

# Tathagata Saha

RESEARCHER · ASTRONOMY

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## Research Positions

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### Inter-University Centre for Astronomy and Astrophysics (IUCAA)

POST DOCTORAL FELLOW

with eROSITA German Consortium, Compact objects working group

Pune, India

15.09.2025 onwards

### Leibniz Institute for Astrophysics Potsdam (AIP)

RESEARCH ASSISTANTSHIP AND GUEST RESEARCHER

with Dr. Mirko Krumpe

Potsdam, Germany

01.12.2023 - 31.05.2026

### Nicolaus Copernicus Astronomical Center of the Polish Academy of Sciences

PHD ASTRONOMY

Thesis Supervisor: Prof. dr. hab. Alex G. Markowitz

Warsaw, Poland

01.10.2019 - 22.03.2024

## Education

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### Presidency University

M.Sc. PHYSICS

- Thesis: Connection Between the Accretion Disc and Corona in the Active Galactic Nuclei  
Advisors: Prof. Ritaban Chatterjee, Prof. Indranil Chattopadhyay

Kolkata, India

01.08.2017 - 01.07.2019

### Presidency University

B.Sc.(HONOURS) PHYSICS

- Thesis: Accretion Disc Corona Interaction in Active Galactic Nuclei  
Honours thesis/undergraduate research advisor: Prof. Ritaban Chatterjee

Kolkata, India

21.07.2014-01.07.2017

## Research Interests

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- Multi-wavelength spectral and timing studies of supermassive black hole transients, particularly changing-look AGNs (CLAGNs) and tidal disruption events (TDEs), to probe rapid accretion state changes.
- Evolution and geometry of the circumnuclear obscuring medium (torus), its connection to accretion in-flows/outflows in AGNs and supermassive black hole growth.
- Time-resolved spectral studies of radio-quiet Seyferts to constrain the structure and evolution of accretion sub-components such as the disk, corona, and broad-line region.
- Theoretical modeling of accretion physics: disk-corona interactions, jet formation, and instabilities governing state transitions in AGNs.
- Investigating the role of accretion-driven feedback on black hole growth, galaxy evolution, and its imprint on the cosmic X-ray background and large-scale structure.

## Research Skills

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- X-ray and optical data reduction and analysis using classical and Bayesian methods Multinest/Ultraneest (Nested Sampling) and Markov Chain Monte Carlo in multiple frameworks including XSPEC, Sherpa, and any python environment.
- Contribution to observation proposals for optical (SALT, ESO-VLT) and X-ray telescopes (XMM-Newton, Chandra, NuSTAR, NICER, ASTROSAT) via performance of feasibility simulations and developing of scientific cases.

- Developer skills: Python (proficient) implementation of numerical methods, data wrangling (Numpy, Pandas), statistical analysis (Scipy, Scikit-Learn), and deep learning (TensorFlow).
- Academic service: Referee for the AAS, The Astrophysical Journal (ApJ)

## Publications

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### REFEREED AND ACCEPTED PUBLICATIONS

- Saha, T** et al., eRASSU J043115.8-711730: The first pulsating symbiotic super-soft X-ray source in the Magellanic Bridge, 2026, Accepted for publication in MNRAS; 2026
- Saha, T** et al., Multiwavelength study of extreme variability in LEDA 1154204: A changing-look event in a type 1.9 Seyfert, A&A, 702, A28; 2025
- Saha, T** et al., The Close AGN Reference Survey (CARS). Long-term spectral variability study of the changing look AGN Mrk 1018; A&A, 699, A205; 2025
- Saha, T**; Markowitz, A. G.; Buchner, J, Inferring the morphology of AGN torus using X-ray spectra: a reliability study; MNRAS, 509, 5485; 2022
- Homan, D., Krumpe M., Markowitz, A., **Saha, T.**, and 16 co-authors. Discovery of the luminous X-ray ignition eRASSt J234402.9-352640; I. Tidal disruption event or a rapid increase in accretion in an active galactic nucleus?, A&A 672, A167; 2023
- Laha, S., Markowitz, A., Krumpe, M., Nikutta, R., Rothschild, R., **Saha, T.**. The Variable and Non-variable X-Ray Absorbers in Compton-thin Type II Active Galactic Nuclei, ApJ, 897, 66; 2020
- Markowitz A., Krumpe M., ... **Saha, T.** and 13 co-authors. eROSITA Detection of a Cloud Obscuration Event in the Seyfert AGN EC 04570-5206, 2024, A&A, 684, A101; 2024
- Krishnan, S., Markowitz, A., ... **Saha, T.** and 13 co-authors. An X-ray flaring event and a variable soft X-ray excess in the Seyfert LCRS B040659.9-385922 as detected with eROSITA, A&A, 691, 19; 2024
- Markowitz A., Krumpe M., ... **Saha, T.** and 12 co-authors. A changing-look Seyfert discovered by eROSITA reveals a two-component broad-line region, A&A, 710, A222; 2026
- Mereghetti, S et al.....**Saha, T.** Time domain astronomy with the THESEUS satellite, Exp Astron, 52, 309; 2021

### ONGOING PROJECTS

- Characterizing the stellar population in the Magellanic Bridge using eROSITA detections and multi-wavelength follow-up.
- Detection Changing Obscuration AGNs in eROSITA archives using X-ray hardness ratios.
- Development of a neural network based spectral classifier that can facilitate efficient identification of changing look AGNs by flagging spectral type changes in optical spectral surveys (e.g. SDSS).  
Github repository: [github.com/tathagatas1996/AGNopspecNN-base](https://github.com/tathagatas1996/AGNopspecNN-base)
- Development of a code base (Saha & Naddaf in prep.) to study the structural evolving of the broad line region in transient changing-look AGNs using Failed Radiatively Driven Outflow model (Naddaf et al., 2022, A&A, 663, A77)

## Teaching Experience

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- August 2024 **X-ray Data Analysis with XSPEC, Content:** X-ray data and statistic, Likelihood functions, Bayesian Statistics: Markov Chain Monte Carlo (MCMC), Nested Sampling, PyXSPEC ,  
**Location:** School of Astrophysics, Presidency University, Kolkata

## Scholarships & Grants

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- 2023 **Research Assistant Scholarship**, Deutsches Zentrum für Luft und Raumfahrt (DLR), P.I. Dr. Mirko Krumpe, FKZ 50 OR 2004
- 2020 **Ph.D. Scholarship on Active Galactic Nuclei**, Polish National Science Center (NCN), P.I. Prof. dr. hab. Alex G. Markowitz, 2018/31/G/ST9/03224
- 2017 **Pre-Ph.D. Selection with Scholarship**, Inter-University Center for Astronomy and Astrophysics, Pune, India
- 2017 **Integrated Ph.D. Selection with Scholarship**, Department of Physics, Indian Institute of Science, Bengaluru, India
- 2017 **All India Rank 26, Joint Entrance Screening Test for Ph.D. programs**,

## Presentations

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### Invited Oral Presentations

- January 2022, *A BXA-driven study of reliability of X-ray Spectral fits in determining AGN torus morphology*. Invited talk: X-ray Spectral Fitting 2022 (XSF22), Prague, Czech Republic
- April 2023, *Active Galactic Nuclei: Active Galactic Nuclei: The multi-wavelength signature of black hole accretion*. Invited Outreach talk: Kolkata, India.
- September 2024, *Morphology of circumnuclear accreting gas in Active Galactic Nuclei*, Invited Talk, School of Astrophysics, Presidency University, Kolkata
- April 2025, *Multiwavelength study of the accretion substructures in AGN transients*, Invited Talk, CESSI, IISER, Kolkata
- July 2025, *Multiwavelength study of the accretion substructures in AGN transients*, Invited Talk, High Energy Astrophysics Group, IUCAA, Pune

### Contributed Oral Presentations

- September 2021, *Determining the AGN torus morphology using X-ray Spectra: A reliability study*, Polish Astronomical Society Meeting 2021, Szczecin, Poland
- July 2022, *A BXA-driven study of reliability of X-ray Spectral fits in determining AGN torus morphology*, Sexten Center for Astrophysics, Sexten, Italy
- December 2022, *A BXA-driven study of reliability of X-ray Spectral fits in determining AGN torus morphology*, TORUS2022 Conference, Leiden, Netherlands
- March 2023, *Multiwavelength follow-up studies of eROSITA detected AGN transients*, Astronomical Society of India Meeting 2023, Indian Institute of Technology, Indore, India
- June 2023, *Multiwavelength follow-up study of a flaring changing-look AGN with double-peaked Balmer lines*, SALT Conference 2023, Warsaw
- October 2023, *Multiwavelength follow-up study of a flaring changing-look AGN with double-peaked Balmer lines* Gaia Alerts Conference 2023, Malta
- July 2024, *Multiwavelength follow-up studies of eROSITA detected AGN transients*, Conference on Blazars and the Restless AGN, Presidency University, Kolkata, India
- June 2026, *J0431-71: The first symbiotic supersoft source in the Magellanic Bridge*, X-ray Universe, Elche, Spain
- July 2026, *Changing look AGNs: divergence in the observed timescales of state transition*, Conference on Blazars and the Restless AGN, IISER, Mohali, India

### Contributed Poster Presentation

- July 2021, *Determination of AGN Torus Morphology with X-ray Spectra: A reliability study*, European Astronomical Society Meeting 2021
- March 2022, *Determination of AGN Torus Morphology with X-ray Spectra: A reliability study*, Astronomical Society of India Meeting 2023, Aryabhata Research Institute for Observational Sciences, Nainital, India
- July 2022, *Determination of AGN Torus Morphology with X-ray Spectra: A reliability study*, European Astronomical Society Meeting 2022
- May 2022, *Multi-wavelength study of extragalactic transients detected with eROSITA: A flaring event in an AGN*, XMM-Newton Workshop 2022, Villafranca del Castillo, Madrid, Spain

June 2023, *Multi-wavelength study of a flaring CLAGN with double-peaked Balmer lines detected with eROSITA and ZTF*, The Restless AGN, Napoli, Italy

July 2023, *Multi-wavelength study of a flaring CLAGN with double-peaked Balmer lines detected with eROSITA and ZTF*, European Astronomical Society Meeting 2023, Krakow

## Mentoring

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|            |                                                                    |            |
|------------|--------------------------------------------------------------------|------------|
| 2026       | <b>Mahek Patel</b> , Florida Institute of Technology, USA          | IUCAA      |
| until 2026 | <b>Ayon Mondal</b> , University of Maryland, Baltimore County, USA | AIP, IUCAA |
| until 2026 | <b>Fida Fathima SS</b> , Presidency University                     | IUCAA      |

## Outreach, Service, & Professional Development

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|-----------------|--------------------------------------------------------------------------------------------------|--------------------------------|
| January<br>2027 | <b>Intl. Conference: X-ray Polarization of Compact Objects</b> , Scientific Organizing Committee | IUCAA, Pune,<br>India          |
| June 2023       | <b>Intl. Conference: SALT 2023 Conference, Warsaw</b> , Local Organizing Committee               | CAMK-PAN,<br>Warsaw,<br>Poland |
| 2021-<br>2023-  | <b>Theseus Mission</b> , Contributing Scientist, changing look AGNs with the Theseus Mission     |                                |
|                 | <b>Astronova Club, IEEE, Calcutta University</b> , Membership                                    | Kolkata, India                 |