

Ayan Bhattacharjee

✉ astro-ayan@snu.ac.kr • 🌐 astro-ayan.github.io • 🌐 Astro-Ayan

RESEARCH INTERESTS

- 📖 **Accretion-Ejection around Compact Objects:** X-Ray Spectra/Timing Studies, Smoothed Particle Hydrodynamics, Monte Carlo Simulations, Radiative Transfer
- 📖 **Dynamics of Jets:** Relativistic Hydrodynamics, Radio Emission Modelling, Hydrodynamic Instabilities

EMPLOYMENT

- 📖 **Postdoctoral Researcher** **South Korea**
Research Institute of Basic Sciences, SNU *Jan 2025 – Present*
NRF CREATIVE AND CHALLENGING (창의·도전) RESEARCH FELLOW
- 📖 **Postdoctoral Researcher** **South Korea**
Department of Physics, UNIST *Jun 2022 – Dec 2024*
NRF CREATIVE AND CHALLENGING (창의·도전) RESEARCH FELLOW
- 📖 **Researcher** **South Korea**
Center for High-Energy Astrophysics, UNIST *Jul 2021 – Jun 2022*
- 📖 **Visiting Researcher** **India**
Department of Astrophysics and Cosmology, SBNBCBS *Aug 2019 – Jul 2020*
- 📖 **Senior Research Fellow** **India**
Department of Astrophysics and Cosmology, SBNBCBS *Aug 2016 – Jul 2019*
- 📖 **Junior Research Fellow** **India**
Department of Astrophysics and Cosmology, SBNBCBS *Aug 2014 – Jul 2016*

EDUCATION

- 🎓 **Ph.D. in Astrophysics** **India**
🏛️: S. N. BOSE NATIONAL CENTRE FOR BASIC SCIENCES *Aug 2014 – Feb 2021*
THESIS: Spectral And Timing Properties Of Black Holes And Neutron Stars In X-Ray Binaries Using Two-Component Advective Flow Solution
Advisor: Prof. Sandip K. Chakrabarti
- 🎓 **M.Sc. in Physical Sciences (Graduated 1st in Class of '14)** **India**
🏛️: S. N. BOSE NATIONAL CENTRE FOR BASIC SCIENCES *Aug 2012 – Jul 2014*
PROJECT: Parrondo's Paradox and the Brownian Ratchet
Project Supervisor: Prof. Punyabrata Pradhan
- 🎓 **B.Sc. in Physics (Graduated 2nd in Class of '12)** **India**
🏛️: WEST BENGAL STATE UNIVERSITY *2009 – 2012*

REFEREED PUBLICATIONS

- 📖 **First Author:** 5 [2 MNRAS[†], 2 ApJ[†], 1 ASSP[†]]
- 📖 **Corresponding Author:** 5
Second Author: 3 [1 ApJ[†], 1 RAA, 1 AdSpR]
- 📖 **Contributory Author:** 2 [1 ApSS, 1 AdSpR]
- ☰ **Complete List of Publications:** Google Scholar, NASA ADS, ORCID

PROFESSIONAL SERVICES

- 📖 **Editor:** Two-Component Advective Flow (TCAF) XSPEC User Manual, 2024
- 👥 **Member:** Korea Numerical Astrophysics Group (KNAG), 2023-Present
- 👥 **Member:** Korean Astronomical Society (KAS), 2021-Present
- 👥 **Member:** Center for High-Energy Astrophysics (CHEA), UNIST, 2021-2022
- 👥 **Peer-Reviewer:** Research in Astronomy and Astrophysics (RAA), 2020-Present
- 👥 **Resource Personnel:** Two-Component Advective Flow (TCAF) XSPEC User Group, 2014-Present

SELECTED PUBLICATIONS

1. **A. Bhattacharjee**, I. Banerjee, A. Banerjee, D. Debnath, S. K. Chakrabarti, "The 2004 outburst of BHC H1743-322: analysis of spectral and timing properties using the TCAF solution", *MNRAS*, **466**, 1372-1381 (2016)
2. **A. Bhattacharjee**, S. K. Chakrabarti, "Monte Carlo Simulations of Thermal Comptonization Process in a Two Component Advective Flow around a Neutron Star.", *MNRAS*, **472**, 1361-1371 (2017)
3. **A. Bhattacharjee**, "Generalized Flows Around Neutron Stars", in Mukhopadhyay B., Sasmal S. (eds) *Exploring the Universe: From Near Space to Extra-Galactic*, **ASSP**, vol 53. Springer, Cham, 93-107 (2018)
4. **A. Bhattacharjee**, S. K. Chakrabarti, "Timing Properties of Shocked Accretion Flows around Neutron Stars in presence of cooling", *ApJ*, **873**, 119 (2019)
5. A. Banerjee, **A. Bhattacharjee**, D. Debnath, S. K. Chakrabarti, "Spectral Analysis of χ Class Data of GRS 1915+105 Using TCAF Solution", *RAA*, 20(12), 208 (2020)
6. A. Banerjee, **A. Bhattacharjee**, D. Chatterjee, D. Debnath, S. K. Chakrabarti, T. Katoch, & H. M. Antia, "Accretion Flow Properties of GRS 1915+105 During Its θ Class Using AstroSat Data", *ApJ*, 916(2), 68 (2021)
7. D. Chatterjee, D. Debnath, A. Jana, J. R. Shang, S. K. Chakrabarti, H. K. Chang, A. Banerjee, **A. Bhattacharjee**, K. Chatterjee, R. Bhowmik, S. K. Nath, "AstroSat observation of non-resonant type-C QPOs in MAXI J1535-571", *ApSS*, 366(8), 82 (2021)
8. S. Chowdhury, S. Sasmal, J. Brundell, S. Chakraborty, **A. Bhattacharjee**, & S. K. Chakrabarti, "Energetic electron precipitation during lightning activities over Indian landmass as observed from WWLLN and NOAA-15 satellite", *AdSR*, 68(10), 4205 (2021)
9. A. Banerjee, **A. Bhattacharjee**, D. Debnath, S. K. Chakrabarti, "Similarities and differences in accretion flow properties between GRS 1915+105 and IGR J17091-3624: A case study", *AdSR*, 69(7), 2930 (2022)
10. **A. Bhattacharjee**, J. Seo, D. Ryu, & H. Kang, "A Simulation Study of Low-Power Relativistic Jets: Flow Dynamics and Radio Morphology of FR-I Jets", *ApJ*, 976, 91 (2024)

GRANTS, FELLOWSHIPS AND ACHIEVEMENTS

- 🏆 **Creative and Challenging Research Grant:** "Simulation Study on Low-Powered FR-I Jets from Radio Galaxies", total budget of 210,000,000 KRW (\$169,195), National Research Foundation of Korea, 2022-2025
- 📺 **SERB-ITS Grant:** Presenting findings at FOXT, API, Amsterdam, DST, India, 2019
- 📺 **COSPAR Grant:** An €800 support for 42nd COSPAR Assembly, COSPAR Secretariat, Caltech, USA, 2018
- 🌟 **Eligibility for Lectureship/Assistant Professorship:** CSIR-UGC NET, India, 2015-2016
- 🌟 **Eligibility for Scientific Officer:** A 99.6 percentile in OCES/DGFS 2014, BARC, India, 2014
- 🌟 **Eligibility for Engineering M.Tech.:** All India Rank 172 in GATE, India, 2014
- 🏆 **Gold Medal:** 1st position in IPhD Programme (2012-2014), Dean (AP) & Director of SNBNCBS, DST, 2014
- 🎓 **PBIR Fellowship:** Scholarship for Post-B.Sc. Integrated-PhD Scholar, SNBNCBS, DST, India, 2012
- 🏆 **Gold Medal:** 1st position in B. Sc.(H) Physics, BRSN College, India, 2012
- 🏆 **INSPIRE (Scholarship for Higher Education):** Top 1% in the 10th & 12th standard, DST, India, 2009

COMPUTATIONAL SKILLS

- >_ PRIMARY: **Fortran** [Advanced], **Shell** [Advanced], **Mathematica** [Advanced]
- </> SECONDARY: **ROOT** [Advanced], **Python** [Proficient], **Matlab** [Intermediate], **C/C++** [Intermediate]
- 📊 DATA VISUALIZATION: **GNUplot** [Advanced], **SuperMongo** [Advanced], **IDL** [Advanced], **Grace** [Advanced], **ParaView** [Intermediate], **Grapher** [Intermediate], **Origin** [Intermediate]
- 🔗 VERSION CONTROL AND PARALLEL COMPUTING: **git** [Proficient], **OpenMP** [Intermediate], **MPI** [User Experience]
- 📄 WORD PROCESSING: **L^AT_EX** [Advanced], **Pages** [Advanced], **Hancom Office** [Proficient], **Markdown** [Proficient]
- 📁 REFERENCE MANAGEMENT: **BibTex** [Advanced], **Obsidian** [Advanced], **Zotero** [Advanced]
- 🐧 OPERATING SYSTEMS: **Linux** [Advanced], **MacOS** [Advanced], **Windows** [Proficient]

DATA REDUCTION & ANALYSIS SKILLS:

- 📦 PACKAGES: **HEASOFT/FTools** [Advanced], **HEASOFT/Xanadu** [Xspec, Xronos; Advanced].
- 📡 MISSIONS: **RXTE/PCA** [Advanced], **RXTE/HEXTE** [Proficient], **AstroSat/LAXPC** [Intermediate].

INVITED AND SOLICITED TALKS

Two Component Advective Flows (TCAF): Fitting Procedure and Results for Stellar and supermassive black holes 🔊: <i>X-ray Spectral fitting of BHXRBs by TCAF FITS file</i>	ICSP, Kolkata, India Sep 25, 2024
THE 2023 SEPTEMBER KNAG MEETING 🔊: <i>A Simulation Study of Low-Power Relativistic Jets:</i> Structures and Dynamics of FR-I Jets	KASI, Daejeon, South Korea Sep 15, 2023
THE 68TH GWNR WORKSHOP 🔊: <i>Numerical Simulations of Accretion-Ejection around Compact Objects:</i> What to include (and what not to)?	APCTP, POSTECH, Pohang, South Korea Mar 15-16, 2023
CHEA SPECIAL SEMINAR 🔊: <i>Could There Be a Unified Spectral Model for Black Holes and Neutron Stars?</i>	CHEA, UNIST, Ulsan, South Korea Jul 22, 2021

SELECTED TALKS FROM INTERNATIONAL CONFERENCES

THE 45TH COSPAR ASSEMBLY, SESSION E1.2 🔊: <i>What is the Origin of Jets in Accreting Neutron Stars?</i> A Unified Accretion-Ejection Mechanism for Compact Objects	BEXCO, Busan, South Korea Jul 13 - 21, 2024
THE 45TH COSPAR ASSEMBLY, SESSION E1.8 🔊: <i>A Simulation Study on Relativistic Jets:</i> Impact of the Central kpc Region on Jets across Different Scales	BEXCO, Busan, South Korea Jul 13 - 21, 2024
THE XXXIst IAU GA MEETING, FOCUS MEETING 1 🔊: <i>A Simulation Study on the Morphological Dichotomy of FR-I and FR-II Jets</i>	BEXCO, Busan, South Korea Aug 2-11, 2022
THE 43RD COSPAR ASSEMBLY, SESSION E1.5 🔊: <i>What is the Origin of QPOs in Accreting Neutron Stars?</i>	Online, Sydney, Australia Jan 28 - Feb 4, 2021
THE 43RD COSPAR ASSEMBLY, SESSION E1.8 🔊: <i>Can there be a Unified Spectral Model for Black Holes and Neutron Stars?</i>	Online, Sydney, Australia Jan 28 - Feb 4, 2021
THE FUTURE OF X-RAY TIMING 🔊: <i>Can a Two-Component paradigm explain the spectral and timing properties of neutron stars?</i>	API, Amsterdam, Netherlands Oct 22 - 25, 2019
EXPUNIV2018: BLACK HOLES & HIGH ENERGY ASTROPHYSICS 🔊: <i>The Formation of Two Component Advective Flow around Neutron Stars</i>	SNBNCBS, Kolkata, India Nov 14 - 17, 2018
THE 42ND COSPAR ASSEMBLY, SESSION E1.13 🔊: <i>Formation of Two-Component Advective Flows around Neutron Stars</i> and the Possibility of Super-Eddington Accretion Rates	Caltech, Pasadena, CA, USA Jul 14 - 22, 2018
THE 42ND COSPAR ASSEMBLY, SESSION E1.10 🔊: <i>Formation and Stability of Oscillating Shocks in Inviscid Advective Flows around Neutron Stars</i> in Presence of Cooling using Smoothed Particle Hydrodynamics Simulations	Caltech, Pasadena, CA, USA Jul 14 - 22, 2018
THE 42ND COSPAR ASSEMBLY, SESSION E1.4 🔊: <i>The Formation of Two Component Advective Flow around Neutron Stars</i>	Caltech, Pasadena, CA, USA Jul 14 - 22, 2018
THE 15TH MARCEL GROSSMANN MEETINGS, S. AC1 🔊: <i>The Formation of Two Component Advective Flows around Neutron Stars</i>	University of Rome, Italy Jul 1 - 7, 2018
INTEGRAL SYMP., S. 4: ACCRETION AND EJECTION: GALACTIC AND EXTRAGALACTIC 🔊: <i>Is neutron star spectrum also an outcome of TCAF?</i>	INAF, Venice, Italy Oct 15 - 20, 2017
INTEGRAL SYMP., S. 2: OUTBURSTING SOURCES: BHC, NS, AGN/BLAZARS 🔊: <i>Outburst of BHC H1743-322: Analysis of Spectral and Timing Properties Using TCAF Solution</i>	INAF, Venice, Italy Oct 15 - 20, 2017
WIDE BAND SPECTRAL AND TIMING STUDIES OF COSMIC X-RAY SOURCES 🔊: <i>Is Neutron Star Spectrum also an Outcome of TCAF?</i>	TIFR Mumbai, India January 10 - 13, 2017