

Jaeden E. Bardati

GRADUATE STUDENT · PHYSICS & ASTRONOMY

California Institute of Technology
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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 (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

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

PUBLICATIONS

- [7] **Bardati, J.**, & Hopkins, P. F. (2024). RT FORGE'd in FIRE: Radiation Analysis of Active Galactic Nuclei from Accretion Disk to Cosmological Scales. *In prep.*
- [6] Horlaville, P., Ruan, J. J., **Bardati, J.**, Haggard, D., & Tremmel, M. (2024). Signatures of Massive Black Hole Merger Host Galaxies from Cosmological Simulations III: Predictions of Dual AGN and First PTA Detections. *In prep.*
- [5] Hopkins, P. F. et al., including **Bardati, J.** (2024). Zooming In On The Multi-Phase Structure of Magnetically-Dominated Quasar Disks: Radiation From Torus to ISCO Across Accretion Rates. *In prep.*
- [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. *Submitted to ApJ on Jul 19*, arXiv: 2407.14061
- [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

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

	Caltech First-Year Teaching Assistant Conference, Facilitator	
2024	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	California
2024	Orange County Science & Engineering Fair (OCSEF) , International Science & Engineering Fair (ISEF) Selection Judge	Orange County, CA
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.	Bishop's University
2019-2020	Cougar Ambassador , Volunteer position to help new students integrate into the college.	Champlain College

MENTORING

2024-2025	Lihang Zhou , Graduate Student, Caltech	Caltech PMA Mentorship
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, Canada	
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).	<i>Perimeter Institute</i>
	DAWN Winter School , Copenhagen, Denmark	
2022	Attended a week-long school aiming to address practical knowledge in astrophysics for graduate students, from both observational and theoretical perspectives.	<i>Cosmic Dawn Center</i>
2022	Introduction to Machine Learning , virtual	<i>Compute Canada</i>
2021	Intro to High-performance computing (HPC) , virtual	<i>Compute Canada</i>
2021	Intro à la ligne de commande Unix , virtual	<i>Calcul Québec</i>

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"*