

Jay Aronow Frothingham

CONTACT

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EDUCATION

B.A. Engineering and Astronomy, 3.92 GPA
Smith College, Northampton MA, May 2023

EXPERIENCE

Scientific Data Analyst, Green Bank Observatory
Green Bank WV
May 2023 - Present

Student Researcher, Smith College Physics Department
Northampton MA
September 2019 - September 2021

Hardware Engineering Intern, HP, Inc.
Corvallis OR
Summer 2019

Electrical Engineering Intern, HP, Inc.
Corvallis OR
Summer 2018

RESEARCH

Microwave Photonic Synthesizer Characterization for Applications in Radio Astronomy Instrumentation

National Radio Astronomy Observatory (NRAO) Research Experience for Undergraduates

Tested and characterized laser source for potential use as ngVLA (next-generation Very Large Array) local oscillator. Presented findings to external engineering representatives and NRAO mentors.

Research Mentor: William Shillue

A Circuit Board Printer for Muon Detector Construction and Classroom Use

Summer Undergraduate Research Fellowship, Smith College Dept. of Physics

Tested feasibility of a circuit board printer to manufacture components quickly and reliably. Assembled and tested muon detectors to assess quality of reflow soldering techniques. Designed and built an adjustable

camera mount to improve equipment accessibility. Wrote documentation and user guide to circuit board printer. Presented results to Smith College Physics and Astronomy departments.

Research Advisor: Dr. Nathanael Fortune

Portable Muon Detectors for Tests of Time Dilation

STudent Research In DEpartments (STRIDE), Smith College Dept. of Physics

Used custom-built portable muon detectors to collect data at different elevations. Worked with peers to analyze data collected in various locations. Managed project milestones and scheduled lab meetings during periods of remote work. Presented results to Smith College Physics and Astronomy departments.

Research Advisor: Dr. Nathanael Fortune

A Python Package for Correction of Magnetic Field Dependence of Resistive Thermometers

Summer Undergraduate Research Fellowship, Smith College Dept. of Physics

Optimized Python code characterizing resistive thermometers' response to magnetic fields. Removed code redundancies by bundling custom functions into a package and defining a class. Automated essential functions and increased user control over other functions. Managed revisions through Gitlab. Wrote detailed documentation in Markdown and Python. Code used in analysis for published paper.

Research Advisor: Dr. Nathanael Fortune

Experimental Measurements of Phase Transitions in Superconductors Under Extreme Conditions

STudent Research In DEpartments (STRIDE), Smith College Dept. of Physics

Designed and fabricated custom lab equipment in a machine shop. Performed soldering under a microscope. Evaluated and modified test probe electronics and wiring.

Research Advisor: Dr. Nathanael Fortune

Using Arduino to Teach Mechatronics

Apprenticeships in Science and Engineering, Oregon State University, Corvallis OR

research description here

Research Advisor: Dr. Burak Sencer

WORKSHOPS

Synthesis Imaging Workshop

National Radio Astronomy Observatory, Socorro NM

May 2024

Single Dish Summer School - Presenter, Observing Group Leader

Green Bank Observatory, Green Bank WV

dates here

Green Bank Telescope Observer Training Workshop - Presenter, Observing Group Leader

Green Bank Observatory, Green Bank WV

dates here

AstroTech Astronomical Instrumentation Summer School

University of California, Berkeley CA

August 2022

Designed and built functioning spectrograph with a small team in three days. Assembled light-integration box

for successful calibration of CCD flat-field images. Hands-on sessions covering optics, teamwork, and instrument development.

National Radio Astronomy Observatory Summer Student Workshop

Green Bank Observatory, Green Bank WV

June 2022

Designed and carried out an observing project with a 40ft radio telescope in a small-group setting. Attended lectures on historical and contemporary radio astronomy research and instrumentation. Toured Green Bank Observatory facilities, including climbing the Green Bank Telescope.

that National High Magnetic Field Lab summer school I did

details [here](#)

COURSEWORK

Course highlights

Engineering mechanics, circuit theory, thermodynamics

Physics through quantum mechanics

Mathematics through multivariate calculus

Introductory chemistry

Astronomy including telescopes and astrophysics

Observational Techniques in Optical and Infrared Astronomy

Programmed data reduction pipeline in Python. Observed open star cluster M34 using 16" Schmidt-Cassegrain telescope. Produced BVRI images, color-magnitude diagrams, and isochrone fits.

Astronomical Data Science

Demonstrated statistical concepts through collaborative Python programming in Jupyter notebooks and Google Colab. Independent projects using real-world data with scientific-style papers and presentations. Focus on best practices in written and visual communication of data.

Project titles:

- Investigation of Links Between Brightness and Orbits in Comets
- Exoplanet Distributions in Systems of Massive Host Stars
- Redesign of Decadal Survey Figure: Impacts of Well-Organized Data Archives

Astronomy & Public Policy

Practiced written and verbal science communication and outreach on topics including light pollution, contested observatory construction sites, and climate change.

Engineering Seminar: Remote Sensing

Wrote technical memos and frequently presented on published scientific articles. Designed and carried out a ground-penetrating radar survey project concluding with presentation and formal scientific report.

Foucault Pendulum Repair (Physics)

Self-designed project to repair and possibly redesign non-functioning drive mechanism for Foucault pendulum displayed on Smith College campus. Will additionally develop display materials and sample lesson plans to increase awareness and educational impact of the Foucault pendulum.

PUBLICATIONS

LaBarre, P.G., Rydh, A., Palmer-Fortune, J., **Frothingham, J.A.**, Hannahs, S.T., Ramirez, A.P., Fortune, N.A. "Magnetoelectric oscillations in the specific heat of a topological Kondo insulator." *Journal of Physics: Condensed Matter* (2022).