Sofia Z. Sheikh

https://sofiazsheikh.wordpress.com/
Email: ssheikh@seti.org

Current Position

NSF-ASCEND Postdoctoral Fellow — Mountain View, CA
SETI Institute — January 2022–Present
Working on radio technosignature searches with the Allen Telescope Array

Education

Pennsylvania State University — University Park, PA
Dual-Title Ph.D. in Astronomy & Astrophysics and Astrobiology — Summer 2021
Observational and Theoretical Studies of Radio Technosignatures and Pulsars
Advisor: Jason Wright

Pennsylvania State University — University Park, PA
M.S. in Astronomy & Astrophysics — Spring 2019

University of California, Berkeley — Berkeley, CA
B.A. in Physics and Astronomy — Spring 2017

Research Interests

- Technosignatures (SETI)
- Pulsars
- Astrobiology
- Radio Astronomy
- Exoplanets

Graduate Coursework

- **Astrobiology:** Astrobiology, SETI
- **Computation and Statistics:** Astrostatistics, Computational Astrophysics, High-Performance Computing
- **Exoplanet Astronomy:** Exoplanets, Evolution of the Biosphere, Planetary Habitability

Languages, Programs, and Skills

- **Programming Languages:** Python (Advanced), IDL (Intermediate), R (Intermediate), Julia (Intermediate), MySQL (Beginner)
- **Specialized Software Utilities:** Pulsar tools (`PSRCHIVE/PRESTO/PyPulse`, Advanced), SETI Software (`turboSETI/blimpy`, Advanced/Developer)
- **Other Scientific Software:** Unix and Bash Scripting (Advanced), LaTeX (Advanced), LabView (Beginner)
- **Media Engineering** (Intermediate in All): Adobe Photoshop, Adobe Premiere, GarageBand, Audacity, Guitar Pro
- **Observing Experience:** Trained Green Bank Telescope (GBT) Observer, 100+ hours of GBT observing experience

Publications

Refereed

1. B. Lacki and 14 other authors, including **S. Z. Sheikh**, "One of Everything: the Breakthrough Listen Exotica Catalog", *ApJ Supplements*, **257(2)**, p. 42, 2021. https://doi.org/10.3847/1538-4365/ac168a

2. D. Czech and 20 other authors, including **S. Z. Sheikh**, "The Breakthrough Listen Search for Intelligent Life: MeerKAT Target Selection", *PASP*, **133(1024)**, 2021. https://doi.org/10.1088/1538-3873/abf329

3. V. Gajjar and 25 other authors including **S. Z. Sheikh** "The Breakthrough Listen Search For Intelligent Life Near the Galactic Center I", *AJ*, **162(1):33**, 22 pp., 2021. DOI 10.3847/1538-3881/abfd36

4. **S. Z. Sheikh** and 17 other authors "Analysis of the Breakthrough Listen signal of interest blc1 with a technosignature verification framework", *Nature Astronomy*, **5(11)**, pp. 1153–1162, 2021. DOI 10.1038/s41550-021-01508-8

5. S. Smith, D. Price, **S. Z. Sheikh** and 15 other authors "A radio technosignature search towards Proxima Centauri resulting in a signal of interest", *Nature Astronomy*, **5(11)**, pp. 1148–-1152, 2021. DOI 10.1038/s41550-021-01479-w.

6. **S. Z. Sheikh** and M. G. MacDonald "A Statistical Analysis of the Nulling Pulsar Population", *MNRAS*, **502(4)**, 4669–4679, 2021. https://doi.org/10.1093/mnras/stab282

7. **S. Z. Sheikh**, "Nine axes of merit for technosignature searches", *IJA*, **19**, pp. 237–243, 2020.

8. **S. Z. Sheikh**, A. Siemion, J. E. Enriquez, D. C. Price, H. Isaacson, M. Lebofsky, V. Gajjar, and P. Kalas, "The Breakthrough Listen Search for Intelligent Life: A 3.95–8.00 GHz Search for Radio Technosignatures in the Restricted Earth Transit Zone", *AJ*, **160**, p. 29, Jun. 2020.

9. M. Lebofsky and 24 other authors, including **S.Z. Sheikh**, "The Breakthrough Listen Search for Intelligent Life: Public Data, Formats, Reduction, and Archiving", *PASP*, **131(1006)**, pp. 1–23, 2019. https://doi.org/10.1088/1538-3873/ab3e82

10. **S. Z. Sheikh**, J. T. Wright, A. Siemion, and J. E. Enriquez, "Choosing a Maximum Drift Rate in a SETI Search: Astrophysical Considerations", *ApJ*, **884**, p. 14, 2019. https://doi.org/10.3847/1538-4357/ab3fa8

11. H. Isaacson and 12 other authors, including **S. Z. Sheikh**, "The Breakthrough Listen Search for Intelligent Life: Target Selection of Nearby Stars and Galaxies", *PASP*, **129(975)**, p. 054501, 2017. https://doi.org/10.1088/1538-3873/aa5800. Associated target catalog at https://cdsarc.cds.unistra.fr/viz-bin/cat/J/PASP/129/E4501.

Academic Service

1. **S. Z. Sheikh** and 14 other authors, "Technosignatures as a Priority in Planetary Science", submitted to the *Planetary Science Decadal Survey 2023–2032*, *Bulletin of the American Astronomical Society*, **53(4)**, pp. 1–7, (2021). https://doi.org/10.3847/25c2cfeb.93bdfe43

2. J. T. Wright, **S. Z. Sheikh**, I. Almár, K. Denning, S. Dick, and J. Tarter, "Recommendations from the Ad Hoc Committee on SETI Nomenclature", *arXiv* arXiv:1809.06857, 2018.

3. NASA Technosignatures Workshop Participants including **S. Z. Sheikh**, "NASA and the Search for Technosignatures: A Report from the NASA Technosignatures Workshop", *arXiv* arXiv:1812.08681, 2018.

Other

1. J. Faber and 17 other authors, including **S. Z. Sheikh**, "Re-Analysis of Breakthrough Listen Observations of FRB 121102: Polarization Properties of Eight New Spectrally Narrow Bursts", *RNAAS*, **5(1)**, pp. 17–21, 2021. https://doi.org/10.3847/2515-5172/abde48
2. **S. Z. Sheikh** and 8 other authors, "No Redetections of blc1 in 39 hr of Reobservation Campaigns of Proxima Centauri", *RNAAS*, **5(10)**, p. 248, 2021.
3. D. C. Price and 12 other authors including **S. Z. Sheikh**, "Expanded Capability of the Breakthrough Listen Parkes Data Recorder for Observations with the UWL Receiver", *RNAAS*, **5(5)**, p. 114, 2021.
4. **S. Z. Sheikh** and 9 other authors, "A Compilation of Pulse Widths and Their Associated Observing Parameters for All Known Nulling Pulsars", *RNAAS*, **5**, p. 128, 2021.
5. R. Traas and 10 other authors, including **S. Z. Sheikh**, "The Breakthrough Listen Search for Intelligent Life: Searching for Technosignatures in Observations of TESS Targets of Interest", *AJ*, **161(6)**, p. 286, 2021.
6. K. Perez and 12 other authors, including **S. Z. Sheikh**, "Breakthrough Listen Search for Technosignatures toward the Kepler-160 System", *RNAAS*, **4(6)**, p. 97, 2020. https://doi.org/10.3847/2515-5172/ab9f36
7. B. Brzycki and 18 other authors, including **S. Z. Sheikh**, "Breakthrough Listen Follow-up of the Random Transiter EPIC 249706694/HD 139139 with the Green Bank Telescope", *RNAAS*, **3(10)**, p. 147, 2019. https://doi.org/10.3847/2515-5172/ab4bd6

Academic Service

Referee for Major Astronomical Journals 2020–Present
Berkeley, CA

- Volunteered time as a reviewer for several academic articles

AAS Abstract Sorter 2021
Salt Lake City, UT

- Sorted abstracts for the (cancelled) AAS 239

Chair of the 2021 Assembly of the Order of the Octopus July 29–30, 2021
Virtual

- Conceived of, organized, and held a conference for early-career researchers in technosignatures sponsored by the Penn State Extraterrestrial Intelligence Center
- Moderated "How to Get Involved in SETI" panel featuring S. Croft, C. Ng, J. Tarter, and J. Wright https://doi.org/10.5281/zenodo.5156165
- https://www.pseti.psu.edu/the-order-of-the-octopus-2021/

Mentoring

Research Mentor for the Cal-URSA Program Fall 2021–Present
Berkeley, CA

- Served as a research mentor to a local community college student via the Cal-URSA (Undergraduate Research Scholarships in Astronomy) program
- Helped student develop coding skills in software tools such as Python, Jupyter Notebooks, Unix, Bash and more

– Using GBT data of calibration pulsars taken for Breakthrough Listen as a dataset for pulsar nulling measurements

Research Mentor for the Penn State Pulsar Search Collaboratory 2018– Present
State College, PA

– Using Arecibo 327 MHz drift scan data of 160 pulsars to measure the properties of the ISM using pulsar scintillation

– Led a dozen undergraduates through parts of the project over the last two years, 8 of whom are still actively working on it

– Met with students twice a week for "hack-sessions", teaching them software tools such as Python, Jupyter Notebooks, Unix, Bash, PRESTO, PSRCHIVE, and more

Research Mentor for the Breakthrough Listen REU Program Summer 2021– Present
Berkeley, CA

– Served as an REU mentor to three undergraduate students for projects on pulsed narrowband signal searching, spatiotemporal SETI with TESS data, and calculating the drift rate distribution of exoplanets

– Helped students develop coding skills in software tools such as Python (including `AstroPy` and `pandas`), Jupyter Notebooks, Unix, Bash, LaTeX and more

– Still working with two of the three students on the publication process for their novel results

Honors, Awards, Grants, and Past Positions

- [NSF] NSF-ASCEND Postdoctoral Fellowship 2022-2024
- [Breakthrough Listen] Post-Doctoral Researcher Summer 2021 – January 2022
- [NRAO] Green Bank Telescope Director's Discretionary Time (10 hrs) 2020
- [PSU] Cecilia Payne-Gaposchkin Science Achievement Graduate Scholarship in Astronomy 2020–2022
- [Breakthrough Listen] Visiting Graduate Student Summer 2018, 2020
- [PSU Astronomy] Brumbach-Sampson Memorial Fund Award 2019
- [PSU] Institute for Computational and Data Science Seed Grant 2019
- [PSU] Graduate Fellowship 2017–2018
- [UC Berkeley] High Honors in Astrophysics 2017

Undergraduate Teaching

Instructor of Record at the Pennsylvania State University Fall 2019 and Spring 2020
Astronomy Communication (ASTRO 297)

– Developed entirety of curriculum for Astronomy Communication course — reading, writing, and presenting in academic astronomy — during Summer 2019

– Was co-instructor of record for the 3-credit, 25 student course during Fall 2019 and Spring 2020

– Held out-of-class Writing and Coding hack-sessions where students collaboratively work with peers and professors

– Registered the course as a permanent undergraduate class; the course was approved for future semesters as the most hands-on graduate student TA opportunity in the astronomy department

Instructor of Record at the Pennsylvania State University Spring 2019
The Astronomical Universe (ASTRO 10)

– Taught astronomy lab course for non-majors focusing on developing scientific reasoning and an appreciation for astronomical methods

Teaching Assistant at the Pennsylvania State University Fall 2018
Planets and Planetary System Formation (ASTRO 420)

- Graded and guest-lectured for Astro 420W, an upper division undergraduate science writing course focusing on planets

Grader at the Pennsylvania State University Fall 2018
First-Year Astronomy Seminar (ASTRO 20)

- Graded assignments in an introductory seminar for freshman astronomy majors

Teaching Seminar Attendee at the Pennsylvania State University 2019
Schreyer Institute for Teaching Excellence

- Teaching So That All of Your Students Are Included (September 2019)
- Doing Research on Your Classroom Practice (October 2019)

Conference Presentations

- **Breakthrough Discuss** April 12–13, 2021
  Virtual
  The Story of blc1: Breakthrough Listen's First Signal-of-Interest
- **TechnoClimes** August 4–8, 2020
  Virtual
  The Nine Axes of Merit for Technosignature Searches: Non-Radio Edition
- **NASA AbGradCon** July 22–26, 2019
  University of Utah, Salt Lake City, Utah
  Choosing a Maximum Drift Rate in a SETI Search: Astrophysical Considerations
- **AbSciCon** June 24–28, 2019
  Bellevue, Washington
  Choosing a Maximum Drift Rate in a SETI Search: Astrophysical Considerations
- **Data-Driven Approaches to the Search for Technosignatures of Advanced Civilizations** May 20–24, 2019
  Keck Institute for Space Sciences, Pasadena, CA
  Exoplanets, SETI, and Technosignatures
- **NASA Technosignatures Workshop** September 26–28, 2018
  Lunar and Planetary Institute, Houston, Texas
  Recommendations from the Ad Hoc Committee on SETI Nomenclature
- **Decoding Alien Intelligence Workshop** March 14–16, 2018
  SETI Institute, Mountain View, CA
  Recommendations from the Ad Hoc Committee on SETI Nomenclature

Diversity, Equity, and Inclusion Work

Speaker: Girls Rock in Science and Math (GRISM) October 2020
Redmond, WA

- Gave hour-long talk covering technosignatures, astrobiology, and women in STEM to 100 girls in grades 3–5

PSU Astronomy Department Climate and Diversity Committee 2018–Present
State College, PA

- Attended C&D committee meetings as a graduate student representative
- Led the effort to recommend the removal of the Physics GRE from PSU admissions

Co-Leader of Women and Underrepresented Genders in Astronomy (W+iA) 2018–2021
State College, PA

- Led weekly discussions on topical Diversity, Equity, and Inclusion (DE&I) papers, headlines, and reports
- Created a library of fiction and non-fiction about DE&I in STEM, curated by W+iA and open to the entire PSU Astronomy department
- Planned social events and meetings with colloquium speakers

ENVISION: STEM Career Day for Girls January 2018 & February 2019
State College, PA

- Taught two astronomy workshops for middle school girls with a game about planning a mission to Mars
- Taught an astronomy workshop for middle school girls with a game presenting the challenges of astrobiology and SETI

STEM Options Astronomy Panelist May 2019
Brandywine, PA

- Remote panelist for an event by the STEM Options Program Committee, discussing STEM careers with 9th grade girls along with speakers in geology, microbiology, and science policy

Outreach

Guest Scientist on SETI Live 2020, 2021
SETI Institute, Mountain View, CA

- Interviewed with Dr. Franck Marchis about the blc1 signal
- Interviewed with Dr. Seth Shostak about an upcoming Anti-Solar Point search at the Allen Telescope Array (>9000 views)

Featured Scientist in CBBC Show Out-of-This-World 2020
UK

- Talked technosignatures with Dr. Maggie Rogers of Out-of-This-World, a children's show targeted towards 8–12 year olds

Astronomy on Tap Speaker September 2019
State College, Pennsylvania

- Gave a public talk titled "How to Find ET" at the Happy Valley Brewing Company

AstroNight September 2017 & 2018
State College, Pennsylvania

- Ran booths to teach the general public about exoplanet detection and general astronomy during an annual department outreach event (2017)
- Gave a featured public talk about SETI (2018)

Artistic Residency at the Global Hands on Universe Conference August 2016
Stord, Norway

- Created promo and introductory videos for the 2016 Global Science Opera, Ghost Particles
- Attended numerous talks and workshops about astronomy, education, and global collaboration

Introductory Astronomy Summer Camp May 2016 - June 2016
Montessori School of Anderson, South Carolina

- Planned, organized, designed, and taught a week-long high school summer camp covering the solar system, exoplanets, SETI, stars, modern physics, and the electromagnetic spectrum

Computer Science Summer Camp April 2015 - May 2015
Montessori School of Anderson, South Carolina

- Planned, organized, designed, and co-taught a week-long summer camp about computer science (using Python) to twelve middle and high school students

Selected Press

- **Massive Science**: *To find extraterrestrials, we have to think like extraterrestrials* 11/28/2021
- **NPR**: *What a telescope in Australia detected that began a search for alien life* 11/16/2021
- **Wired**: *A Strange Radio Signal Was Just From Earth, Not Aliens* 10/27/2021
- **Nature**: *Mysterious 'alien beacon' was false alarm* 10/25/2021
- **AGU: 3rd Pod From the Sun**: *A Modern Way to Look for Aliens* 02/08/2021
- **The Atlantic**: *Astronomers Are Keeping a Close Watch on the Next Star Over* 01/11/2021
- **New York Times**: *Was That a Dropped Call from ET?* 12/31/2020
- **Scientific American**: *Alien Hunters Discover Mysterious Signal from Proxima Centauri* 12/18/2020
- **National Geographic**: *Alien hunters detect mysterious radio signal from nearby star* 12/18/2020
- **Popular Science**: *Aliens could be talking to us right now. This scientist is listening.* 12/10/2020
- **Scientific American**: *Space Alien Research Could Get Its First Grad Program* 11/18/2019
- **StarTalk**: *Technosignatures: Detecting Alien Civilizations* 09/01/2018

Other

- Independent musician and songwriter *Szaras*: https://soundcloud.com/szaras 2021–
- Drummer/vocalist/songwriter for three albums with band Ultimatum Project 2013–2017
- FIRST Robotics LEGO League coach at the Montessori School of Anderson 2012–2013