

# Jaeden E. Bardati

GRADUATE STUDENT · PHYSICS & ASTRONOMY

California Institute of Technology  
1200 E California Blvd  
MC 350-17  
Pasadena, CA 91125

✉ jbardati@caltech.edu | 🏠 jaedenbardati.github.io | 📷 JaedenBardati | 🌐 jaeden-bardati

## Education

### California Institute of Technology

Pasadena CA, United States

#### PHD PHYSICS

2023 - Present

- Member of the TAPIR group
- 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
- 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

2023	Hummel-Gray Award, Caltech Y	\$1K USD
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
2021-2023	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
2021-2022	Bourse d'Éxcclence 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

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### TEACHING ASSISTANT

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

### TUTORING

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

## Technical Skills

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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

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### 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., Horlavage, 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)

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

### OTHER PUBLICATIONS

**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

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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

	<b>Caltech First-Year Teaching Assistant Conference</b> , 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	<b>California Science &amp; Engineering Fair (CSEF)</b> , Physics & Astronomy (Senior) Category Award Judge	
2024	<b>Orange County Science &amp; Engineering Fair (OCSEF)</b> , International Science & Engineering Fair (ISEF) Selection Judge	
	<b>Astronomy, Mathematics and Physics Society (AMPS)</b> , Co-founder and Physics & Astronomy Representative (Co-lead position).	
2021-2023	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	<b>Student Accessibility &amp; Accommodation Services</b> , Peer Note-Taker for students with accessibility needs.	
2019-2020	<b>Cougar Ambassador</b> , Volunteer position to help new students integrate into the college.	Champlain College

### MENTORING

2024-2025	<b>Shai Toledano</b> , Undergraduate Student, University of Michigan	Caltech CAPP Program
2023-2024	<b>Adrian Lam</b> , Undergraduate Student, UCLA	AAS DDA Mentorship
2023-2024	<b>Jeremiah Reynoso</b> , Undergraduate Student, Morehouse College	AAS DDA Mentorship

### CONFERENCES ATTENDED

2024	<b>Massive Black Holes in First Billion Years</b> , Kinsale, Co. Cork, Ireland
2023	<b>American Astronomical Society Meeting 241</b> , Seattle, WA
2022	<b>LISA Canada 2022 Workshop</b> , virtual
2022	<b>CRAQ Annual Meeting 2022</b> , Orford, QC
2021	<b>LISA Canada 2021 Workshop</b> , virtual
2021	<b>Atlantic General Relativity Meeting 2021</b> , Bishop's University, virtual
2021	<b>CAP Canadian Undergraduate Physics Conference (CUPC)</b> , Ryerson University, virtual

## 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"*

## PROFESSIONAL MEMBERSHIPS

**Student Member**, American Astronomical Society (AAS)