Jaeden E. Bardati

Graduate Student · Physics & Astronomy

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Education

California Institute of Technology — *Pasadena CA, United States*
PhD Physics — *2023 - Present*
- Advisor: Philip F. Hopkins

Bishop's University — *Sherbrooke QC, Canada*
BSc Physics Honours (With Distinction) — *2020 - 2023*
- Minor in Mathematics; GPA: 4.0/4.0
- Honours Thesis: "Signatures Of Massive Black Hole Mergers In Their Host Galaxy Morphologies"
- Advisor: John J. Ruan

Professional Experience

2024-Present	**(Head) Graduate Teaching Assistant**, California Institute of Technology
2023-Present	**Graduate Research Assistant**, California Institute of Technology
2022-2023	**Undergraduate Teaching Assistant**, Bishop's University
2021-2023	**Undergraduate Research Assistant**, Bishop's University
2020-2023	**Private Tutor**, Bishop's University
2020-2021	**Mathematics Tutor**, Bishop's College School
2019-2020	**Mathematics and Physics Tutor**, Champlain College

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'Éxcellence 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	

Teaching Experience

Teaching Assistant

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

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	
2020-2021	**R.D.W. Howson Enrichment Centre**, Mathematics Tutor	*Bishop's College School*
2019-2020	**Math and Physics Workshop**, Tutor	*Champlain College*

Technical Skills

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

High Performance Computing: Used over 1 million CPU-hours on Compute Canada Cedar and TACC Frontera

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

Publications

Refereed Publications

Bardati, J., Ruan, J. J., Haggard, D., Tremmel, M., "Signatures of massive black hole merger host galaxies from cosmological simulations i: unique galaxy morphologies in imaging", The Astrophysical Journal **961**, 34 (2024), `https://dx.doi.org/10.3847/1538-4357/ad055a`

In Review

Bardati, J., Ruan, J. J., Haggard, D., Tremmel, M., Horlaville, P., "Signatures of Massive Black Hole Merger Host Galaxies from Cosmological Simulations II: Unique Stellar Kinematics in Integral Field Unit Spectroscopy", Submitted to ApJ. (2024) `https://dx.doi.org/10.48550/arXiv.2407.14061`

Bardati, J., Hopkins, P. F., "Dust Properties of the Forge'd in FIRE AGN Simulation", In prep. (2024)

Horlaville, P., Ruan, J. J., **Bardati, J.,** "Finding Dual AGN candidates using Morphology and Stellar Kinematics of Host Galaxies", In prep. (2024)

Other Publications

Ruan, J., **Bardati, J.**, Haggard, D., Tremmel, M., "Signatures of Massive Black Hole Merger Host Galaxies from Cosmological Simulations: Unique Stellar Kinematics in Spatially-Resolved Spectroscopy", in American astronomical society meeting abstracts, Vol. 243, American Astronomical Society Meeting Abstracts (Feb. 2024), p. 456.11

Bardati, J., Ruan, J. J., Haggard, D., Tremmel, M., "Host Galaxy Morphological Signatures of Massive Black Hole Mergers", in American astronomical society meeting abstracts, Vol. 55, American Astronomical Society Meeting Abstracts (Jan. 2023)

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 Lunch Talk: Bishop's University.

Outreach & Professional Development

Service

2024	**Caltech First-Year Teaching Assistant Conference**, Facilitator Co-led the PMA session for the Caltech First-Year TA training. Involved planning the session with the other facilitators of the PMA session, and answering questions posed by students.	*Caltech*
2024	**California Science & Engineering Fair (CSEF)**, Physics & Astronomy (Senior) Category Award Judge	
2024	**Orange County Science & Engineering Fair (OCSEF)**, International Science & Engineering Fair (ISEF) Selection Judge	
2021-2023	**Astronomy, Mathematics and Physics Society (AMPS)**, Co-founder and Physics & Astronomy Representative (Co-lead position). Duties involved: Jointly coordinating bi-weekly meetings with over 60 recruited members, coding and managing a publicly-accessible club website, organizing physics and astronomy-related AMPS projects and events such as sky viewings at the Bishop's Observatory or graduate school preparation seminars, and arranging for an appropriate space to be booked, creates detailed budgets of event expenses, and contacts speakers.	*Bishop's University*
2021-2022	**Student Accessibility & Accommodation Services**, Peer Note-Taker for students with accessibility needs.	
2019-2020	**Cougar Ambassador**, Volunteer position to help new students integrate into the college.	*Champlain College*

Mentoring

2024-2025	**Kai Jaffarove**, Undergraduate Student, UC, Berkeley	*AAS DDA Mentorship*
2024-2025	**Max Kogan**, Undergraduate Student, UCSC	*AAS DDA Mentorship*
2024-2025	**Varun Pritmani**, Undergraduate Student, Hunter College	*Caltech CAPP Program*
2024-2025	**Shai Toledano**, Undergraduate Student, University of Michigan	*Caltech CAPP Program*
2023-2024	**Adrian Lam**, Undergraduate Student, UCLA	*AAS DDA Mentorship*

Training & Workshops

Perimeter Scholars International - Students' Training Accelerator for Research in Theory (PSI START), Waterloo, ON

2022 — Attended a selective ten-week online school consisting of 4 courses in Quantum Information, Path Integral Formulation of Quantum Mechanics, Numerical Methods (+ an introduction to Quantum Field Theory), and Mathematics of Symmetries, including a small research project in General Relativity. One of ten worldwide to be offered a summer research internship (declined). *Perimeter Institute*

DAWN Winter School, virtual

2022 — Attended a week-long school aiming to address practical knowledge in astrophysics for graduate students, from both observational and theoretical perspectives. *Cosmic Dawn Center*

2022 **Introduction to Machine Learning**, Compute Canada
2021 **Intro to High-performance computing (HPC)**, Compute Canada
2021 **Intro à la ligne de commande Unix**, Calcul Québec

Media Coverage

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"*