Sabrina Berger-Marcelo[1]

Website: https://sabrinastronomy.github.io/
Citizenship: USA

SUMMARY

Research Interests: Astrostatistics and computational astrophysics; high-z quasars, 21cm cosmology, and radio instrumentation.
Publications: 4 as first author (1 in prep), 10 as co-author
Science Talks: 32+ given, 1 scheduled, 7/32 invited
Outreach/Inreach Talks: 13 total, 7/13 invited, 50+ hours of astronomy podcast episodes (Astro[sound]bites Podcast)
Science Posters: 15
Mentees: Research (2), Professional (13)

EDUCATION

PhD, Physics, **University of Melbourne** Dec 2022–May 2026 (expected)
Dissertation: *Bridging Theory and Observation: What Simulations Reveal About High-z Discoveries with Space Telescopes*
Visiting PhD Student at ANU and Swinburne
Advisor: Stuart Wyithe

MSc, Physics, **McGill University** 2022
Dissertation: *Constraining reionization density fields and ionospheric errors for radio interferometers*
Advisors: Adrian Liu and Jonathan Sievers

BA, Astrophysics, **University of California, Berkeley** 2018
Transferred from Diablo Valley College

FIRST AUTHOR PUBLICATIONS

1. **S. Berger**, M. Marshall, S. Wyithe, T. Di Matteo, Y. Ni, S. Wilkins, & M. Yue, *Biases in stellar masses of JWST high-z quasar host galaxies caused by quasar subtraction* — 2025, **submitted to MNRAS**.
2. B. Metha and **S. Berger** (Shared first authorship), *A "Rosetta Stone" for Studies of Spatial Variation in Astrophysical Data: Power Spectra, Semivariograms, and Structure Functions* — 2025, **PASP, 137, 7**.
3. **S. Berger**, A. Lasinski†, V. MacKay et al., *First Use of GPS Satellites for Beam Calibration of Radio Dish Telescopes* — 2025, **PASA, in press**.
4. **S. Berger**, M. Marshall, S. Wyithe, T. Di Matteo, Y. Ni, & S. Wilkins, *Simulated host galaxy analogs of high-z quasars observed with JWST* — 2024, **MNRAS 530, 4**.

2ND AUTHOR PUBLICATIONS

1. W.G. Newton, **S. Berger**, & B. Haskell, *Observational constraints on neutron star crust-core coupling during glitches* — 2015, **MNRAS 454, 4**.

CO-AUTHORED PUBLICATIONS

1. Roper et al. (incl. **S. Berger**), *Synthesizer: Synthetic Observables For Modern Astronomy* — 2025, **submitted to JOSS**.

[1]Publishing as Sabrina Berger.
†Indicates a student I mentored.

2. Wilkins et al. (incl. **S. Berger**), *First Light and Reionization Epoch Simulations (FLARES) — XV: The physical properties of super-massive black holes and their impact on galaxies in the early universe* — 2025, **OJAp, 8**.
3. Cassanelli et al. (incl. **S. Berger**), *A fast radio burst localized at detection to an edge-on galaxy using very-long-baseline interferometry* — 2024 **Nature Astronomy 8, 1429–1442**.
4. Cassanelli et al. (incl. **S. Berger**), *Localizing FRBs through VLBI with the Algonquin Radio Observatory 10 m Telescope* — 2022, **AJ 163, 65**.
5. The CHIME/FRB Collaboration et al. (incl. **S. Berger**), *The First CHIME/FRB Fast Radio Burst Catalog* — 2021, **ApJS 257, 59**.
6. M. Rafiei-Ravandi et al. (incl. **S. Berger**), *CHIME/FRB catalog 1 results: statistical cross-correlations with large-scale structure* — 2021, **ApJ 922, 42**.
7. V. Gajjar et al. (incl. **S. Berger**), *Absence of Bursts between 4 and 8 GHz from FRB 20200120E Located in an M81 Globular Cluster* — 2021, **RNAAS 5, 166**.
8. D. Michilli et al. (incl. **S. Berger**), *An analysis pipeline for CHIME/FRB full-array baseband data* — 2021, **ApJ 910, 147**.
9. FAST Collaboration et al. (incl. **S. Berger**), *Opportunities to SETI with the Five-hundred-meter Aperture Spherical radio Telescope* — 2020, **RAA FAST Special Issue 20, 078**.

IN PREP PUBLICATIONS

1. **S. Berger**, A. Gorce, & A. Liu, *Predicting the matter density field from 21cm brightness temperature observations using Bayesian inference with JAX* — **in prep**.

GRANTS

Co-PI, French-Australian Science and Innovation Collaboration Grant (USD∼$20K)
-*Deciphering the mysteries of how the first galaxies formed with Square Kilometre Array-Low and Artificial Intelligence* 2025
Mary H. Brown Fund for *Mental Health in Physics Seminars* (CAD $1.5K) 2021

FELLOWSHIPS AND SCHOLARSHIPS

Astronomical Society of Australia Student Travel Grant (AUD $1K) 2025
Alan Kenneth Head Travel Grant (AUD $5K) 2024
Astronomical Society of Australia Student Travel Grant (AUD $1.5K) 2024
University of Melbourne Women in Physics Scholarship (AUD $1K) 2023
Melbourne Research Scholarship/Australian RTP (AUD $290K, including tuition) 2022
ND Goldsworthy Scholarship (AUD $21K) 2023
-highest-ranked international students in physics
Rowden White Scholarship (AUD $6.5K) 2022
NSERC NTCO-CREATE Fellowship (CAD $15K) 2021
McGill Graduate Mobility Award (CAD $1.5K) 2021
Berkeley Physics Undergraduate Research Scholar (USD $1000) 2017 & 2018
UC Berkeley Academic Opportunity Fund (USD $250) 2017
European Space Agency Young Researcher's Award (€200) 2017

SOFTWARE

Programming Languages: Python (10+ years), Bash, C++, and Java
ML & Stats Tools: numpyro, PyMC3, JAX, Scikit-Learn, and pytorch
HPC: Slurm, MPI, GPU-accelerated workflows
GitHub: https://github.com/sabrinastronomy

INDUSTRY EXPERIENCE

Physicist Intern at Meta (Facebook) Summer 2021
Applied machine learning models to classify GPS error with $> 90\%$ accuracy; integrated into Facebook's augmented reality products. Received excellent peer and manager performance reviews, leading to a return internship offer (declined).

Data Science Intern at NASA Ames Jan–May 2019
Applied conditional Generative Adversarial Networks (cGANs) to clean data from the Transiting Exoplanet Survey Satellite (TESS) pipeline. Produced results comparable to those from traditional data cleaning methods.

CONFERENCE RESEARCH TALKS (20, 1 scheduled)

High-redshift galaxy formation at the interface between simulations and observations (Kerala, India)	*scheduled* Jan 2026
sys2025: Systematic and Measurement Errors across the Sciences - Astrostatistics and Data Science (Huntsville, Alabama)	Nov 2025
Exploring the first billion years of the Universe (Port Douglas, Australia)	Sep 2025
Australian Astronomical Society Meeting (virtual)	July 2025
SKA Cosmic Dawn/EoR Meeting 2024 (virtual)	July 2024
Astro3D Legacy Science Meeting (Sydney, Australia)	June 2024
COSMO 21–Statistical Challenges in 21cm Cosmology (Chania, Greece)	May 2024
Massive Black Holes in the Early Universe (Kinsale, Ireland)	May 2024
Nagoya-Melb. Joint Research Workshop on Cosmology (Nagoya, Japan)	Feb 2024
ANITA[2] Meeting (Monash University)	Feb 2024
JWST@Sesto (virtual)	July 2023
Shedding new light on the first billion years of the Universe (virtual)	July 2023
Astro3D Science Meeting (Perth, Western Australia)	June 2023
Faculty of Science Research Summit (UniMelb)	Feb 2023
URSI[3] National Radio Science Meeting (virtual)	Jan 2023
Assembly of the Order of the Octopus Meeting (virtual)	July 2021
ESA Extreme Habitable Worlds Conference (Noordwijk, Netherlands)	Dec 2017
Gulf Coast Undergraduate Research Symposium (Rice University)	Oct 2016
Emerging Researcher National Conference in STEM (Washington D.C.)	Feb 2015
APS Conference for Undergraduate Women in Physics (UC Santa Cruz)	Jan 2015
APS Far West Meeting (University of Nevada, Reno)	Oct 2014

SELECTED UNIVERSITY TALKS (12 given, 7/12 invited)

[*] *Galaxies SIG Talk for Habitable Worlds Observatory*	*Dec 2025*
[*] *UC Berkeley GalForm Meeting*	*Nov 2025*
[*] *Stanford KIPAC Seminar*	*Nov 2025*
Princeton Galaxy Reading Group	Nov 2025
MIT MATS Talk (USA)	Nov 2025
[*] *Macquarie University Astro Seminar*	*Oct 2025*
Australian 3D View of Galaxies Seminar Series (virtual)	Aug 2025
NRAO Socorro Lunch Talk	May 2025
[*] *Paris Institut d'Astrophysique Spatiale–Orsay Seminar*	*May 2024*
Yale Data Science X Astronomy & Astrophysics Seminar (virtual)	Dec 2023
[*] *University of Melbourne Student Awards Ceremony Speaker*	*Aug 2023*
[*] *Indiana University Lunch Talk (virtual)*	*Oct 2020*

POSTERS (15)

Inaugural Cosmic Frontier Center Conference (University of Texas, Austin)	May 2025
Australian Astronomical Society Meeting (Sydney, Australia)	July 2023

[2] Australian National Institute for Theoretical Astrophysics
[3] International Union of Radio Science
[*] *Invited.*

	First Light Conference @ MIT (virtual)	June 2023
	NTCO-CREATE Research Symposium (Montréal, Canada)	Jul 2022
	International HPC Summer School (Kobe, Japan)	Jul 2019
	NRAO Radio Frontiers in the Next Decade (Charlottesville, Virginia)	June 2019
	AAS #233 (Seattle, Washington)	Jan 2019
	NRAO Radio Frontiers in the Next Decade (Portland, Oregon)	June 2018
	Emerging Researchers in Exoplanet Science (Penn State University)	June 2018
	Berkeley Physics Undergraduate Research Symposium (UC Berkeley)	April 2018
	Berkeley Physics Undergraduate Research Symposium (UC Berkeley)	April 2017
	APS Conference for Undergraduate Women in Physics (UCLA)	Jan 2017
	AAS #229 (Grapevine, TX)	Jan 2017
	UC Berkeley Undergraduate Astronomy Research Symposium	July 2016
	Conference on Science at Sanford Underground Research Facility (SDSMU)	May 2015

TEACHING EXPERIENCE (University tutor, 7 semesters)

Tutor for *Special Relativity*, UniMelb (Undergrad Course)	Sem. 2 2023
Tutor for *The Art of Scientific Computing*, UniMelb (Grad Course)	Sem. 1/2 2023
Instructor in Software Engineering for Hackbright Coding Academy	2021–2022
–Delivered 25 hours of lectures on Python concepts each month.	
–Provided one-on-one tutoring, mentorship, and project feedback.	
–Helped 150+ women and non-binary students of all ages learn Python for the first time.	
Tutor for *Astrophysics*, McGill (Honors Undergrad/Grad Course)	Fall 2021
Linux/GitHub Lecture, McDonald Institute Summer for Particle Astrophys.	May 2021
Tutor for *Signal Processing*, McGill	Winter 2021/2022
Tutor for *Computational Phys.*, McGill (Honors Undergrad/Grad Course)	Fall 2019
Tutor for *Python for Astronomy*, UC Berkeley	Winter 2019
Instructor for Splash Course on Radio Astronomy, UC Berkeley	Feb 2019
Reader for *Stellar Astrophysics*, UC Berkeley	Winter 2018
100+ Hours of Private Physics, Math, Python Tutor	Jan 2016-
Tutor for NIH Math Community College Students	2016
Teacher for ProjectASTRO, Ford Elementary School	Sept 2016–June 2017
-Developed curriculum and instructed a fifth-grade class in astronomy biweekly	
Volunteer at Chabot Space and Science Center	2014–2015
Tutor in Astronomy/Italian, Diablo Valley College	2014–2015

OUTREACH (o) & INREACH (i) TALKS (13 total with 7 invited)

* *Accessibility in Astronomy Workshop Co-Leader at choir (Maine)*	*(i) July 2025*
* *UniMelb Physics Colloquium on Antarctica Flyover*	*(i) Feb 2025*
* *Notre Dame College, (Victoria, Australia) (virtual, 1 hour)*	*(o) Nov 2024*
Mental Health in Astronomy at MSSS[4] (ANU)	(i) Sept 2024
Skype a Scientist at Clyde Creek Primary School (virtual, 1 hour)	(o) Aug 2024
Notre Dame College (Victoria, Australia) (virtual, 1 hour)	(o) May 2024
* *Mental Health in Physics to McGill summer students*	*(i) July, 2022*
Champlain College (Sherbrooke, Québec, Canada) (1 hour)	(o) March 2022
Fischer Middle School (San Jose, California) (30 min)	(o) May 2021
* *Women of Science Week at Vanier College (virtual) (1 hour)*	*(o) Oct 2020*
Vanderbilt University Virtual Star Talk (virtual) (15 min)	(o) Sept 2020
* *Machine Learning in Astronomy at Saratoga High School (1 hour)*	*(o) Feb 2020*
* *Khan Lab School (Mountain View, California) (30 min)*	*(o) April 2019*

RESEARCH MENTORSHIP (1 student)

Claire Mckee (Master's thesis at University of Melbourne)

* *Invited.*

[4] Mt. Stromlo Student Seminars

Topic: AGN in in Rubin/LSST (co-supervised with Rachel Webster) 2025-
Arianna Lasinski (Undergrad at University of Toronto),
Topic: *GNSS Beam Calibration* (co-supervised with Jonathan Sievers) 2022-

NON-RESEARCH MENTORSHIP (13 students)

UniMelb Physics Group Mentor (6 undergrads) 2023
InGenius Prep Physics Mentor (paid, 2 undergrads) Aug 2020–Sept 2021
CAMPARE-HERA Astronomy Minority Partnership Mentor (Iman Fahmy, now a PhD student at UWashington) 2020–2021
McGill Graduate Association of Physics Mentoring (3 physics undergrads) 2019–2021
Canadian Science Fair Mentor for Girls (one middle school student) April–June 2020

LEADERSHIP AND SERVICE

*Guest on the *LIUniverse Podcast* with Dr. Charles Liu* Sept 2025
UniMelb Black Hole Journal Club Founder/Organizer Dec 2024-
Reionization in Australia Conference LOC Dec 2024–Sep 2025
- Co-lead organizer for a conference ($\sim$ 80 attendees) on the *First Billion Years in the Universe*, held in Port Douglas, Australia.
-Led the organization and co-wrote the associated astrobite
Astro[sound]bites Podcast Host/Co-host 2022– 2025
-More than 30K downloads as of June 2025
-36 episodes including:
-Breaking the Stigma Around Community College (Part I/II), co-authored associated astrobite
-Indigenous Astronomy (Part I/II)
-The Pulsar Boomerang
UniMelb Women in Physics Industry Panelist April 2025
ANITA[5] Student Representative 2023–2025
-LOC and SOC for 2024/2025 ANITA Conferences
UMontréal Astromatic Machine Learning in Astrophysics Workshop Judge Aug 2022
McGill Faculty of Science Outreach and Communication Panelist Jan 2022
McGill Machine Learning in Astrophysics Journal Club Founder/Organizer 2021–2022
McGill Graduate Assoc. of Phys. Jan 2021–Sept 2022
-Served as Mental Health Officer and Task Force Member, Website Developer
-Organized three talks and a workshop, secured $1500 in funding (>100 attendees)
McGill Physics Hackathon Co-organizer Aug–Dec 2020
-Lead organizer for 2020 McGill Physics Hackathon attended by 190 people around the world
-Covered in the McGill Reporter
-Organized eight coding workshops attended by more than 200 people
McGill Phys. Matters Outreach Coordinator Jan–Dec 2020
McGill Cosmology Journal Club Organizer Jan–Aug 2020
Canadian Undergraduate Physics Conference Judge Nov 2019
Speed Dating with Scientists at Notte dei Ricercatori (Night of the Researchers)
(University of Bologna) 2017
President (Vice-Pres. in 2016) of Society of Phys. Students (UC Berkeley) 2016–2018
Editor at UC Berkeley Undergraduate Scientific Journal 2015–2016

OTHER RESEARCH EXPERIENCE

Breakthrough Listen Undergrad Researcher and 2018 UC Berkeley SURF[6] 2015–2018
-Research Topic: *FRB pipelines* with Vishal Gajjar, Dan Werthimer, and Casey Law.

* *Invited.*
[5] Australian National Institute for Theoretical Astrophysics
[6] Summer Undergraduate Research Fellowship

See Li+2020 and Gajjar+2021.

NSF[7] REU[8], University of Chicago 2015–2017
-Research Topic: Rocky exoplanet modeling with Leslie Rogers. Wrote a Python package for self-consistent rocky exoplanet models with thermal effects (Github).

DOE/Italian National Institute of Nuclear Physics Research Exchange Program 2017
-Research Topic: A study of jet reconstruction algorithms for highly-boosted top quarks with Matteo Negrini.

Undergraduate Research Apprenticeship Program, UC Berkeley 2016
-Research Topic: Cryogenic instrumentation for CMB polarization experiment with POLARBEAR.

NSF REU, American Museum of Natural History, NYC 2015
-Research Topic: *Missing satellites problem* with Jana Grcevich.

NSF REU, Texas A&M Commerce 2014
-Research Topic: Neutron star theory with William Newton. See Newton+2015.

OUTREACH TRAINING

Scientell ASTRO 3D Presentation Skills Training Course at USyd July 2023
[†]AAS Outreach Workshop – On-the-Spot Feedback March–May 2021
[†]AAS Astronomy Ambassadors Workshop Jan 2019

PROFESSIONAL MEMBERSHIPS LSST Junior Associate (full data access), Astronomical Society of Australia (ASA)

LANGUAGES Fluent in English (Native) and Italian (B2)

OTHER Recipient of CorePower Yoga POC Teacher Training Scholarship

REFERENCES

- **Stuart Wyithe** — Director/Professor, Research School of Astronomy & Astrophysics, Australian National University
  `Stuart.Wyithe@anu.edu.au`
- **Adélie Gorce** — Research Professor, Institut d'Astrophysique Spatiale (IAS), Université Paris-Saclay
  `adelie.gorce@universite-paris-saclay.fr`
- **Adrian Liu** — Professor, Trottier Space Institute, McGill University
  `acliu@physics.mcgill.ca`
- **Rachel Webster** — Professor, School of Physics, University of Melbourne
  `r.webster@unimelb.edu.au`
- **Emma Ryan-Weber** — Professor, School of Science, Swinburne University of Technology
  `eryanweber@swin.edu.au`

[7] National Science Foundation
[8] Research Experience for Undergraduates
[*] *Invited.*
[†] By application only and funded.

EXPANDED OUTREACH, LEADERSHIP, AND SERVICE

I build inclusive research communities through

1. **Astronomy Podcasting (astro[sound]bites Host):** Between 2022-2025, I co-hosted and managed astro[sound]bites, the podcast spinoff of *Astrobites* which now has over 30,000 downloads worldwide. The show expands access to astrophysics by translating cutting-edge research into an accessible and conversational audio format. I have hosted over 36 episodes (more than 50 hours of astronomy research discussions). I also co-led and researched conversations on topics beyond research, such as community college pathways to astrophysics careers, Indigenous astronomy, and mental health in astrophysics.
2. **Mentoring:** Since 2020, I have mentored 15 students both in research and professional development. One mentee is now a PhD. student at the University of Washington (Iman Fahmy), while another (Arianna Lasinski) co-authored one of my first-author publications and is applying to graduate school with my guidance.
3. **Journal Clubs (Founder/Organizer):** In 2024, I founded and continue to organize the Black Hole Journal Club at the University of Melbourne, which attracts more than 25 astrophysicists weekly and was recently described by attendees as "the favorite part of my week because it feels like a fun, inclusive, and supportive place to learn". With Carter Rhea, I also co-founded the Machine Learning in Astrophysics Journal Club while at McGill University, which enabled discussion on publications of the latest AI applications in astronomy.
4. **Mental Health Literacy in Academia:** In parallel, I have delivered three talks to promote mental health literacy in academia. As Mental Health Officer for the McGill Graduate Association of Physics, I secured $1500 in funding to organize a series of talks by physicists sharing their mental health journeys and worked to improve wellbeing resources and awareness across the department.
5. **Teaching:** I have taught Python programming to more than 150 women and non-binary students through an American software engineering bootcamp. Several of my former students now work at major technology companies. I have also assisted in teaching for seven semesters of physics and computing courses across three universities, emphasizing active learning and inclusive pedagogy.
6. **Conference & Hackathon Organization:**
   Conferences – I have served on the LOC or SOC for three Australian conferences since 2023, including as co-lead organizer for a high-redshift conference, which brought together more than 80 astronomers from around the world to Australia. I coordinated events to promote student inclusion and assisted with all aspects of conference logistics and planning. I also led and organized an astrobite ("A Week Down Under, Unifying Theorists and Observers of the High-Redshift Universe") on the conference.

   Hackathon – I co-led the organization of the 2020 McGill Physics Hackathon, which was attended by 190 hackers worldwide. I led the coordination of eight coding workshops before the hackathon ranging from Python fundamentals to machine learning, attended by over 200 participants.
7. **Public Engagement & Training:** I have delivered 9 outreach talks (4 invited) across the USA, Canada, and Australia. I also completed science communication training through the Scientell ASTRO 3D Presentation Skills Course (2023), AAS On-The-Spot-Feedback Outreach Workshop (2021), and AAS Astronomy Ambassadors Workshop (2019). As the McGill Physics Outreach Coordinator during the COVID-19 pandemic, I organized outreach events for McGill Physics and established an international collaboration between Dyer Observatory at Vanderbilt University and McGill University to host virtual discussions about space and astronomy for public audiences.