MD RAHAT ALI

Norman, Oklahoma, USA | rahatku44@gmail.com | md.rahat.ali-1@ou.edu | +1 (405) 430-7033
Google Scholar: scholar.google.com/citations? User=xoGggKMAAAAJ | Citations: 50 | h-index: 3 | i10-index: 2

RESEARCH PROFILE

Physics PhD researcher at the University of Oklahoma transitioning from a strong background in nuclear analytical techniques, gamma-ray spectrometry, and environmental radioactivity into high-energy astrophysics. Current research focuses on X-ray spectroscopy of gravitationally lensed quasars, including continuum modeling, absorption, Fe Kα emission, spectral variability, and microlensing signatures using Chandra data. Experienced with scientific Python, CIAO/Sherpa, HEASoft/XSPEC, radiation detection, and quantitative data analysis.

RESEARCH INTERESTS

High-Energy Astrophysics • Gravitational Lensing & Quasar Microlensing • AGN & Fe Kα Spectroscopy • X-ray Astronomy • Galaxy Clusters • Gamma-Ray Astrophysics • Radiation Detection • Nuclear Analytical Techniques

EDUCATION

Ph.D. in Physics, University of Oklahoma, Norman, Oklahoma, USA 2025-Present
- Research area: high-energy astrophysics and X-ray spectroscopy; advisor: Prof. Xinyu Dai.

M.Sc. in Physics, Khulna University, Bangladesh — GPA: 3.88/4.00 2019
B.Sc. in Physics, Khulna University, Bangladesh — GPA: 3.93/4.00 2017

CURRENT ASTROPHYSICS RESEARCH

Graduate Research, University of Oklahoma — Advisor: Prof. Xinyu Dai 2025-Present
- Analyze multi-epoch Chandra X-ray observations of gravitationally lensed quasars to study spectral variability and microlensing.
- Fit absorbed power-law continua and Gaussian Fe Kα emission-line models; evaluate fit quality, parameter uncertainties, and line significance.
- Process and analyze spectra with CIAO/Sherpa and HEASoft/XSPEC; use Python for automated fitting, visualization, and time-series analysis.
- Investigate image-resolved and combined spectra, Fe-line energy shifts, photon-index evolution, and possible constraints on compact X-ray emission regions.

ACADEMIC & RESEARCH POSITIONS

Graduate Teaching Assistant, Department of Physics and Astronomy, University of Oklahoma Aug 2025-Present
- Teaching/grading support for undergraduate physics courses, including PHYS 2514 and PHYS 2524; student support, course administration, and exam proctoring.

Assistant Professor, Department of Physics, RUET, Bangladesh Dec 2023-Present
Lecturer, Department of Physics, RUET, Bangladesh Nov 2019-Dec 2023
Adjunct Faculty, Ahsania Mission University of Science & Technology, Bangladesh 2023-2024
Research Assistant, Institute of Nuclear Science and Technology, Bangladesh Atomic Energy Commission 2018-Present
Research Assistant, Photonics Laboratory, Khulna University 2024-2025

PEER-REVIEWED PUBLICATIONS

- Ali, M.R., Islam, M.A., Hossain, M.F., et al. (2021). Depth-wise elemental contamination trend in sediment cores of the Sundarbans mangrove forest, Bangladesh. Journal of Radioanalytical and Nuclear Chemistry.
- Sayam, A.S.M., Islam, M.A., Ali, M.R., et al. (2023). Neutron activation analysis of sediments of the Padma River adjacent to Rooppur Nuclear Power Plant. Applied Radiation and Isotopes.
- Islam, M.A., Sayam, A.S.M., Ali, M.R., et al. (2025). Natural radioactivity and radiological risks in sediments of the Padma River near Rooppur Nuclear Power Plant. Radiochimica Acta.
- Ali, M.R., Das, R., Das, B., Islam, M.A. (2026). Neutron activation analysis of sediments of the Karnaphuli River: elemental contamination and ecological risk assessments.

SELECTED RESEARCH GRANTS & PROJECTS

- Assessment of Natural Radioactivity in Sediment of the Padma River near Rooppur Nuclear Power Plant — RUET Research Grant (2021-2022).
- Spatial Sediment Analysis and Anthropogenic Activity Assessment of Karnaphuli River — RUET Research Grant (2023-2024).

TECHNICAL SKILLS

- Astrophysics software: CIAO, Sherpa, DS9, HEASoft/XSPEC; Chandra spectral extraction, fitting, and visualization.
- Programming/data analysis: Python, Jupyter Notebook, MATLAB, C; statistical modeling and scientific visualization.
- Experimental/nuclear methods: Neutron Activation Analysis (NAA/INAA), HPGe gamma-ray spectrometry, radiation detection, QA/QC and environmental risk indices.

CONFERENCE PRESENTATIONS

- National Conference on Physics, Bangladesh Physical Society (2025).
- IEEE International Conference on Power, Electrical, Electronics and Industrial Applications (PEEIACON) (2024).
- National Conference on Physics (2024).
- International Conference on Climate Change (2019).

HONORS & AWARDS

- Prime Minister Gold Medal, University Grants Commission, Bangladesh.
- President Gold Medal, Khulna University.
- Dean's Award for Academic Excellence; UGC Scholarship; National Science and Technology Fellowship.

REFERENCES

- Prof. Xinyu Dai — Professor of Physics and Astronomy, University of Oklahoma.
- Prof. Farzana Nahid — Professor of Physics, Khulna University.
- Dr. Mohammad Amirul Islam — Chief Scientific Officer, Bangladesh Atomic Energy Commission.