



Benjamin Scully

 Benjamin Scully |  b.scully [at] mail.utoronto.ca

EDUCATION

University of Toronto

2025 - Current

PhD - Astronomy and Astrophysics

University of British Columbia

2020 - 2025

BSc - Combined Honours in Physics and Astronomy

with Distinction; Co-operative Education Program

PUBLICATIONS

1. **Scully, B.**, Matzner, C. D., & Yalinewich, A., Observability of flashes from ejecta crashes in aspherical supernovae, with application to SN 2008D. *MNRAS*: [10.1093/mnras/stad2360](https://doi.org/10.1093/mnras/stad2360) arXiv: [2307.15859](https://arxiv.org/abs/2307.15859) (Aug. 2023).
2. Sekatchev, M., Liang, X., Majidi, F., **Scully, B.**, Waerbeke, L. V., & Zhitnitsky, A., The Glow of Axion Quark Nugget Dark Matter: (III) the Mysteries of the Milky Way UV Background. *Submitted to JCAP*, arXiv: [2504.15382](https://arxiv.org/abs/2504.15382) (Apr. 2025)
3. Soni, S., et al. incl. **Scully, B.** LIGO Detector Characterization in the first half of the fourth Observing run. *CQG*: [10.1088/1361-6382/adc4b6](https://doi.org/10.1088/1361-6382/adc4b6) arXiv: [2409.02831](https://arxiv.org/abs/2409.02831) (Sep. 2024)

RESEARCH EXPERIENCE

Undergraduate Honours Thesis - *UBC*

Sep 2024 - Jul 2025

Supervised by Dr. Ludovic Van Waerbeke & Dr. Ariel Zhitnitsky

- Modelling Axion Quark Nugget dark matter model emission spectrum in JWST and Euclid bands to test observation potential
- Bridging technical details of modern telescopes with theoretical modelling in Python to compare predictions to real-world capabilities
- Communicated work multiple times in oral and written media

Undergraduate Research Assistant - *TRIUMF*

May - Aug 2024

Supervised by Dr. Jason Holt

- Used nuclear theory to probe physics beyond the standard model in the field of quark mixing
- Implemented a new quantum operator in the group-wide code base and identified other necessary improvements
- Selected papers and collaborated across theory groups to achieve results

Undergraduate Research Assistant - *TRIUMF*

Sep 2023 - May 2024

Supervised by Dr. Katherine Pachal

- Prepared and developed fast scintillator detector paddles for the DarkLight experiment
- Improved mechanical design and assembled scintillators, detector architecture, and wiring for the set-up
- Developed and conducted data analysis to achieve sub-200 picosecond time resolution
- Simulated particle interactions to confirm theoretical expectations

Undergraduate Research Assistant - *LIGO UBC*

May - Aug 2023

Supervised by Dr. Jess McIver

- Studied signal vs glitch classification in LIGO/Virgo detectors to improve gravitational wave detection capabilities
- Developed machine learning, dimensional reduction, and visualization techniques in Python with *KERAS & TensorFlow* to identify gaps in classifier performance
- Worked with large data sets to directly improve identification capabilities of the classifier

Undergraduate Research Assistant - *University of Toronto*

May - Aug 2022

Supervised by Dr. Christopher D. Matzner

- Studied observability of circumstellar ejecta collisions from aspherical supernovae and compared findings to observed events
- Independently implemented aspherical supernovae in C++ hydrodynamics simulation despite having no prior experience with the language or object oriented design
- Achieved novel conclusions on observables and wrote a paper which was published in MNRAS.

PRESENTATIONS AND TALKS

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|---|----------|
| 1. Undergraduate Thesis | Apr 2025 |
| <i>Axion Quark Nugget Glow: Observing dark matter in modern telescopes</i> | |
| 2. CUPC 2024 Undergraduate Talk | Oct 2024 |
| <i>Standard Model Mixology: Exploring Quark Mixing Through Nuclear Theory</i> | |
| 3. TRIUMF Science Week “Science Pitch” (Honourable Mention) | Jul 2024 |
| <i>Up is Down: Ab-Initio Approaches to Superaligned Beta Decay to Test for New Physics</i> | |
| 4. UBC Summer-student Astronomy Colloquium | Aug 2023 |
| <i>Semi-supervised clustering of LIGO-Virgo signals to improve GSPyNetTree classification</i> | |

POSTERS

- | | |
|---|----------|
| 1. TRIUMF Co-op Poster Presentations | Aug 2024 |
| <i>Standard Model Mixology: Exploring Quark Mixing Through Nuclear Theory</i> | |
| 2. TRIUMF Co-op Poster Presentations | Apr 2024 |
| <i>DarkLight Fast Scintillator Trigger Detector Development</i> | |
| 3. UofT Dunlap SURP Poster Presentation (Honourable Mention) | Aug 2022 |
| <i>Do circumstellar collisions make observable transients in aspherical supernovae?</i> | |

AWARDS AND GRANTS

Faculty of Arts & Science Top (FAST) Doctoral Award – (\$180 000 over 4 years) 2025-Present

- Entrance award for a top incoming domestic student

Paul Sykes Scholarship in Astronomy – (\$1 200) 2024

- Scholarship made on the recommendation of the Department of Physics and Astronomy

Dante Ciccone Memorial Scholarship in Astronomy – (\$1 575) 2024

- Scholarships totaling \$3,150 for graduate or undergraduate students studying astronomy

Dean of Science Scholarship – (\$280) 2024

- Recognizes UBC students for service to faculty and fellow students

Canadian Institute for Nuclear Physics URS – (\$11 500) 2024

NSERC USRA – (\$11 000) 2023

Charles and Jane Banks Scholarship – (\$270) 2022

- Awarded on the recommendation of the Faculty to worthy and deserving students

NSERC USRA – (\$9 600)

2022

Dean's Scholar – UBC

2021-2025

- Awarded to students with an average of $\geq 90\%$ the previous Winter Session

OUTREACH AND SERVICE

UBC PHAS EDI Committee

May 2024 - May 2025

- Member of the UBC Physics Department's Equity Diversity and Inclusion committee with the goal of providing guidance on policy changes, and inspiring new initiatives
- My responsibilities center around establishing professional development and effective resources for members of the community

Girl Guide Physics Activities

Jan 2024 - Apr 2025

- Taught interactive physics activities to Girl Guide groups of ages 5-12.
- Activities included LED circuits, spaghetti towers, and instruction about general relativity

UBC Physics Olympics

Mar 2023 - Mar 2025

- Physics and astronomy competition for high-school students
- Formulated rules, designed and ran pre-build competition in 2024 and currently for 2025
- Ran vacuum pump pre-build competition and Quizzics (Physics Quiz) competition in 2023

UBC Canadian Undergraduate Physics Conference Organizer

Jan - Oct 2024

- Acted as external coordinator in the organization of CUPC at UBC for the Fall of 2024.
- Handled all aspects of securement, and organization of all nineteen keynote and panellist speakers
- Additionally managed catering and sponsorship details, and judged student presentations

UBC Faraday show

Nov 2023

- Annual science lecture to introduce Physics to younger generations
- Presented to over 300 members of the public

SKILLS

Programming: Python (TensorFlow, Astropy), C++, ROOT, Java, Matlab

Applications: GitHub, Linux terminal, LaTeX, MadGraph, SolidWorks, Microsoft Office

Other: Object oriented design, Data collection & analysis, Computing clusters, Scientific writing, Delicate materials handling, Physical construction/assembly

Attributes: Detail oriented, Communication, Public speaking, Teamwork, Empathy

WORKSHOPS AND SPECIAL PROGRAMS

Canadian Astroparticle Physics Summer School (CAPSS)

May 2023

French Immersion Dual Dogwood highschool diploma

Jun 2020

NON-ACADEMIC WORK EXPERIENCE

Lifeguard & Swim Instructor – City of Rossland

2019 - 2021

Meat shop Cleaner and Cashier – Ferraro Foods

2017 - 2019

LANGUAGES

Fluent: English, French – **Learning:** Spanish (B1), German (A1)