Yifan Zhao

Personal Information

Yifan (Amy) Zhao
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Education

Ph.D. Candidate in Exploration Systems Design (Instrumentation), Arizona State University (present)
B.S. in Physics (Astrophysics track) with Research Honors, Carnegie Mellon University (May 2020)

Research Projects

DORA, Low Frequency Cosmology Lab, Arizona State University *2021-present*

The Deployable Optical and Radio Array (DORA) is a student-built cubesat, launched to the ISS in August 2024 and deployed October 2024. It features a guest payload with a miniaturized, low-cost radio astronomy platform that aims to study the radio frequency interference (RFI) environment from low-Earth orbit.

- Built, integrated, and tested various components of a miniaturized radio instrument based on the Experiment to Detect the Global EoR Signature (EDGES) instrument, including load calibrator switches, a signal chain board, a software defined radio, and a Raspberry Pi for switch control and data processing
- Performed environmental testing on the first versions of the instrument, including thermal vacuum testing and amateur weather balloon flight tests
- Further developed, integrated, and tested the instrument as a guest payload on DORA

ECHO, Low Frequency Cosmology Lab, Arizona State University *2024-present*

The External Calibration for Hydrogen Observatories (ECHO) aims to make in-situ measurements of the beam response of large, low-frequency radio arrays with a known calibrator on a drone.

- Participated in drone campaigns to the Owen's Valley Radio Observatory Long Wavelength Array (OVRO-LWA) to test drone flight system performance
- Performed laboratory systems testing for future drone campaigns

Lucy TTCam, Bell Research Group, Arizona State University *2020-2024*

The Terminal Tracking Cameras (TTCams) on the NASA Lucy mission are a pair of wide-angle broadband imagers meant for flight navigation, with a secondary science objective of asteroid flyby imaging.

- Developed and tested a radiometric calibration pipeline for the TTCams
- Analyzed TTCam pre-flight calibration data to characterize the instrument and its backups with photon transfer curves, linearity graphs, dark models, and bad pixel models

SAGE III Limb Scatter Data Retrieval, NASA Langley Research Center *June-August 2019*

The Stratospheric Aerosol and Gas Experiment III on the ISS studies aerosols in the Earth's stratosphere. As a summer intern, I worked with mentors and other students in the Chemistry and Dynamics branch on SAGE III data retrieval.

- Developed and tested a Python script for retrieval of the limb scatter data product, which uses spectroscopy to determine aerosol and ozone levels in the stratosphere
- Made quality assurance plots to determine the accuracy of the geolocation of the data product

Publications

Zhao, Y., Bell, J. F., III, Sahr, E., Lessac-Chenen, E., Adam, C., Cisneros, E., et al. (2024). Pre-flight and in-flight calibration and performance of the Terminal Tracking Cameras (TTCams) on the NASA Lucy mission. *Earth and Space Science*, 11, e2024EA003576. https ://doi.org/10.1029/2024EA003576

Bell, J.F., Zhao, Y., Cisneros, E. et al. The Terminal Tracking Camera System on the NASA Lucy Trojan Asteroid Discovery Mission. *Space Sci Rev* **219**, 86 (2023). https ://doi.org/10.1007/s11214-023-01030-5

Zhao, Y., Jacobs, D. C., Samson, T., Bowman, J., and Lalonde, M.-O. R. Building a global map of low frequency radio interference from orbit with DORA. RFI 2024 Conference, Bariloche, Argentina. *[in progress, expected Dec 2024.]*

Zhao, Y., Jacobs, D. C., Samson, T., Gopal Krishna, M., Horn, M., Lalonde, M.-O. R., et al. An Update on the External Calibrator for Hydrogen Observatories (ECHO). *[in progess, expected Mar 2025.]*

Zhao, Y., Jacobs, D. C., Bowman, J., Samson, T. and Lalonde, M.-O. R. Pathfinding Low Frequency Radio Astronomy with the DORA Radio Background Experiment. 2025 IEEE Aerospace Conference, Big Sky, Montana. *[submitted, expected Mar 2025.]*

Teaching and Outreach

Teaching Assistant, Senior Exploration Project I (SES410), Arizona State University *Fall 2024*
Teaching Assistant, ASU Radio Astronomy Bootcamp, Arizona State University *August 2023*
Graduate Mentor, Research Experience for Non-Traditional Students (RENTU), Arizona State University *Summer 2022, Summer 2023*
Teaching Assistant, Summer Science Program, New Mexico Tech *June-August 2020*

Talks

"Space-like testing of 21-cm cosmology instruments on balloons and beyond." National Radio Science Meeting (URSI), University of Colorado Boulder. *January 2023*
"Building a global map of low frequency radio interference from orbit with DORA." Engineering Coffee, Arizona State University. *April 2024*
"Space-based instrumentation for exploration of Trojan asteroids and beyond." East Valley Astronomy Club, Tempe, Arizona. *August 2024*