

SABRINA BERGER

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EDUCATION

McGill University

September 2019 - present

Physics M.Sc./PhD

Advisors: Jonathan Sievers and Adrian Liu

Projects:

Determining suitable calibrators for localization of fast radio bursts: pulsars and GPS satellites.

Optimizing simulations of reionization with machine learning and Bayesian statistics

Partially funded by NSERC's NTCO-Create Fellowship (\$30,000 Canadian)

University of California, Berkeley

August 2015 - December 2018

B.A., Astrophysics

TECHNICAL SKILLS

Programming Languages/Software

Python, Java, C++, Javascript, LabView, Keras

Fluent in English and Italian

RESEARCH EXPERIENCE

Machine Learning Techniques for TESS Data Processing

January 2019 - May 2019

NASA Ames Research Intern

Advisor: Hamed Valizadegan

- Researched and experimented with different machine learning techniques to clean data from the Transiting Exoplanet Sky Survey (TESS) pipeline prior to searching for exoplanet transits
- Successfully applied Conditional Generative Adversarial Networks (cGANs) to data
- Produced results comparable to those from previously used data cleaning methods such as principal component analysis (PCA)

realfast: FRB Search Pipeline at the VLA

May 2018 - December 2018

Summer Undergraduate Research Fellow at UC Berkeley

Advisor: Casey Law

- Helped optimize part of the *realfast* pipeline at the Very Large Array (VLA) through a thorough exploration in parameter space of simulated FRBs (fast radio bursts)

fastburst: FRB Search Pipeline at FAST

September 2016 - June 2019

Undergraduate Research at UC Berkeley

Advisors: Dan Werthimer and Vishal Gajjar

- Developed software to search for FRBs on the Five-hundred-meter Aperture Spherical radio Telescope (FAST) in China, including incorporating multi-beam capabilities and an automated website displaying telescope diagnostics and candidates
- Berkeley Physics Undergraduate Research Scholar (funding and research symposium) - Spring 2018

Thermal Evolution of Rocky Exoplanets

January 2016 - August 2019

Undergraduate Researcher at UC Berkeley and University of Chicago (UChicago)

Advisor: Leslie Rogers

- Wrote the Python module, `PyPlanet`, to model rocky exoplanets and their thermal evolution. Code available at github.com/sabrinastronomy/PyPlanet
- Project *partly* conducted at the National Science Foundation (NSF) funded Research Experience for Undergraduates (REU) at University of Chicago from June 2017 - August 2017

Breakthrough Listen

Undergraduate Intern at UC Berkeley

September 2016 - June 2018

Advisors: Steve Croft and Howard Isaacson

- Helped automate and optimize observation being conducted through Breakthrough Listen on the Green Bank Telescope (GBT) and gained experience observing with GBT and Parkes
- Berkeley Physics Undergraduate Research Scholar (funding and research symposium) - Spring 2017

Department of Energy-Italian National Institute of Nuclear Physics (INFN) Research Exchange Program

Researcher in the ATLAS group at University of Bologna

August 2017 - December 2017

Advisor: Matteo Negrini

- Made modifications to particle physics simulations of highly-boosted top quarks to apply to data being collected in proton-proton collisions at 13 TeV at the Large Hadron Collider.

POLARBEAR Cosmic Microwave Background Polarization Experiment

January 2016 - August 2017

Undergraduate Research Apprenticeship Program (URAP) at UC Berkeley *Advisors: Adrian Lee and Yuji Chinone*

- Helped fix a damaged cryogenic device (dewar) used to test pieces for POLARBEAR
- Data analysis of POLARBEAR point sources detection for possible causes

NSF REU: Evaluating GALFA-HI DR2 Survey Data For Potential Nearby Dwarf Galaxies

June - August 2015

Undergraduate Researcher at American Museum of Natural History (AMNH) in New York, New York
Advisors: Jana Grcevich and Charles Liu

- Analyzed Arecibo GALFA-HI (Galactic Arecibo L-Band Feed Array HI) data for compact neutral hydrogen clouds and potential dwarf galaxies
- Several interesting compact neutral hydrogen clouds were found in this search which may be undiscovered dwarf galaxies

NSF REU: Observational constraints on neutron star crust-core coupling during glitches

June - August 2015

Undergraduate Researcher at Texas A&M University Commerce

Advisor: William Newton

- Helped constrain the crust-core coupling model in pulsar glitches while incorporating new observational data from the Vela Pulsar

PUBLICATIONS

- **S. Berger**, L. Rogers and J. Zhang, “Quantifying the effects of temperature on rocky exoplanets” - **in prep**
- D. Michilli et al. “An analysis pipeline for CHIME/FRB full-array baseband data”, 2020, *Submitted*, <https://arxiv.org/abs/2010.06748>. (24 authors)
- FAST Collaboration et al. “Opportunities to Search for Extra-Terrestrial Intelligence with the Five-hundred-meter Aperture Spherical radio Telescope”, 2020, *Research in Astron. Astrophys. (FAST Special Issue)*, (<https://arxiv.org/abs/2003.09639>). (34 authors)
- W.G. Newton, **S. Berger** and B. Haskell, “Observational constraints on neutron star crust-core coupling during glitches”, 2015, *Monthly Notices of the Royal Astronomical Society (MNRAS)*, Volume 454, Issue 4 (<https://arxiv.org/abs/1506.01445>)

CONFERENCE PRESENTATIONS

“CHIME Outriggers: GPS Satellites as Calibrators” presented at

- Indiana University Lunch Talk (invited) (October 2020)

“*realfast*: FRB Search Pipeline at the VLA” presented at

- National Radio Astronomy Observatory (NRAO) Radio/Millimeter Astrophysical Frontiers in the Next Decade in Charlottesville, Virginia (June 2019)
- 233rd American Astronomical Society Meeting in Seattle, Washington (January 2019) - iPoster
 - Funded workshop and membership for the 2019 AAS Astronomy Ambassadors

“*fastburst*: FRB Search Pipeline at FAST” presented at

- NRAO Astrophysical Frontiers in the Next Decade and Beyond Conference in Portland, Oregon (June 2018) - Poster

“Quantifying the effects of temperature on rocky exoplanets” presented at

- Emerging Researchers in Exoplanet Science Symposium (ERES IV) at Penn State University (June 2018) - Poster
- European Space Agency’s (ESA) Extreme Habitable Worlds Conference in Noordwijk, Netherlands (December, 2017) - Oral
 - Received ESA’s Young Researcher’s Award and the UC Berkeley Academic Opportunity Fund
- American Physical Society Conference for Undergraduate Women in Physics (CUWiP) at University of California, Los Angeles (January, 2017) - Poster
- 229th American Astronomical Society Meeting in Grapevine, TX (January 2017) - Poster
- 2016 Gulf Coast Undergraduate Research Symposium at Rice University (October 2016) - Oral

“Observational constraints on neutron star crust-core coupling during glitches” presented at

- 2015 Emerging Researchers National (ERN) Conference in STEM in Washington D.C. (February 2015) - Oral
- American Physical Society Conference for Undergraduate Women in Physics (CUWiP) at UC Santa Cruz (January 2015) - Oral
- Conference on Science at the Sanford Undergraduate Research Facility, South Dakota School of Mines and Technology (May 2015) - Poster
- American Physical Society Far West Meeting, at University of Nevada, Reno (October 2014) - Oral

FUNDED SCHOOLS

Deep Learning Early Career Accelerator for Women at NVIDIA GPU Technology Conference 2019 in Washington DC

International High Performance Computing Summer School 2019 at RIKEN Center for Computational Science in Kobe, Japan

Software-Tailored Architectures for Quantum Codesign Quantum Ideas Summer School 2019 at Duke University

**10-day La Serena School of Data Science 2018: “Applied Tools for Data-driven Sciences”
with full scholarship from NSF in La Serena, Chile**

- Completed distance metrics project using machine learning to help classify light curve data. Advisor: Ashish Mahabal (Caltech)

PAID MENTORING AND TEACHING EXPERIENCE

- Hackbright Academy (Coding Academy for Women) Software Engineering Prep Teaching Assistant (November 2021 - present)
- InGenius Prep Physics Mentor for Undergraduate at Dartmouth University (August 2020 - September 2021)
- Astronomy Python Decal Tutor at UC Berkeley (January 2019 - June 2019)
- Reader for Stellar Astrophysics at UC Berkeley (Astro 160) with Prof. Jessica Lu (January 2018 - June 2018)
- National Institutes of Health Math Tutor at Chabot College (January 2016 - August 2016)

SCIENCE OUTREACH/INREACH

- Linux and Github Class Lecturer for McDonald Institute for Particle Astrophysics 3rd Summer Particle Astrophysics Workshop (May 2021)
- On-the-spot-feedback one month workshop with AAS to improve efficacy of public engagement and presentation to Fischer Middle School students in San Jose, California (March/May 2021)
- Montreal ML in Astrophysics Journal Club Founder/Co-organizer (January 2021-present)
- Women of Science Talk at Vanier College (invited) (October 2020):
https://www.youtube.com/watch?v=YV058d_9BWU
- Vanderbilt University Virtual Star Talk on Exoplanets (September 2020):
<https://www.youtube.com/watch?v=cyIKsSsyRpw>
- Cosmology Journal Club Organizer at McGill University (January - August 2020)
- McGill Physics Hackathon Co-organizer (August - December 2020)
- McGill Physics Matters Outreach Coordinator (January - December 2020)
- CAMPARE-HERA Astronomy Minority Partnership Mentor (June - December 2020)
- Canadian Science Fair Mentor for Girls (April to June 2020)
- “Machine Learning in Astronomy” Outreach Talk at Saratoga High School Astronomy (invited) Club (February 2020)
- Canadian Undergraduate Physics Conference Judge for Astrophysics (November 2019)
- UC Berkeley Splash Course Teacher (SETI/Radio Astronomy) (February 2019)
- Guest Speaker at Khan Lab School in Mountain View, California (invited) (April 2019)
- President/Vice President of Society of Physics Students at UC Berkeley (September 2016 - June 2018)
- ProjectASTRO Teacher Volunteer (September 2016 - June 2017): developed curriculum and instructed a fifth-grade class in astronomy biweekly
- Editor at Berkeley Undergraduate Scientific Journal (September 2015 - June 2016)