Bryan Brzycki
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Education

2018–2024 **Ph.D.** Astrophysics, University of California, Berkeley
Advisors: Andrew Siemion & Imke de Pater
Dissertation: *Novel Algorithmic and Astrophysical Methods in the Search for Radio Technosignatures*

2018–2020 **M.A.** Astrophysics, University of California, Berkeley

2014–2018 **A.B.** Astrophysics and Physics, Harvard University
Advisor: John ZuHone
Thesis: *Quantifying the Energy Contribution from Magnetic Fields in Simulations of Galaxy Cluster Mergers*

Research Experience

2018–2024 Graduate Researcher, Berkeley SETI Research Center, University of California, Berkeley
Advisors: Andrew Siemion & Imke de Pater

2017–2018 Undergraduate Researcher, Harvard-Smithsonian Center for Astrophysics, Harvard University
Advisor: John ZuHone

2017–2018 Research Intern, Maria Mitchell Observatory REU
Advisor: Devin Silvia

Other Experience

2019 Data Science Intern, Integral Ad Science, New York City, New York. Explored anomaly detection methods on ad impression data as part of the fraud detection team.

Publications

Google Scholar

Journal Articles

J1. **Brzycki, Bryan**, Siemion, A. P., de Pater, I., Cordes, J. M., Gajjar, V., Lacki, B. & Sheikh, S. On Detecting Interstellar Scintillation in Narrowband Radio SETI. *The Astrophysical Journal* **952,** 46 (2023).

J2. Ma, P. X., Ng, C., Rizk, L., Croft, S., Siemion, A. P., **Brzycki, Bryan**, Czech, D., Drew, J., Gajjar, V., Hoang, J., *et al.* A deep-learning search for technosignatures from 820 nearby stars. *Nature Astronomy* **7,** 492–502 (2023).

J3. Hoang, J., Zheng, Z., Zelakiewicz, A., Ma, P. X. & **Brzycki, Bryan**. Exploring the Use of Generative AI in the Search for Extraterrestrial Intelligence (SETI). *arXiv preprint arXiv:2308.13125* (2023).

J4. Johnson, O. A., Gajjar, V., Keane, E. F., McKenna, D. J., Giese, C., McKeon, B., Carozzi, T. D., Alcaria, C., Brennan, A., **Brzycki, Bryan**, *et al.* A Simultaneous Dual-site Technosignature Search Using International LOFAR Stations. *The Astronomical Journal* **166,** 193 (2023).

J5. Choza, C., Bautista, D., Croft, S., Siemion, A. P., **Brzycki, Bryan**, Bhattaram, K., Czech, D., de Pater, I., Gajjar, V., Isaacson, H., *et al.* The Breakthrough Listen Search for Intelligent Life: Technosignature Search of 97 Nearby Galaxies. *The Astronomical Journal* **167,** 10 (2023).

J6. **Brzycki, Bryan**, Siemion, A. P., de Pater, I., Croft, S., Hoang, J., Ng, C., Price, D. C., Sheikh, S. & Zheng, Z. Setigen: Simulating Radio Technosignatures for the Search for Extraterrestrial Intelligence. *The Astronomical Journal* **163,** 222 (2022).

J7. Sand, K. R., Faber, J. T., Gajjar, V., Michilli, D., Andersen, B. C., Joshi, B. C., Kudale, S., Pilia, M., **Brzycki, Bryan**, Cassanelli, T., *et al.* Multiband Detection of Repeating FRB 20180916B. *The Astrophysical Journal* **932,** 98 (2022).

J8. Franz, N., Croft, S., Siemion, A. P., Traas, R., **Brzycki, Bryan**, Gajjar, V., Isaacson, H., Lebofsky, M., MacMahon, D. H., Price, D. C., *et al.* The Breakthrough Listen Search for Intelligent Life: Technosignature Search of Transiting TESS Targets of Interest. *The Astronomical Journal* **163,** 104 (2022).

J9. Gajjar, V., LeDuc, D., Chen, J., Siemion, A. P., Sheikh, S. Z., **Brzycki, Bryan**, Croft, S., Czech, D., DeBoer, D., DeMarines, J., *et al.* Searching for Broadband Pulsed Beacons from 1883 Stars Using Neural Networks. *The Astrophysical Journal* **932,** 81 (2022).

J10. Perez, K. I., Farah, W., Sheikh, S. Z., Croft, S., Siemion, A., Pollak, A. W., **Brzycki, Bryan**, Cruz, L. F., Czech, D., DeBoer, D., *et al.* Breakthrough Listen Search for the WOW! Signal. *Research Notes of the AAS* **6,** 197 (2022).

J11. Lacki, B. C., **Brzycki, Bryan**, Croft, S., Czech, D., DeBoer, D., DeMarines, J., Gajjar, V., Isaacson, H., Lebofsky, M., MacMahon, D. H., *et al.* One of Everything: The Breakthrough Listen Exotica Catalog. *The Astrophysical Journal Supplement Series* **257,** 42 (2021).

J12. Czech, D., Isaacson, H., Pearce, L., Cox, T., Sheikh, S. Z., **Brzycki, Bryan**, Buchner, S., Croft, S., DeBoer, D., DeMarines, J., *et al.* The Breakthrough Listen Search for Intelligent Life: MeerKAT Target Selection. *Publications of the Astronomical Society of the Pacific* **133,** 064502 (2021).

J13. Gajjar, V., Perez, K. I., Siemion, A. P., Foster, G., **Brzycki, Bryan**, Chatterjee, S., Chen, Y., Cordes, J. M., Croft, S., Czech, D., *et al.* The Breakthrough Listen Search For Intelligent Life Near the Galactic Center. I. *The Astronomical Journal* **162,** 33 (2021).

J14. **Brzycki, Bryan**, Siemion, A. P., Croft, S., Czech, D., DeBoer, D., DeMarines, J., Drew, J., Gajjar, V., Isaacson, H., Lacki, B., *et al.* Narrow-band Signal Localization for SETI on Noisy Synthetic Spectrogram Data. *Publications of the Astronomical Society of the Pacific* **132,** 114501 (2020).

J15. Price, D. C., Enriquez, J. E., **Brzycki, Bryan**, Croft, S., Czech, D., DeBoer, D., DeMarines, J., Foster, G., Gajjar, V., Gizani, N., *et al.* The Breakthrough Listen search for Intelligent Life: Observations of 1327 Nearby Stars over 1.10–3.45 GHz. *The Astronomical Journal* **159,** 86 (2020).

J16. Li, D., Gajjar, V., Wang, P., Siemion, A., Zhang, Z.-S., Zhang, H.-Y., Yue, Y.-L., Zhu, Y., Jin, C.-J., Li, S.-Y., *et al.* Opportunities to search for extraterrestrial intelligence with the FAST. *Research in astronomy and astrophysics* **20,** 078 (2020).

J17. **Brzycki, Bryan** & ZuHone, J. A Parameter Space Exploration of Galaxy Cluster Mergers. II. Effects of Magnetic Fields. *The Astrophysical Journal* **883,** 118 (2019).

J18. Lebofsky, M., Croft, S., Siemion, A. P., Price, D. C., Enriquez, J. E., Isaacson, H., MacMahon, D. H., Anderson, D., **Brzycki, Bryan**, Cobb, J., *et al.* The Breakthrough Listen Search for Intelligent Life: Public Data, Formats, Reduction, and Archiving. *Publications of the Astronomical Society of the Pacific* **131,** 124505 (2019).

J19. Gajjar, V., Siemion, A., Croft, S., **Brzycki, Bryan**, Burgay, M., Carozzi, T., Concu, R., Czech, D., DeBoer, D., DeMarines, J., *et al.* The Breakthrough Listen Search for Extraterrestrial Intelligence. *arXiv preprint arXiv:1907.05519* (2019).

J20. **Brzycki, Bryan**, Siemion, A. P., Croft, S., Czech, D., DeBoer, D., DeMarines, J., Drew, J., Enriquez, J. E., Gajjar, V., Gizani, N., *et al.* Breakthrough Listen Follow-up of the Random Transiter (EPIC 249706694/HD 139139) with the Green Bank Telescope. *arXiv preprint arXiv:1910.03711* (2019).

J21. **Brzycki, Bryan**, Giesler, M. D., Gomez, K., Odom, L. H. & Suceava, B. D. A Ladder of Curvatures for Hypersurfaces in the Euclidean Ambient Space. *Houston Journal of Mathematics* **40,** 1347–1356 (2014).

J22. **Brzycki, Bryan**. On a Geometric Locus in Taxicab Geometry. *Forum Geometricorum* **14,** 117–121 (2014).

Working papers

W1. **Brzycki, Bryan**, Siemion, A. P., de Pater, I., Choza, C., Croft, S., Gajjar, V., Drew, J., Lacki, B. C., Price, D. C. & Sheikh, S. Z. *The Breakthrough Listen Search for Intelligent Life: Galactic Center Search for Scintillated Technosignatures.* Submitted to ApJ. 2024.

Tools & Software

Breakthrough Listen / Berkeley SETI Research Center

setigen: Python package for generating synthetic signals and injecting into real radio spectrogram observations. Supports synthesis and injection in both spectrogram (Stokes I) and antenna voltage regimes.

blscint: Python package with tools for evaluating the presence of ISM scintillation in prospective radio technosignatures. Contains methods for estimating the presence of ISM scintillation as a function of observation parameters as well as for analyzing detected radio signals for characteristic intensity modulation.

Other Projects

jort: Python package and command-line tools for tracking, profiling, and notifying at custom checkpoints in coding scripts.

blossom: A Python library for simulating the evolution of organism populations. Supports basic 2D worlds and provides a live dashboard for tracking simulation progress.

Deep Reinforcement Learning-Based Portfolio Optimization: Basic portfolio optimization and trading using Deep Reinforcement Learning.

Presentations

Talks

T1. **Brzycki, Bryan**. *Algorithmic and Astrophysical Methods in the Search for Radio Technosignatures.* Berkeley SETI Research Center REU Seminar (Virtual). July 2024.

T2. **Brzycki, Bryan**. *Detecting ISM Scintillation in Narrowband Signals: A New Filter for Radio SETI.* University of California, San Diego Astronomy Journal Club. Oct. 2023.

T3. **Brzycki, Bryan**. *Detecting ISM Scintillation in Narrowband Signals: A New Filter for Radio SETI.* Penn State Extraterrestrial Intelligence Center Seminar. Sept. 2023.

T4. **Brzycki, Bryan**. *A Narrowband Search for Scintillated Signals near the Galactic Center.* Breakthrough Listen Advisory Committee Meeting (Santa Cruz, CA). June 2023.

T5. **Brzycki, Bryan**, Siemion, A. & de Pater, I. *On Detecting Interstellar Scintillation in Narrowband Radio SETI.* American Astronomical Society Meeting #241 (Seattle, WA). Jan. 2023.

T6. **Brzycki, Bryan**. *Astrophysical Effects on Narrowband Signals.* Breakthrough Listen Advisory Committee Meeting (Santa Cruz, CA). June 2022.

T7. **Brzycki, Bryan**. *Searching for technosignatures with machine learning.* McGill Space Institute MSI Seminar (Virtual). Dec. 2020.

T8. **Brzycki, Bryan**. *Searching for narrow-band signals with ML.* Breakthrough Listen Advisory Committee Meeting (Virtual). June 2020.

T9. **Brzycki, Bryan**. *Searching for ISM-Scintillated Technosignatures.* Breakthrough Listen Advisory Committee Meeting (Berkeley, CA). Apr. 2019.

Posters

P1. **Brzycki, Bryan** & Silvia, D. *Observational Tracers of Hot and Cold Gas in Isolated Galaxy Simulations.* American Astronomical Society Meeting #231 (Washington, D.C.) Jan. 2018.

Selected Media Coverage

2023	KRON4 News, UC researchers develop new technique to find extraterrestrial life. Live local TV interview.
2023	Inverse, Twinkling stars might hold the key to finding alien intelligence.
2023	UC Berkeley News, When ET calls, can we be sure we're not being spoofed?
2023	Universe Today, Did That Message Come From Earth or Space? Now SETI Researchers can be Sure.
2022	Universe Today, If Aliens Were Sending us Signals, This is What They Might Look Like.

Teaching

University of California, Berkeley

2019	Graduate Student Instructor, Radio Astronomy Laboratory (Astro 121)
2018	Graduate Student Instructor, Introduction to General Astronomy (Astro C10)

Harvard University

2017–2018	Course Assistant, Multivariable Calculus (Math 21a)
2016	Course Assistant, Linear Algebra and Differential Equations (Math 21b)
2015–2016	Course Assistant, Multivariable Calculus (Math 21a)

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