Nasser Mohammed

Ph.D. Student at The University of Toronto

nasser.mohammed@mail.utoronto.ca +1 236 338-0494 Toronto, ON, Canada

Education

Ph.D. Student in Astronomy & Astrophysics

The University of Toronto

September 2024 – ongoing Toronto, ON

BSc. Honours in Physics (Minor in Data Science)

The University of British Columbia

September 2019 – December 2023 Kelowna, BC

- Supervisor: Dr. Alex S. Hill
- Thesis Title: Polarimetric Study of 'Tadpole' Feature G137+7 with CHIME all-sky Radio Data.

Awards and Honours

- UofT Recognition of Excellence Award (2024)
- Mary Louise & Ronald Laidlaw Martin Graduate Scholarship in A&A (2024)
- David A Dunlap Department of Astronomy & Astrophysics Entrance Fellowship (2024)
- 2x NSERC Undergraduate Student Research Award (2022, '24)
- Irving K. Barber Faculty of Science Undergraduate Research Award (2023)

Research Experience

Undergraduate Research Assistant

UBC Irving K. Barber Faculty of Science | Dominion Radio Astro. Observatory

May 2023 - May 2024 Kelowna, BC

- Funded through Irving K. Barber Undergraduate Research Awards.
- Integrated diverse survey data from WSRT, DRAO Synthesis Telescope, and Dwingeloo to the multi-wavelength study of the feature.
- Performed RM Synthesis on CHIME data cubes to study the Faraday tomography of tadpole and verify that the 'tail' is a cohesive feature
- Investigating the sensitivity of Faraday Rotation to slight variations in electron column density in the ISM
- Lead-author for publication in The Astrophysical Journal: **N. Mohammed** & A. Ordog, et al. 2024, "Faraday tomography with CHIME: the 'tadpole' feature G137+7"

Canadian Stratospheric Balloon Experiment Design Challenge VI

Physics Lead

August 2023 - May 2024

- Proposed and designed a novel stratospheric balloon experiment with scientific objectives and a payload plan.
- Collaborated with team members to create a comprehensive proposal and took a leadership role in organizing the team.
- The experiment measured the Faraday rotation effects of radio signals through the stratosphere due to free ions and the Earth's magnetic field.

Honours Thesis

UBC Irving K. Barber Faculty of Science | PHYS 449

September 2022 - April 2023 Kelowna, BC

- Data from the CHIME telescope was used to study the tadpole-shaped polarization feature G137+7 located within the Fan Region.
- Performed an in-depth polarimetric study on features using CHIME 400-800 MHz data cubes.
- Created derotated polarization angle maps for insight into intrinsic polarization angles of the Fan Region.
- Queried Gaia DR3 for stars capable of sustaining a Strömgren sphere at high relative velocities or white dwarves that may have left a relic Strömgren sphere.
- Culminated in a 42-page undergraduate thesis supervised by Dr. Alex S. Hill

Undergraduate Research Assistant

UBC Irving K. Barber Faculty of Science | Dominion Radio Astro. Observatory

May 2022 – August 2022 Kaleden

- Funded through the Undergraduate Student Research Award (USRA) Natural Sciences and Engineering Research Council of Canada Grant.
- Worked on-site at the
- Developed code to process & analyze polarization data from the CHIME.
- Utilized 'template' data sets to address gain differences across CHIME's 1024 dual-polarized receivers.
- Acquired a rigorous understanding of polarized emissions mechanisms in the interstellar medium and Galactic magnetism fundamentals.

Teaching Experience

Undergraduate Teaching Assistant

Irving K. Barber Faculty of Science

September 2022 - Present

- Led weekly lab sections for introductory physics courses and tutorials for intermediate physics courses, providing hands-on instruction and guidance to first-year students on fundamental concepts in kinematics and statistical analysis.
- Responsibilities included ensuring fair grading with detailed feedback, preparing relevant presentations on key topics, and fostering an inclusive and open environment for students to learn in.

Globalink International Student Research Mentor

Mitacs

April 2023 - September 2023

- Guided and empowered five diverse international students in achieving academic and professional excellence.
- Provided dedicated mentorship, guidance, motivation, and support throughout their educational and career journeys.
- Fostered an inclusive and welcoming environment, promoted cultural immersion, and active engagement in campus and community activities.

Conferences

UBC Okanagan 18th Annual F.o.S. Undergraduate Research Awards Symposium

September 2023 — Kelowna, BC

- I presented a poster titled “The Tadpole in Space” as a general-audience introduction to my research on the tadpole feature and Faraday rotation in the interstellar medium.
- Awarded second place for ‘Most Accessible Poster Presentation’ for explaining complex scientific concepts to a broad non-science audience.

Canadian Astronomical Society Annual General Meeting

June 2023 — Penticton, BC

- I presented a poster titled "Polarimetric Study of ‘Tadpole’ Feature using CHIME Radio Data" regarding my research on the polarisation feature G137+7 to an audience of experienced astronomers.
- Volunteered throughout the conference, ensuring smooth operations and managing microphones and audio equipment.

TomFest: Frontiers in Radio Science and Engineering with Tom Landecker

June 2023 Kaleden, BC

- Gave a talk titled "A Tad Polarized, A Polarimetric Study of G137+7", honouring both Tom Landecker's influence on students entering the field of Radio Astronomy and presenting my research on the 'tadpole' polarisation feature in the Fan region.

Canadian Astroparticle Physics Summer School

May 2023 Queen's University, SNOLAB

- Organized by the Arthur B. McDonald Canadian Astroparticle Physics Institute
- Engaged in lectures, workshops, and hands-on activities, deepening understanding of fundamental principles, theories, and experimental techniques.
- Toured the SNOLAB in Sudbury, ON.
- Received mentorship from experts and leading researchers at the forefront of astroparticle physics.

UBC Okanagan 17th Annual F.o.S. Undergraduate Research Awards Symposium

September 2022 Kelowna, BC

- I presented a poster titled "Calibration of Polarized Radio Data from CHIME," where I demonstrated the effectiveness of a novel polarisation angle calibration technique with CHIME ring maps.

Volunteer & Community Activities

Co-Founder & VP Astronomy

Space Exploration Student Association

May 2023 - May 2024

- I co-founded the student association with the goal of broadening the space community in the Okanagan.
- Organized astronomy demonstration with the Lake Country Girl Guides to engage young women in physics and engineering questions and activities.
- Partnered with the Royal Astronomical Society of Canada branch in the Okanagan to get students involved in the non-profit organization.
- Organized and executed youth STEM outreach initiatives for elementary school children in the Okanagan to get them excited and engaged in physics and astronomy concepts.

Co-Founder & President

UBC Okanagan Astronomy Club

December 2019 - May 2023

- Organized and hosted engaging and interactive seminars that fostered active participation and discussions among attendees and contributed to their appreciation of the universe, observational astronomy & astrophotography.
- Coordinated and led multiple stargazing nights on and off campus, where attendance frequency exceeded 70, providing students and community members with the opportunity to observe and learn about the night sky.

External Relations Coordinator

Zenith Canada Pathways Foundation

June 2021 - September 2021

- External Relations coordinator and volunteer. Regular responsibilities include facilitating contact with potential partner organizations and outreach centers, searching and documenting potential contacts, and reaching out and interacting with outreach targets.
- The goal is to increase students' and young professionals' interest in Canada's space sector and to aid their entry into the industry.