Department of Physics
School of Sciences
Maulana Azad National Urdu University
(Central University)
Gachibowli, Hyderabad,
Telangana-500032, India
✆ +919860371895
✉ md.alam660@gmail.com

MD. SHAH ALAM

CURRENT DESIGNATION/ INVOLVEMENT

- Currently working as a Guest Faculty (Contractual) in Physics at the Department of Physics, School of Sciences, Maulana Azad National Urdu University (MANUU), Gachibowli, Hyderabad, Telangana, India.

RESEARCH PROFILES

- Google Scholar ID : JF4kAAAAJ&hl
- Scopus ID :
- Web of Science Researcher ID :
- ORCID ID :

AREA(S) OF SPECIALIZATION

- Observational studies of stellar-mass black hole X-ray binaries using space-based telescopes operating in the X-ray band.

RESEARCH INTERESTS:

- **Black Hole X-ray Binaries:** Analysis of both confirmed and candidate black hole systems using observational data in the X-ray regime.
- **Space-based X-ray Astronomy:** Utilization of archival and proprietary data from major space missions such as **RXTE**, **Suzaku**, **XMM-Newton**, and **AstroSat**.
- **Spectral Analysis:** Modeling X-ray energy spectra to investigate the physical properties and geometry of **accretion disks** and **coronae** around black holes.
- **Relativistic Iron Line Broadening:** Study of broad Fe Kα lines as signatures of **strong gravitational effects** near black holes.
- **Accretion Disk Dynamics:** Exploration of temporal evolution in the size and structure of accretion disks, including disk truncation and extension near the event horizon.

- **Time Series and Fourier Analysis:** Application of Fourier techniques to generate and analyze **power density spectra (PDS)** of black hole binaries.
- **Quasi-Periodic Oscillations (QPOs):** Identification and physical interpretation of QPOs, particularly in persistent high-mass black hole systems.
- **Energy-Dependent Timing Features:** Investigation of how timing properties such as **rms variability**, **break frequencies**, and **PDS shape** vary across energy bands.

ONGOING ACADEMIC RESEARCH/PROJECTS

We are investigating the relationship between accretion disk and corona dynamics and their temporal properties using power density spectra (PDS), particularly quasi-periodic oscillations (QPOs), in black hole X-ray binaries.

INNOVATION WITH FIELD OF STUDY AND COLLABORATIVE EFFORTS

- Our research makes a significant contribution to the understanding of **accretion disk–corona geometry** and their **temporal evolution** in black hole X-ray binaries. A key highlight is the detection and interpretation of **quasi-periodic oscillations (QPOs)** in persistent systems such as **LMC X-1**.
- The innovative aspect lies in **linking Fourier-derived timing features**—including power density spectra (PDS), break frequencies, and rms variability—with underlying **spectral states**, thereby offering new insights into the **energy-dependent behavior** of black hole environments.
- The **discovery and interpretation of a ~30 mHz QPO in LMC X-1** marks a notable advancement in understanding disk–corona interactions and the inner accretion processes under strong gravitational influence.
- The study is inherently **collaborative**, involving the use of **archival data from multiple international space missions** (RXTE, Suzaku, XMM-Newton), and combines efforts across institutions and countries.

COLLABORATORS

- **Prof. Gulab Chand Dewangan**
  Inter-University Centre for Astronomy & Astrophysics (IUCAA), Pune 411007, India
- **Dr. Sanjay Jhingan**
  Dean, International College of Liberal Arts
  Yamanashi Gakuin University, 2-7-17 Sakaori, Kofu,
  Yamanashi 400-0805, Japan
- **Dr. Aditya S. Mondal**
  Department of Physics, Visva-Bharati University,
  Santiniketan, West Bengal 731235, India

ACADEMIC AND ADMINISTRATIVE EXPERIENCES

- I served as a **Post-Doctoral Fellow at the Inter-University Centre for Astronomy and Astrophysics (IUCAA), Pune**, for a period of **4 years and 10 months**
- In addition to research, I have contributed to undergraduate and postgraduate teaching. I worked as a **Guest Faculty in the Department of Physics at Bakhtiyarpur College of Engineering, Patna**, **Bihar** for **8 months**, where I taught core physics courses and supported academic activities of the department.
- Following that, I am serving as a **Guest Faculty at the Department of Physics, School of Sciences, Maulana Azad National Urdu University (MANUU), Hyderabad**, for **7 months**, where I am engaged in teaching B.Sc. and M.Sc. Physics courses and supported curriculum development and student mentoring.

Work Undertaken During the Post-Doctoral Fellowship:

- Organized the online workshop "Advanced AstroSat Data Analysis Workshop" held at IUCAA, Pune, India (June 21–30, 2021), in collaboration with my team. I also served as a tutor for CZTI data analysis during this event.

- Conducted a hands-on session on CZTI data analysis from AstroSat during the workshop “Multi-wavelength Sky Observations – AstroSat and Beyond” at IIT Indore, Madhya Pradesh, India (February 3–9, 2019).

- Facilitated a hands-on session on CZTI data analysis in the COSPAR Capacity Building Workshop on Broadband Spectral and Timing Studies with AstroSat, Chandra, and XMM-Newton, held at IISER Mohali, Punjab, India (March 9–20, 2019).

- Delivered a practical session on simulating energy spectra using the Interactive Spectral Interpretation System (ISIS) software during the “Workshop on Technical Aspects of AstroSat Proposal Submission” at IUCAA, Pune, India (October 15–16, 2019).

- Participated in the “Webinar on the AstroSat Proposal Preparation” hosted by IUCAA, Pune (November 11, 2019), where we interacted with participants from across India and abroad and provided a demonstration of simulating energy spectra using the ISIS script astrosat.sl.

- Conducted a hands-on session on SXT data analysis techniques during the “National Workshop on AstroSat Data Analysis” at Goa University, Goa, India (November 20–22, 2019).

EDUCATIONAL QUALIFICATIONS

- Ph. D. (Physics): Jamia Millia Islamia (JMI), A Central University, New Delhi, India.
- M.Sc. (Physics): Aligarh Muslim University (AMU), Central University Varanasi, Uttar Pradesh, India.

TEACHING PROFICIENCY

- Solid-State physics
- Quantum Mechanics
- Element of modern Physics
- Wave and Optics

- Atomic Physics

RESEARCH PUBLICATION DETAILS

1. Md. Shah Alam, G. C. Dewangan, T. Belloni, D. Mukherjee, and S. Jhingan, Millihertz quasi-periodic oscillations and a broad iron line from LMC X-1, MNRAS, Oxford University Press, Vol. 445, Pages 4259-4266 (2014).

2. Md. Shah Alam, Dipanjan Mukherjee, Aditya S. Mondal, Gulab C. Dewangan, Sanjay Jhingan, and Biplab Raychaudhuri, XMM-Newton view of a hard X-ray transient IGR J17497-2821, MNRAS, Oxford UniversityPress, UK, Vol. 451, Pages 3078-3088 (2015)

3. J. Roy, Md. Shah Alam, C. Balamurugan, D. Bhattacharya, P. Bhoye, G. C. Dewangan, M. Hulsurkar, N. Mali, R. Misra and A. Pore, AstroSat Science Support Cell, JAA, Volume – 42, Issue 2, article id 28 (2021)

4. Yash Bhargava, Nandini Hazra, A R Rao, Ranjeev Misra, Dipankar Bhattacharya, Jayashree Roy, Md Shah Alam, Probing the shot behaviour in Cygnus X-1 using simultaneous AstroSat-NICER observation, MNRAS, Oxford University Press, UK, Vol. 512, Issue 4, Pages 6067-6077 (2022)

DETAILS OF CONFERENCE/ SEMINAR /WORKSHOP/ FDP (ATTENDED/ PRESENTED)

Participation and presentation in National & International Conferences

1. Advanced workshop on X-ray timing at IUCAA, Pune, India from Jan 23-28, 2012.

2. Winter school on high energy astrophysics at HRI Allahabad India from Feb 6-18 2012.

3. 2nd IUCAA x-ray astronomy school February 3 - March 2, 2013

4. COSPAR: Committee on Space Research, An Advanced School for Asian Astronomers, held from Sep 2-13, 2013 in Xuyi, China.

5. MIT-IUCAA workshop on X-ray studies of Transient Astronomical Sources, held at IUCAA, Pune, India from 13-24 January 2014.

6. International Conference on Matters of Gravity and the Universe, held at Centre for Theoretical Physics, Jamia Millia Islamia, New Delhi, India from 27-29 October 2014.

7. Workshop on Science with LAXPC/ASTROSAT, held at TIFR Balloon Facility, Hyderabad, India, from 15-17 December 2014.

8. Astronomical Society of India (ASI 2015) workshop “Workshop on Transients”, held at the National Centre for Radio Astrophysics of the Tata Institute of Fundamental research on 16 Feb 2015.

9. 33rd Meeting of the Astronomical Society of India (ASI), held at National Centre for Radio Astrophysics (NCRA) of the Tata Institute of Fundamental Research (TIFR), Pune, India from 17-20 February 2015

10. CLOUDY Workshop, held at IUCAA, Pune, India from 21-26 September 2015

11. A workshop on Timing and spectroscopy: Wideband X-ray Astronomy, held at TIFR Balloon Facility, Hyderabad, India from 12-14 January 2016

12. Jet Triggering Mechanisms in Black Hole Sources, held at TIFR, Mumbai, India, from 20-23 January 2016

13. Workshop on Data Analysis & LAXPC Science, held at TIFR, Mumbai, India, from 18-21 January 2017

14. International Conference on Current Advances in Applied Physics (ICCAAP-2025), held at MANUU Hyderabad, India from 20-21 Feb 2025

DETAILS OF SUPERVISION (M.PHIL/M.TECH/PH.D.)

PROFESSIONAL MEMBERSHIPS

PROFESSIONAL ACTIVITIES

ACHIVEMENTS

PERSONAL DETAILS

Father's Name	: Md Idrish Alam
Date of Birth	:01 March 1982
Gender	: Male
Marital Status	: Married
Nationality	: Indian
Language Known	: Urdu, Hindi, English

Date: 15-06-2025
Place: Hyderabad

Md Shah Alam

[Last update on 16/06/2025]