

LINDSAY (“LIBBY”) BERKHOUT

1522 E Southern Ave 1019, Tempe, Arizona 85282

(704)-699-7453 ◊ lberkhout@asu.edu

EDUCATION

Arizona State University

August 2019 - Present

PhD Candidate in Exploration Systems Design (Instrumentation)

School of Earth and Space Exploration

The University of Chicago

September 2015 - June 2019

B.S in Astronomy & Astrophysics with Honors

HONORS & AWARDS

National Science Foundation Graduate Research Fellow, awarded 2020- Arizona State University

Graduate Excellence Scholarship, awarded 2021- Arizona State University, The College of Liberal Arts and Sciences

ASU SESE Summer Exploration Graduate Fellowship, awarded 2020- Arizona State University

SELECTED PUBLICATIONS

- [1] Lindsay M. Berkhout et al. “Demodulation demonstration using the LightCube CubeSat”. In: *Proceedings of the GNU Radio Conference 8.1* (2023). eprint: <https://pubs.gnuradio.org/index.php/grcon/article/view/138>.
- [2] Lindsay M. Berkhout et al. “The Completely Hackable Amateur Radio Telescope (CHART) project”. In: *Physics Education* 59.1 (Nov. 2023), p. 015020. eprint: <https://iopscience.iop.org/article/10.1088/1361-6552/ad0542/meta>.
- [3] (Preprint) Lindsay M. Berkhout et al. “Hydrogen Epoch of Reionization Array (HERA) Phase II Deployment and Commissioning”. In: *arXiv e-prints*, arXiv:2401.04304 (Jan. 2024), arXiv:2401.04304. arXiv: 2401.04304 [astro-ph.IM].

GRADUATE RESEARCH EXPERIENCE

Arizona State University, Low Frequency Cosmology Lab

July 2019-Present

PhD Candidate

- As a part of the Hydrogen Epoch of Reionization Array (HERA) collaboration, I develop and test instrumentation for a radio interferometer targeting measurements of the the formation of the first astronomical objects and tracing their evolution. I am part of the commissioning group, which develops tools to ensure smooth monitoring of the system and consistent operation of the telescope. Additionally, I am implementing a calibration system for the analog signal chain to improve the accuracy of the antenna gain calibration, as well as commissioning a crosstalk mitigation scheme for the HERA analog and digital system.
- I led the groundstation communications system for the LightCube small-sat mission. LightCube was an educational mission launched from the ISS on April 24th, 2023. The mission operated for 24 hours before a battery failure occurred. I developed a GNURadio based decoder for the downlink telemetry and analyzed the resulting beacons.
- In partnership with NASA’s Jet Propulsion Laboratory (JPL), I developed open loop recorder for the Goldstone Apple Valley Radio Telescope (GAVRT). The GAVRT project uses a retired Deep Space Network (DSN) antenna for secondary school education, targeting radio astronomy as a science case. My recorder will extend the capabilities of the backend to include satellite downlink communications in the curriculum.

- In collaboration with the Ira A. Fulton schools of engineering, I helmed a study on the impact of early intervention engineering courses on the self-efficacy of undergraduate students. I have used the knowledge I gained from this study to implement tools and techniques into my mentorship of undergraduates in the Low Frequency Cosomology (LoCo) lab.

UNDERGRADUATE RESEARCH EXPERIENCE

Brookhaven National Laboratory

Summer 2018

SULI DOE Intern

- Worked on a radio interferometry project called the Baryon Mapping Experiment (BMX) in order to develop new technologies for mapping the large scale structure of the early Universe using 21-cm intensity mapping
- Designed and constructed a temperature regulation system for the front end electronics to ensure stable year-round calibration for the data, as well as constructed and tested the front end electronics and receivers for the radio dishes

United States Antarctic Program

Winter 2018

Grantee

- Travelled to the Amundsen-Scott South Pole Station on an NSF grant awarded to the University of Wisconsin- River Falls to perform maintenance on the CosRay Neutron Monitors, a network of neutron monitors intended to research cosmic rays, solar activity, and Earths geomagnetic activity
- Tested and modified the neutron monitors located at Amundsen-Scott in order to ensure their future dependability

Department of Physics, University of Chicago

August 2017- March 2018

Research Assistant

- Worked for the University of Chicagos electronics group for the ATLAS experiment at the Large Hadron Collider
- Tested and debugged the electronics boards for the Fast TrackKer (FTK) project, an intended upgrade to the ATLAS trigger system to improve the way the experiment conducts its particle track reconstruction

Department of Physics, University of Wisconsin-River Falls

Summer 2017

REU Student

- Worked within the IceCube lab group at UWRF to develop new methods for implementing an expansion of the surface detector array of the IceCube Neutrino Observatory, referred to as the IceTop Array
- Designed, fabricated, and tested an optical coupler intended for use in an IceTop detector in order to investigate new methods for expanding the surface area of the current IceTop array

Department of Astronomy & Astrophysics, University of Chicago

Nov 2016- June 2017

College Research Fellow

- Repaired and tested an on-campus spectroscopic system that had recently fallen out of use due to functionality issues
- Planned and completed a project pertaining to ensuring dependability of the spectroscope for future lab use, which involved testing and replacing hardware and software necessary for optimal functionality of the spectroscope

Yerkes Observatory, University of Chicago

Summer 2016

Intern

- Planned and completed a project that consisted of creating a methodology to measure stellar magnitudes and light curves on the Sloan Digital Sky Survey magnitude scale using Yerkes telescopes

- Assisted with telescope operations on site at Yerkes and remotely through Stone Edge Observatory, as well as educational outreach

TEACHING

Fall 2023 TA for SES 410: Senior Exploration Project I at Arizona State University. SES 410 is a capstone course for seniors in the School of Earth and Space Exploration. Students work in teams to plan and complete a capstone research project.

Spring 2019 TA for ASTR 13300: Introduction to Astrophysics at the University of Chicago. ASTR 13300 is an introductory course for Astrophysics majors.

Lead developer and teacher for the Low Frequency Cosmology Lab undergraduate radio astronomy bootcamp. This course is a weeklong night class taught in the Spring semester that is free for undergraduate students. Spring 2023 had over 30 students attend.

OUTREACH & DEI

Advisor at ASU of the Completely Hackable Amateur Radio Telescope (CHART) project. CHART aims to provide DIY tutorials to teach radio astronomy to high school students and teachers. I mentor undergraduate students on the development side of the project. I also help plan and teach summer workshops for high school teachers. Supported by an ASU SESE Summer exploration fellowship, I ran the summer high school workshop in 2020. In summer 2022, the workshop was held at Winona State University, and I co-planned and taught the lessons.

Planned and co-led a mentorship program for Summer undergraduates involved in the HERA project. This program pairs undergraduates with a graduate students in the collaboration for weekly mentorship meetings. We also organize a talk series for the students, covering topics such as career paths in physics and strategies for managing research projects.

HERA ombudsman and DEI committee member. As part of the ombuds committee, I serve as a resource for collaboration members to report equity issues. I also organized the drafting of a collaboration code of conduct and values statement, as well as an anonymous reporting form to submit issues to the ombuds committee.

Serve on the ASU SESE Equity in Qualifying Exams committee, where we are researching and developing more equitable metrics for measuring student success in PhD candidacy exams.

TECHNICAL SKILLS

Proficient in Python and Matlab/Simulink

Familiar with Simulink and Vivado based FPGA tools, including the CASPER (The Collaboration for Astronomy Signal Processing and Electronics Research) toolset

Proficient with Arduino and familiar with other micro-controller types

Basic programming in IDL

Basic experience with CAD and 3-D printing technologies