erramilli, Justin Kulp, and Fedor K. Popov. "Do null defects dream of conformal symmetry?" *JHEP (Accepted, in press)* (Sept. 2025). arXiv: 2509.04578 [hep-th].

[6] Justin Kulp and Sabrina Pasterski. "Multiparticle states for the flat hologram". *JHEP* 08 (2025), p. 091. DOI: 10.1007/JHEP08(2025)091. arXiv: 2501.00462 [hep-th].

[7] Latham Boyle and Justin Kulp. "Holographic foliations: Self-similar quasicrystals from hyperbolic honeycombs". *Phys. Rev. D* 111.4 (2025), p. 046001. DOI: 10.1103/PhysRevD.111.046001. arXiv: 2408.15316 [hep-th].

[8] Davide Gaiotto, Justin Kulp, and Jingxiang Wu. "Higher Operations in Perturbation Theory" (Mar. 2024). arXiv: 2403.13049 [hep-th].

[9] Kasia Budzik, Davide Gaiotto, Justin Kulp, Brian R. Williams, Jingxiang Wu, and Matthew Yu. "Semi-chiral operators in 4d $\mathcal{N} = 1$ gauge theories". *JHEP* 05 (2024), p. 245. DOI: 10.1007/JHEP05(2024)245. arXiv: 2306.01039 [hep-th].

[10] Kasia Budzik, Davide Gaiotto, Justin Kulp, Jingxiang Wu, and Matthew Yu. "Feynman diagrams in four-dimensional holomorphic theories and the Operatope". *JHEP* 07 (2023). https://github.com/TwistedQFTs/laman-loopstrap, p. 127. DOI: 10.1007/JHEP07(2023)127. arXiv: 2207.14321 [hep-th].

[11] Diego García-Sepúlveda, Alfredo Guevara, Justin Kulp, and Jingxiang Wu. "Notes on resonances and unitarity from celestial amplitudes". *JHEP* 09 (2022), p. 245. DOI: 10.1007/JHEP09(2022)245. arXiv: 2205.14633 [hep-th].

[12] Ivan M. Burbano, Justin Kulp, and Jonas Neuser. "Duality defects in E_8". *JHEP* 10 (2022), p. 186. DOI: 10.1007/JHEP10(2022)187. arXiv: 2112.14323 [hep-th].

[13] Davide Gaiotto and Justin Kulp. "Orbifold groupoids". *JHEP* 02 (2021), p. 132. DOI: 10.1007/JHEP02(2021)132. arXiv: 2008.05960 [hep-th].

[14] Justin Kulp. "Two More Fermionic Minimal Models". *JHEP* 03 (2021), p. 124. DOI: 10.1007/JHEP03(2021)124. arXiv: 2003.04278 [hep-th].

[15] 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].

Invited Talks and Seminars

Upcoming **TBA**
– KITP, Energy Correlators: From Theory to Experiment
– Tsinghua Sanya International Mathematics Forum, Anomalies, Topology, and QFTs

2026 **Dear Quantizers, Stochastic $\approx$ Brane**
– Institute for Advanced Study, Physics Seminar
– UCLA, Condensed Matter Theory Seminar

2026 **The Good, the Bad, and the Null**
– Cambridge, Simons Collaboration Celestial Holography Seminar
– UCLA, High Energy Physics Journal Club

2026 **Higher Dimensional Quasicrystals from Hyperbolic Honeycombs**
– International Centre for Mathematical Sciences, Quasicrystals in Fundamental Physics
– University of Calgary, Physics Colloquium

2025–2026 **BV and the ThimTFT**
– Harvard CMSA, Quantum Field Theory and Physical Mathematics Seminar
– Korea Advanced Institute of Science & Technology, Aspects of SQFT 2026

2025–2026 **Revisiting Schrödinger CFTs**
– Institute for Advanced Study, CMP/QFT Group Meeting
– NYU, High Energy Theory Group Meeting
– École Polytechnique Fédérale de Lausanne, QFT in AdS Conference
– SISSA International School for Advanced Studies, Theoretical Particle Physics Seminar
– UCLA, Theoretical Elementary Particle Physics Seminar
– Yale, Particle Theory Seminar

2025–2026 **Do null defects dream of conformal symmetry?**
– CERN, High Energy Theory Weekly Seminar
– University of Chicago, Leinweber Seminar
– Princeton University, High Energy Theory Seminar
– Harvard University, High Energy Theory Seminar
– ICTP-SAIFR, Theory Meets Practice: Energy Correlators and Detector Operators
– Brookhaven National Lab & SUNY OW, Holography, QCD, and the Electron-Ion Collider

2025–2026 **Higher Brackets, BRST Anomalies, and Non-Renormalization**
– Simons Center for Geometry and Physics, SQFTs, VOAs, and Geometry
– Shanghai Institute for Mathematics and Interdisciplinary Sciences, Physical Mathematics Seminar

2025 **Null Defects and Non-Relativistic CFTs**
– University of Cincinnati, SPOCK Conference
– Perimeter Institute, Quantum Fields and Strings Seminar

2025 **Lectures on the BV Formalism**
– Simons Center for Geometry and Physics

2024–2025 **Twisted Tools for (Untwisted) Quantum Field Theory**
– Abdus Salam International Centre for Theoretical Physics, String Math 2024
– Harvard CMSA, Algebraic Geometry Seminar
– Perimeter Institute, Higher Categorical Tools for Quantum Phases of Matter
– Yale University, Geometry, Symmetry, and Physics Seminar
– Quiver Meeting
– University of Edinburgh, Physics Seminar
– CUNY, Physics Seminar
– Boston University, Weekly Mathematics Seminar
– University of Toronto, High Energy Theory Seminar
– Virgina Tech, High Energy Theory Seminar

2023–2025 **Self-Similar Quasicrystals and Hyperbolic Honeycombs**
– IHES, Séminaire de Physique Théorique
– Perimeter Institute, Quantum Fields and Strings Seminar
– University of Pennsylvania, High Energy Theory Seminar
– Simons Center for Gometry and Physics, Weekly Seminar
– Quantum Theories of Fields, Matter, and Strings
– University of British Columbia, High Energy Physics Seminar

2022 **Confinement and Holomorphic Twists of $\mathcal{N} = 1$ SYM**
– Harvard CMSA, Weekly Seminar
– Princeton Center for Theoretical Science, Simons Confinement Inaugural Workshop
– Perimeter Institute, Quantum Fields and Strings Seminar
– Johns Hopkins University, High Energy Theory Seminar
– Institute for Advanced Study, PITP Gong Show

2022 **Quasicrystals and Decapods**
– SCGP, Generalized Global Symmetries, Quantum Field Theory, and Geometry

2022 **Holomorphic QFTs: Higher Structures and Bootstrap**
– University of Vienna, Strings 2022 (Gong Show Prize Winner)

2022 **The $3d$ $O(N)$ Model on the Celestial Circle**
– Princeton Center for Theoretical Science, Celestial Holography '22

2021 **Duality Defects in E_8**
– Perimeter Institute, Global Categorical Symmetries

2021 **Topological Aspects of QFT**
– Perimeter Institute, PSI Seminar

2020 **Orbifold Groupoids**
– Harvard CMSA, Condensed Matter Seminar
– Perimeter Institute, Quantum Fields and Strings Seminar

2020 **Fermionization and Minimal Models**
– Perimeter Institute, Quantum Fields and Strings Seminar

2019 **Scattering in Chern-Simons Matter Theories**
– Perimeter Institute, Winter School

2018 **Aperiodic Tilings in Physics**
– Perimeter Institute, PSI-minar

2017 **Aperiodic Tilings: An Introduction**
– Lakehead University, Mathematics Colloquium

2016 **Beta Testing ITk Modules**
– University of Toronto, ATLAS Canada Seminar

2016 **Decays of the Higgs Boson**
– University of Toronto, HEPex Seminar

Academic Service and Volunteer Experience

2026 **Conference Organizer**, *International Centre for Mathematical Sciences*, UK
Conference organizer for *Quasicrystals in Fundamental Physics*. Competitive application process; work included scheduling, making budgets, and securing additional funding through grants from the Higgs Centre for Theoretical Physics and Glasgow Mathematical Journal Trust. Conference budget $\sim \$58{,}000$.

2025–2026 **Journal Club/Seminar Organizer**, *Simons Center for Geometry and Physics*, USA

2026–Present **Journal Referee Physical Review D**, *Online*

2024–Present **Journal Referee Communications in Mathematical Physics**, *Online*

2023–Present **Journal Referee SciPost**, *Online*

2022–Present **Journal Referee JHEP**, *Online*

2022–Present **Anomalology Moderator and Organizer**, *Online*
Run and moderate the Anomalology community Discord server for "Global Categorical Symmetries," consisting of 300+ members, mainly graduate students, postdocs, and faculty. As well as organize and run the online Zoom seminar series and YouTube channel.

2021–2023 **Science Faculty Council**, *University of Waterloo*, Canada
Elected graduate student representative to university Science Faculty Council.

2020–2022 **PhysicsOH Community Contributor and Moderator**, *Online*

2019–2023 **Student Seminar Manager**, *Perimeter Institute*, Canada

2017–2018 **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. Proved equivalencies between certain aperiodic tilings. Proved some important topological defects in quasicrystals cannot be classified by natural topological charges/invariants.

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 **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.

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.

2014–2017 **Math Contest Invigilator**, *Lakehead University*, Canada
Northwestern Ontario High School Math Contest and Canadian Math Kangaroo Contest.

2014–2015 **Peer Tutor**, *Lakehead University*, Canada
One-on-one and group tutoring in calculus, real analysis, and introductory physics.

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

2024–2026 **NSERC Canada Postdoctoral Fellowship** ($\$70\mathrm{k}/\mathrm{yr}$)

Graduate

2020–2023 **NSERC Canada Graduate Scholarship - Doctoral** ($\$35\mathrm{k}/\mathrm{yr}$)

2020-2023 **University of Waterloo President's Graduate Scholarship** ($\$5\mathrm{k}/\mathrm{yr}$)
Awarded to graduate students holding major federal/provincial competition-based scholarships.

2019-2020 **Traditional Fulbright Canada Student Award** ($\$20\mathrm{k}$)

2019 **University of Waterloo Marie Curie Award** ($\$883$)

2018-2019 **NSERC Canada Graduate Scholarship - Masters** ($\$17.5\mathrm{k}$)
Nationally competitive master's research scholarship awarded by NSERC of Canada on recommendation of the University of Waterloo.

2018-2019 **University of Waterloo President's Graduate Scholarship** ($\$10\mathrm{k}$)

2018-2019 **Perimeter Scholars International Award** ($\$30\mathrm{k}$)
Awarded to attend Perimeter Scholars International at the Perimeter Institute.

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)