

Jaeden Bardati

GRADUATE STUDENT · PHYSICS & ASTRONOMY

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Education

California Institute of Technology

Pasadena CA, United States

PHD PHYSICS

2023 - Present

- General Relativity I & II, Quantum Field Theory I-III, Mathematical Methods, Applications of Physics, etc.
- Advisor: Philip F. Hopkins

Bishop's University

Sherbrooke QC, Canada

BSc PHYSICS HONOURS (WITH DISTINCTION)

2020 - 2023

- Minor in Mathematics; One course shy of Minor in Computer Science; GPA: 4.0/4.0.
- Honours Thesis: "Signatures Of Massive Black Hole Mergers In Their Host Galaxy Morphologies"
- Advisor: John J. Ruan

Technical Skills

Python: 10+ years experience (including using numpy, matplotlib, scipy, pandas, scikit-learn, etc.)

High Performance Computing: Used several million CPU-hours on Compute Canada Cedar and TACC Frontera

Fluid dynamics and radiative transfer codes: SKIRT, Powderday (Hyperion + FSPS), Dedalus

Astronomical analysis software & tools: astropy, photutils, pynbody, tangos, yt, h5py, vorbin, statmorph, ppXF, Kinemetry

Other languages & tools: C/C++, Java, MIPS Assembly, Bash, Batch, HTML, CSS, Javascript, LaTeX

Awards & Scholarships

2024	Hummel-Gray Award , Caltech Y	\$1K USD
2021-2023	3x awarded Undergraduate Student Research Award (USRA) , Natural Sciences and Engineering Research Council of Canada (NSERC)	\$18K CAD
2021-2023	3x awarded Supplément au bourse de 1er cycle du CRSNG , Fonds de Recherche du Québec Nature et technologies (FRQNT)	\$4.5K CAD
2023	The University Prize in Physics and Astronomy , Bishop's University	\$100 CAD
2023	The David Savage Prize in Physics and Mathematics , Bishop's University	\$1K CAD
2022-2023	American Biltrite (Canada) Ltd Scholarship (merit scholarship), Bishop's University	\$1.5K CAD
2022-2023	Florence May Foreman Scholarship (merit scholarship), Bishop's University	\$1.5K CAD
2022	The Undergraduate Prize in Physics and Astronomy (highest achievement), Bishop's University	\$100 CAD
2021-2022	Bourse d'Écellence Hydro-Québec (scholarship for "academic excellence and leadership qualities"), Bishop's University	\$4K CAD
2021	The Faculty Prize in Physics (highest achievement), Bishop's University	\$100 CAD
2020-2023	Academic Honour Roll (every year), Bishop's University	
2020-2021	H. Greville Smith Memorial Scholarship (entrance merit scholarship), Bishop's University	\$5K CAD
2020	Academic Excellence Award , Champlain College	
2020	Highest Achievement in Physics , Champlain College	

Publications

PUBLICATIONS

- [7] **Bardati, J.**, & Hopkins, P. F. (2025). Anisotropic Infrared AGN Emission from High-Redshift Simulation Spanning Dust Sublimation to Galactic Scales. *In prep.*
- [6] Horlaville, P. et al., including **Bardati, J.** (2025). Identifying the Potential Host Galaxies of Upcoming Supermassive Black Hole Binary Gravitational Wave Detections. *In prep.*
- [5] Hopkins, P. F. et al., including **Bardati, J.** (2025). Zooming In On The Multi-Phase Structure of Magnetically-Dominated Quasar Disks: Radiation From Torus to ISCO Across Accretion Rates. Submitted to the *Open Journal of Astrophysics*. arXiv:2502.05268.
- [4] **Bardati, J.**, Ruan, J. J., Haggard, D., Tremmel, M., & Horlaville, P. (2024). Signatures of Massive Black Hole Merger Host Galaxies from Cosmological Simulations II: Unique Stellar Kinematics in Integral Field Unit Spectroscopy. *The Astrophysical Journal*, 977(2), 265
- [3] **Bardati, J.**, Ruan, J. J., Haggard, D., & Tremmel, M. (2024). Signatures of Massive Black Hole Merger Host Galaxies from Cosmological Simulations I: Unique Galaxy Morphologies in Imaging. *The Astrophysical Journal*, 961(1), 34
- [2] Ruan, J., **Bardati, J.**, Haggard, D., & Tremmel, M. (2024). Signatures of Massive Black Hole Merger Host Galaxies from Cosmological Simulations: Unique Stellar Kinematics in Spatially-Resolved Spectroscopy. *American Astronomical Society Meeting Abstracts*, 56(2), Article 456.11
- [1] **Bardati, J.**, Ruan, J. J., Haggard, D., & Tremmel, M. (2023). Host Galaxy Morphological Signatures of Massive Black Hole Mergers. *American Astronomical Society Meeting Abstracts*, 55(2), Article 268.17

Teaching Experience

TEACHING ASSISTANT

Winter 2025	Ph 21: Computational Physics II , Teaching Assistant	Caltech
Fall 2024	Ph 20: Computational Physics I , Teaching Assistant	Caltech
Spring 2024	Ph 1c: Classical Mechanics & Electromagnetism (2 groups), Head TA	Caltech
Winter 2024	Ph 1b: Classical Mechanics & Electromagnetism , Teaching Assistant	Caltech
Winter 2023	MAT 82: Enriched Calculus Laboratory II , Teaching Assistant	Bishop's University
Fall 2022	PHY 113: Introduction to Astronomy , Marker	Bishop's University
Fall 2022	PHY 101: Statistical Methods in Experimental Science , Marker	Bishop's University
Fall 2022	MAT 81: Enriched Calculus Laboratory I (2 groups), Teaching Assistant	Bishop's University

TUTORING

2023-Present	Caltech Y-Tutor , University Tutor	Online
2023-Present	Rise Tutor , High School Tutor	Caltech
2022-2023	Math Help Center , Tutor	Bishop's University
2020-2023	Nimbus Learning Platform , Private Tutor	Bishop's University
2020-2021	R.D.W. Howson Enrichment Centre , Mathematics Tutor	Bishop's College School
2019-2020	Math and Physics Workshop , Tutor	Champlain College

MENTORING

2024-2025	Shai Toledano , Undergraduate Student, University of Michigan	Caltech CAPP Program
2024-2025	Varun Pritmani , Undergraduate Student, Hunter College	Caltech CAPP Program
2024-2025	Lihang Zhou , Graduate Student, Caltech	Caltech PMA Mentorship
2024-2025	Max Kogan , Undergraduate Student, UCSC	AAS DDA Mentorship
2023-2024	Adrian Lam , Undergraduate Student, UCLA	AAS DDA Mentorship

Presentations

April 2024. *Signatures of Massive Black Hole Merger Host Galaxies in Morphology and Stellar Kinematics*. Contributed talk: Massive Black Holes in First Billion Years, Kinsale, Co. Cork, Ireland.

June 2023. *Host Galaxy Morphological Indicators of MBH Mergers*. Invited talk: LISA MMA-WP telecon.

Apr 2023. *Signatures of MBHs in their Host Galaxy Morphologies*. Honours thesis talk: Bishop's University.

Mar 2023. *MBH Mergers and Their Host Galaxies: Multi-Messenger Prospects*. Seminar talk: Bishop's University.

Mar 2023. *How Do We Find Supermassive Black Hole Mergers?* 3-min thesis: Bishop's University.

Jan 2023. *Host Galaxy Morphological Signatures of Massive Black Hole Mergers*. Poster: AAS Meeting 241, Seattle, WA.

Aug 2022. *Host Galaxy Morphological Signatures of MBH Mergers*. Contributed talk: LISA Canada 2022 Workshop.

Jul 2022. *Department Paper Presentation*. Physics & Astronomy Department Talk: Bishop's University.

Outreach & Professional Development

SERVICE & VOLUNTEERING

Sept 2024	Caltech First-Year Teaching assistant Conference Facilitator , Co-led and planned the Caltech physics, mathematics and astronomy department TA conference, training over 50 new graduate students.	Caltech
Apr 2024	California Science & Engineering Fair , Category Award Judge	California, USA
Mar 2024	Orange County Science & Engineering Fair , ISEF Selection Judge	Orange County, CA
2021-2023	Astronomy, Mathematics and Physics Society (AMPS) , Co-founder and Physics & Astronomy Representative (elected co-lead position).	Bishop's University
2021-2022	Student Accessibility & Accommodation Services , Peer Note-Taker	Bishop's University
2019-2020	Cougar Ambassador , Helped new students integrate into the college.	Champlain College

OTHER TRAINING & WORKSHOPS

	Perimeter Scholars International - Students' Training Accelerator for Research in Theory (PSI START) , Waterloo, ON, Canada	
May-Jul 2022	Selective ten-week online school consisting of 4 courses in quantum information, path integral quantum mechanics, numerical methods, and symmetry mathematics, including a small project in general relativity. One of ten worldwide to be offered a summer research internship (declined).	Perimeter Institute
	DAWN Winter School , Copenhagen, Denmark	
Feb 2022	One-week school aiming to address practical knowledge in astrophysics for graduate students, from both observational and theoretical perspectives.	Cosmic Dawn Center

MEDIA COVERAGE

2024. BU Research Spotlights: *Signatures of Massive Black Hole Merger Host Galaxies from Cosmological Simulations*

2023. Sherbrooke Record: *Bishop's grad accepted to PhD physics program at Caltech*

2023. BU Research Spotlights: *Jaeden Bardati, Bishop Graduate 2023: Accepted in the PhD Physics Program at Caltech*

2023. Bishop's University Blog: *Training the Physicists of Tomorrow*

2023. Centre de Recherche en Astrophysique du Québec Calendar: *Mergers of galaxies hosting supermassive black holes*

2022. BU Research Spotlights: *Undergraduate Student Accepted in Prestigious International Summer Training Program*

2021. Sherbrooke Record: *"This is going to be a big thing"*