Shuhan Zheng

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Summary

I am a first year Master's student at the University of Toronto Institute for Aerosapce Studies (UTIAS), with an undergraduate degree double majoring in astronomy and physics. I specialize in solving engineering problems from a physics-informed approach, while leveraging my experience in computational modelling and data analysis.

Education

M.Eng. from **University of Toronto Institute for Aerosapce Studies (UTIAS)**.

Master's in Aerospace Science and Engineering, 2024 to 2026 (exp.).

Research interest: Spacecraft trajectory design and guidance, mission planning, and astrodynamics/orbital mechanics.

Coursework: Spacecraft Dynamics and Control, Fundamentals of Computational Fluid Dynamics.

M.Eng. Project: Prediction and characterization of trajectories for Temporary Captured Orbiters (TCOs).

HBSc. from **University of Toronto**, Toronto ON, Canada.

Major in Physics, University of Toronto, 2020 to 2024.

Major in Astronomy and Astrophysics, University of Toronto, 2020 to 2024.

Notable courses: Introductory Optics, Electronics Lab, Electromagnetic Theory, Computational Physics, Time Series Analysis.

DEC from **Marianopolis College**, Montreal QC, Canada.

Pure & Applied Science, 2018 to 2020.

Provincial top 15 rank in Quebec, Canadian Association of Physicists (CAP) Exam, 2019.

Past Experiences

- **Astronomy Capstone Project**
  - In the 2023-2024 academic year, I worked under the guidance of Post Doc Dr. Nathan Sandford in Professor Ting Li's Near Field Cosmology group at the University of Toronto for my Astronomy Capstone Project.
  - The goal was to compile a much-needed all-in-one catalog of stellar chemical abundance data to propel data-driven studies of chemical evolution in dwarf galaxies around the Milky Way. In the process, I produced a tool that retrieves, standardizes, and cross-matches data from various sources.
- **University of Toronto Physics Student Union (UofT PhySU)**
  - Vice-President of Internal and External Affairs, 2023 to 2024 academic year. My role is to organize and coordinate PhySU's collaboration with external partners, as well as with the Department of Physics itself.
- **China Spallation Neutron Source (CSNS), China Academy of Sciences, Institute of High Energy Physics**

  - Summer research internship in Dr. Xin Tong's [1] Polarized Neutron group, May to July 2023.
  - During this time, I collaborated with PhD supervisor Dr. Tianhao (Radian) Wang and Post Doc Dr. Ahmad Salman to develop a polarized neutron imager that can directly observe the magnetic field of a given sample in 3D. My contribution was to independently design and implement a raytracing-based neutron optics simulation to generate synthetic polarized neutron images for future training of a machine learning model, which will be used to interpolate the magnetic field of the sample.

- **University of Toronto Aerospace Team (UTAT) Space Systems**
  - Data Processing subsystem
    * Since September 2021, member of the Smile correction project team. I was one of the core contributors who developed, implemented, and tested an algorithm that removes smile distortion.
  - Mission Science subsystem (disbanded due to mission progress)
    * General member, September 2021 to August 2022. Our task was scoping for alternative missions for the team's CubeSat project FINCH, which was published in the team's submission to the Small Satellite Conference 2022[3].

- **Moon Base Design Contest**
  - Team lead and first author of one of the top 10 finalist submissions in The Moon Society's Moon Base Design Contest[4], 2021 (the only undergraduate team to be selected as a finalist). The goal was to design a lunar base that sustainably supports the survival and well-being of a crew of 30 for 10 years, and then evaluate its cultural and economic significance. The contest welcomed submissions from all levels of education, including engineering graduate students and professionals.

- **Marianopolis Propulsion Laboratory**, a student rocketry society at Marianopolis College, Montreal
  - Co-executive, 2019 to 2020 academic years;
  - Outreach director, 2018 to 2020.

Notable Skills

- Python programming and LaTeX typesetting;
- Analog and digital electronics design and prototyping, including applications involving Arduino microcontrollers;
- Technical drawing, including designing parts with SolidEdge. I am also familiar with making simulations with COMSOL Multiphysics;
- Scientific and technical writing, including lab reports and scientific journal articles.

Languages

Native Chinese (Mandarin)
Fluent English (IELTS Overall 8.0,)

[1] Dr. Tong is a **lead scientist** in the field of polarized neutron science at Oak Ridge National Laboratory and CSNS.
See more info about Dr. Tong's Google Scholar page: https://scholar.google.com/citations?user=Iy4X3WAAAAAJ

[3] Miles, A. (n.d.). FINCH: A blueprint for accessible and scientifically valuable remote sensing satellite missions. DigitalCommons@USU. https://digitalcommons.usu.edu/smallsat/2022/all2022/88/

[4] The Moon Society's announcement for contest winners: https://www.moonsociety.org/news/2021/03/10/announcement-of-winners-for-the-moon-societys-first-moon-base-design-contest/