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Sean Heakes

Research and Instrumentation Projects

2024-Ongoing	Developing a computational model to simulate the lunar temperature brightness and solar radiative processes at 5 and 8.6 GHz with retired solar astronomer Ken Tapping.
2024-Ongoing	Constructing a cylindrical parabolic radio telescope to perform spectral line observations of 21 cm Neutral Hydrogen.
May 2024	Attended National Radio Astronomy Organization's Synthesis Imaging Workshop in Socorro, New Mexico. Discussed topics related to interferometry and data analysis.
2023-2024	Preforming optical testing on UBC Astronomy Club refractor telescopes using the method of Double Pass Auto Collimation using an optical flat and Ronchi gratings to determine optical quality.
2022-Ongoing	Coordinating and implementing the refurbishment of a 0.4m Optical Guidance Systems Ritchey-Chretien telescope for UBC's Astronomy Club and UBC Department of Physics and Astronomy with assistance from the Dominion Astrophysical Observatory in Victoria, BC.
2022- Ongoing	With the assistance of UBC's Physics and Astronomy Department Machinists I am constructing an open truss dobsonian telescope around a f/4.5 0.4m mirror using designs from *A Practical Manual for Building Large Aperture Telescopes*.
2021-2022	Using Python and astronomy programming packages and open-source radio telescope data of the Hydrogen 21 cm wavelength I wrote a program to model the doppler shift of hydrogen clouds within the Milky Way at various pointing directions.
2021	Co-wrote a grant proposal on behalf of the UBC Astronomy Club for a new apochromatic 140mm refractor from the UBC Alma Mater Society.

Academic History

SEPTEMBER 2021 - APRIL 2026

B.Sc Astronomy/ University of British Columbia

- Select courses:
  - PHYS 216: Classical Mechanics
  - CPSC 203: Programming, Problem Solving, and Algorithms
  - PHYS 210: Introduction to Computational Physics
  - PHYS 301: Introduction to Electromagnetism
  - PHYS 312: Mathematical Physics
  - ASTR 205: Stars and Stellar Populations
  - ASTR 300: Galaxies
  - PHYS 229: Intermediate Experimental Physics II
  - MATH 317: Vector Calculus

Academic Work Experience

JULY 2024 – DECEMBER 2024

Astronomy Coop Student/ Dominion Radio Astrophysical Observatory in Kaleden, British Columbia

- Programmed a python pipeline to convolve a simulated polarized beam response for the 26-metre John. A. Galt radio telescope with the Effelsberg-Bonn HI Survey.
- Designed code to transform relative velocities from galactic Local Standard of Rest to topocentric reference frames, interpolate large datasets, preform coordinate transforms, and produce infographics that will be featured in a coming series of academic papers.

JANUARY 2024 – APRIL 2024

Jr. Mechanical Design Engineer/ Dominion Radio Astrophysical Observatory in Kaleden, British Columbia

- Led the development of a drone photogrammetry project to model the 26-metre John A. Galt radio telescope's mechanical characteristics.
- Fabricated a custom drone/camera bracket, programmed a drone positioning waypoint generator using geodetic python packages, and performed analysis of the datasets to model the telescope distortions at various telescope pointing positions.

OCTOBER 2023 – APRIL 2024

Research Assistant/ Thunderbird South Telescope Commissioning

- Working under the direction of UBC Professor Aaron Boley. I operated remote telescope systems, used automated data capture shell scripts, and Linux astronomy software for image analysis and tracking. Developed skills in troubleshooting optical systems and related hardware failures.

Academic Service

OCTOBER 2023 – OCTOBER 2024

Astronomy Representative / UBC Science Undergraduate Society

- Advocating for and supporting astronomy students' academic interests. I voted on matters pertaining to the function of the university student body that represents all science students.

APRIL 2023 – PRESENT

Equipment Coordinator / UBC Astronomy Club

- Organizes and maintains the club's various telescopes, eyepieces, and accessories.
- Collaborates with other members of the club to write grants to procure new equipment.

Certificates

SEPTEMBER 2022 – NOVEMBER 2022

Student Machine Shop Course / UBC Physics and Astronomy

- 35-hour course in which I learned how to safely operate a variety of machine tools such as a mill, lathe, bandsaw, drill press, and bench grinder. I also demonstrated the ability to manufacture high precision parts of various materials in a final project.

JANUARY 2023 – MARCH 2023

PCB Design and Prototyping / UBC Physics and Astronomy

- 30-hour course in which I learned best practices for schematic capture and PCB layout, generating PCB manufacturing files, assembled PCBA, and testing circuits.