Fahim Rajit Hossain Shwadhin

75-A/W, University of Rajshahi, Bangladesh-6205

📞 01781259313 ✉ farahoshwadhin.13@gmail.com 🔗 linkedin.com/in/fahim-rajit-hossain/ ⭘ https://rajit13.github.io/

Profile

As an aspiring researcher in the field of observational astrophysics, I have developed a robust theoretical foundation. I have demonstrated proficiency in programming and leadership, and I have shown the ability to find intricate analytical solutions to problems. My unwavering passion for research drives my continuous pursuit of knowledge and growth in this field.

Education

Bangladesh Army University of Engineering & Technology - BAUET   2019 – Present
Bachelor of Science in Electrical and Electronic Engineering   *Natore, Bangladesh*

- **Thesis Title:** A Low-cost Radio Telescope model for 21 cm H-line Detection under the supervision of Afzal Hossen, Lecturer, BAUET.
- **Relevant Courseworks**: Signals and Systems, Electrical and Electronic Systems, Engineering Electromagnetics, Solid State Devices, Optical Fiber Communication.
- **External Coursework:** 'Data-Driven Astronomy', 'Analyzing the Universe', 'Data Science with Python' [Coursera], Introduction to Astrophysics (ASTRO 142) [UoR], Machine Learning for Physics and Astronomy by Dr. Viviana Acquaviva, Introduction to Astronomy Research (Intro2Astro).

Skills and Interest

Programming Languages: Proficient in Python (NumPy, SciPy, Matplotlib, AstroPy, Pandas), MATLAB, with basic proficiency in C, C++, HTML/CSS, ADQL
Software:/Frameworks: LaTeX, GitHub, WordPress, Inkscape, LENSTRONOMY, TOPCAT, SAOImage DS9.
Astronomy: Observation, Photometry and Data Collection with CCD/Telescopes, Modelling with Bayesian Statistics (MCMC), Astronomy Olympiads: Organizing, Collaborating, Teaching, Writing
Languages: English(Fluent), Bengali(native), Hindi(working proficiency)

Research and Technical Experience

Research Project   **February 2023 – Present**
Supervisor: Dr. Anowar J. Shajib   *BDLensing*

- Part of a research group that focuses on modeling galaxy-scale strong lensing systems using *LENSTRONOMY* software. The first author to be of the subsequent journal paper. (Manuscript Under Preparation).
- Worked with HST data to create a Sérsic profile and simulate how the mass is distributed in the lens galaxy and compare it with the light distribution to investigate the alignment between dark matter and baryonic matter in massive elliptical galaxies

Summer Astrophysics Intern   **May 2020 – August 2020**
Supervisor(s): Dr. Aurora Kesseli   *Leiden/ESA Astrophysics Program for Summer Students (LEAPS) 2020*

- Worked with high-resolution spectroscopic archival data of Exoplanet WAST 76-b from Calar-Alto Observatory. Wrote a program in Python to analyze, plot, and perform basic spectral time series analysis.
- Using the Cross-correlation method created a model for the atmosphere of the exoplanet for detection of special species such as TiO, VO, and water molecules. With a novel model of HRCRS detected very little sign of TiO.
- Compared results from high-resolution spectroscopy with previously gathered results from low-resolution spectroscopy to confirm the significance of both results ultimately verifying the importance of multi-resolution works.

Pedagogical Project   **February 2023– Present**
Supervisor: Dr. Khan Muhammad Bin Asad   *Astronomy Research Group, IUB (ARGI)*

- Working on modifying the existing antenna model for better radio observation of 21-cm signal from the center of the Milkyway Galaxy and with better affordability. The project is named "Jagadish Horn Radio Telescope (JHoR)." The extension of this project is adapted for my undergraduate thesis.
- Developing an Image analysis pipeline for curated deep sky object imaging conditions using Equinox telescopes. Under the supervision of both Dr. Asad and Dr. Lamiya Mawla.

Summer School Participant   **August 2021**
Dunlap Astronomical Instrumentation Summer School   *University of Toronto*

- Participated in a week-long virtual summer school on Astronomical Instrumentation and Research Methodology.
- Worked with CCD data for Image Analysis with virtual lab tour at the Dunlap Institute.

Publications

[**Journal Article**] **Hossain, F, et. al. Lens models of galaxy–galaxy strong lenses.** To be submitted to Astronomy & Astrophysics Journal (Q1-indexed, IF: 6.24) (Manuscript Under Preparation).

[**Book**] **Hossain, F,. Mahmudunnobe, M. Jyotirbigganer Joto Kichu (Introduction to Astronomy: Olympiads and Others):** First-ever Bengali Astronomy textbook focused on Introduction to Astronomy and International Olympiads. To be published by: https://www.adarsha.com.bd/ [in preprint 2024]

[**Poster Presentation**] **Detecting TiO in the spectrum of the hot Jupiter WASP-76b:** Journal Club SPADE: Space and Astronomy for Development and Education IUB (ARGI) See: https://rajit13.github.io/research.html#leaps

Leadership / Extracurricular

International Olympiad on Astronomy and Astrophysics (IOAA)   2018 − Present
Bangladesh Team Leader   *IOAA*
- Led Team Bangladesh as a team mentor on several editions of IOAA resulting in the first-ever silver medal along with the best prize for group contest awarded to Bangladesh.
- Prepared and moderated questionnaire and graded student responses as one of the youngest members of IOAA and similar international Olympiads like GeCAA/OWAO Jury Board.
- Participated in International Board Meeting of IOAA as Bangladesh representative. Worked under local Astronomy Organizations like Planetariums and Observatory in India, China, Hungary, and Poland.

Bangladesh Olympiad on Astronomy and Astrophysics (BDOAA)   2018 − Present
Co-founder   *Bangladesh*
- Part of the founding committee of the first internationally recognized Astronomy and Astrophysics Olympiad in Bangladesh. Yearly participants over 100 students nationwide.
- Responsibilities includes - creating a balanced problem-solving astrophysics curriculum, social outreach, creating problem sets for tests, training the national team, and event coordinating nationwide
- Published 100 notes/posts on Physics, Astronomy, and Earth Science at https://bdoaa.org/blog/.

Service and Outreach

Space and Astronomy for Development and Education Astronomy Coordinator   2023 − Present
SPADE aims to provide rigorous training and development of Astronomy and encourage Astronomy and Astrophysics education across the country at the school level in Bangladesh.

Dur Bishwer Nagorik − Citizens of the universe: Observer and Volunteer   2023 − Present
Durbin is an observational group that will travel around Bangladesh to do Astrophotography of planets, nebula, stars, galaxies, and other exciting astronomical objects. The program is aimed at astronomical outreach via public events consisting of telescopes. Website: https://durbin.cc/en/

National Earth Science Olympiad: Academic Team Member & Volunteer   2016 − 2019
Bangladesh Youth Environmental Initiative (BYEI) organizes the National Earth Olympiad (Bangladesh) that selects the National Team for Bangladesh at the International Earth Science Olympiad (IESO). The programs focus on environmental sustainability and awareness among young students.

Awards and Honors

Winner   2018
Win A Telescope Project Contest, IAU100   *International Astronomical Union*
- Awarded for best astronomical outreach project model in Bangladesh.

Bronze Medal   September, 2017
11th International Earth Science Olympiad   *Nice, France*
- Awarded for excellence in the theoretical and the field components of this international high school science competition.

Diploma   December, 2016
10th International Olympiad on Astronomy and Astrophysics   *India*
- Awarded for excellent performance in both the individual and the group sections of this international competition.

Champion   2017
National Earth Science Olympiad   *BYEI*
- Became overall champion at the national high school Olympiad focused on Earth and Climate Sciences.