

TONIMA TASNIM ANANNA

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EDUCATION/AWARDS

- August 2023 - **Assistant Professor**
Department of Physics and Astronomy, Wayne State University
- 2019-Current **Postdoctoral Research Associate**
Department of Physics and Astronomy, Dartmouth College
Advisor: Ryan Hickox
- 2017-2019 **Ph.D.**
Yale University
Thesis: Accretion History of AGN: Population Synthesis Model, Mass Function and Photometric Redshifts
Advisor: Claudia Megan Urry
Listed in [Science News: 10 Scientists to Watch 2020](#)
- 2013-2017 **Master of Philosophy, Master of Science**
Yale University
- [Udacity Data Analyst Nanodegree](#)
January-August 2017
This course teaches statistics and machine learning techniques designed by companies like Kaggle/Tableau using the latest programming language/modules
- 2009-2013 **Bachelor of Arts: Physics and Astronomy Double Major**
Bryn Mawr College, Graduated with 3.9 GPA
Physics Honor Society, Sigma Pi Sigma
Awards:
Elizabeth S. Shippen Award for Excellence in Sciences
Double Honors in Physics and Astronomy
magna cum laude
- 2012 **Visiting Student: Physics, Part II Natural Science Tripos**
University of Cambridge
- 2006 **IGCSE**
Cambridge International Examinations
Awards:
Highest Score in Bangladesh in Physics, Additional Mathematics, Computer Science
Highest sum of scores in six Cambridge O'Levels subjects (in Bangladesh)

GRANTS/FELLOWSHIP OBSERVING PROPOSALS

**ADAP NNH22ZDA001N-UPDATING THE UNIFIED MODEL OF AGN BASED ON X-RAY DETECTED
OBSCURED AGN POPULATIONS (\$335K; as PI, 2022)**

Leigh Page Award, Physics Department, Yale University (2013) - Presented to first-year graduate students in recognition of their fine academic record and for the promise of important contributions to the field of physics

Bromley Fellowship, Physics Department, Yale University (2017) - Presented to a fourth year graduate student for a commitment to outreach, diversity, and teaching, thereby demonstrating a broader impact on the University

SALT Telescope **2022** Semester 2 (NIR IFU data, ~63K seconds; **as PI**)

Dartmouth Open Access Publication Grant (**\$1.1K**; **as PI**, 2022)

NNH18ZDA001N-NUSTAR **2018** (Collaborator as a graduate student, PI: Meg Urry)

NSF Grant AST-171551 **2017** (Collaborator as a graduate student, PI: Meg Urry)

NASA ADAP Grant No. 80NSSC18K0418 **2017** (Collaborator as a graduate student, PI: Meg Urry)

PROPOSAL REVIEW PANEL SERVICE

Reviewer for NASA ADAP 2018 proposals
Reviewer for Chandra and NuSTAR TACs (2021, 2022)

PEER REVIEW FOR JOURNAL

ApJ (2020, 2021), MNRAS (2022), MNRAS letters (2022)

PAST JOB EXPERIENCE

June-Aug, 2011 **Summer Research Intern**
Space Telescope Science Institute, NASA – Baltimore, MD

June-Aug, 2012 **Summer Research Intern**
LHCb Experiment, CERN – Ferney-Voltaire, Auvergne-Rhône-Alpes

COLLABORATION MEMBERSHIPS

- [The BAT AGN Spectroscopic Survey](#)
- [Rubin LSST AGN SC](#)
- [Accretion History of AGN \(AHA: Yale University, University of Hawaii\)](#)
- [Black Holes and Galaxies Research Group \(Dartmouth College\)](#)
- [AXIS AGN and Galaxy working groups](#)
- [HEX-P Black Hole Growth working group](#)

MENTORSHIP EXPERIENCE

- Stephanie Podjed (Dartmouth College Graduate student, May 2022-present), **Bias-correction of black hole mass measurements at high redshifts**
- Elizabeth Welch-Jani (Yale Undergraduate Advisee, June 2022-present), **Exploring the systematic uncertainties in SMBH mass measurements in the local Universe**
- [Shafaat Mahmud](#), March 2021- June 2022, became my mentee as a high school student in Dhaka, Bangladesh, and is currently an undergraduate at Colgate University. **Project: Data Analysis techniques in Astrophysics**
- Emmanuel Newsome (Yale Summer Student, June-July 2018, **Extracting X-ray spectra for Stripe 82X sources**)
- Tristan Weaver (Yale Undergraduate Advisee, May-June, 2019, **Multiwavelength spectral energy distribution of AGN using BASS DR2 data**)
- [Saffana Humaira](#) (Wi-STEM Bangladesh mentee, 2016-2018, Duke University), currently pursuing Masters in Education, Harvard University
- [Antara Titiksha](#) (Wi-STEM Bangladesh mentee, September-December 2016, Graduate Student, Carnegie Mellon University, Project: Organizing and conducting Mathematics workshops targeted at women high school students)
- [Mashiat Lamisa](#) (Wi-STEM Bangladesh mentee, Sept-Dec 2016, Hong Kong University of Science and Technology, Project: Data analysis project on incidences of cyber harassment in Dhaka)
- Adrita Khan (Wi-STEM Bangladesh mentee, July 2021-present, Physics, Universiti Sains Malaysia, **Project: Photometric Redshifts using Gaussian processes**)
- Krishna Pushpita Banik (Wi-STEM Bangladesh mentee, June 2021-present, Applied Mathematics, University of Dhaka. **Project: Exploring Machine learning techniques in Astronomy**)

Note that the 2016 Wi-STEM projects were chosen by high school students who wanted to experience data analysis techniques. They were not directly Astronomy related projects. I volunteered to mentor students in Wi-STEM, and **my mentees have gone on to pursue STEM degrees all over US and Asia.**

SCIENCE OUTREACH/ LEADERSHIP

- **Black in Physics Week Core Organizing Committee**, July 2022-present
- Black in Physics Week, Career exploration exhibitor on behalf of Dartmouth, October 2022
- **Black in Physics Juneteenth Essay Competition Judge, June 2022**
- Invited Speaker On the Physics of Black Holes, 14th Abdul Jabbar Astronomy Workshop 2022, Bangladesh University of Engineering and Technology (BUET)
- **Keynote speaker, EducationUSA, US Embassy in Dhaka, Women's Day 2021**
- **Invited Talk on Astronomical Research, Ottawa-Carleton District School Board, February 2021** (outreach event aimed at middle school students)
- Invited Speaker on Extragalactic Phenomena, Bibha Girls Workshop, March 2021 (outreach workshop aimed at middle school and high school students)
- Invited Speaker on Current Astronomical Research Techniques, Jamal Nazrul Islam Astronomy Club, Jashore University of Science and Technology, July 2021 (outreach event aimed at college students)
- Invited Talk about Black Holes, Notre Dame Eco and Space Club, Dhaka, February 2021 (outreach event aimed at 10-12th grade students)
- **Granville Academy Instructor, SQLite and Astronomy Databases, Yale University, 2018**
- **Wi-STEM Mentorship Program for Women in Sciences** (co-founder and mentor, 2016-2022)
- Wi-STEM Steminism Workshops (August 2015)
- Chambliss Poster Judge 227th AAS meeting

TALKS/POSTERS

Invited Seminar: *StackFast - a stacking tool for Chandra and future X-ray missions*, MIT HETG group (July 2023)

Invited Colloquium: *AGN Populations - what we know so far and where we are going*, Occidental College (March 2023)

Invited Colloquium: *AGN Populations - what we know so far and where we are going*, Drexel University (March 2023)

Invited Colloquium: *AGN Populations Studies*, University of Montana (March 2023)

Invited Colloquium: *AGN Populations Studies and their future*, University of Florida (February 2023)

Invited Colloquium: *AGN Populations Studies*, University of Kentucky (January 2023)

Invited Seminar: *Population Synthesis Models and Future X-ray Surveys*, AXIS monthly seminar (September 2022)

Invited Review Talk: *On the Cosmic X-ray Background*, NuSTAR 10-Years-in-space Celebration (June 2022)

Invited Talk: *AXIS Probe and Population Synthesis Models*, AXIS AGN Science Working Group (June 2022)

Invited Seminar: *On the Properties of Obscured AGN*, Kansas University (May 2022)

Invited Seminar: *Eddington Ratio Distribution Function of BASS AGN*, University of Southampton (May 2022)

Invited Seminar: *Eddington Ratio Distribution Function of BASS AGN*, National Observatory of Athens (April 2022)

Talk: *Swift-BAT AGN: The Accretion Rates of Type 1 and Type 2 AGN are significantly different*, BLack Holes Across Space and Time (BLAST) Workshop (December 2021)

Invited Talk: *MODELING THE INTRINSIC POPULATION OF ACTIVE GALACTIC NUCLEI USING HIGH-ENERGY X-RAYS*, Goddard Space Flight Center (October 2021)

Invited Talk: *Studying AGN populations using X-ray surveys*, Wellesley College Physics/Astronomy Colloquium (April 2021)

Talk: *Eddington Ratio Distribution Function of obscured and unobscured AGN*, June 2021

Invited Talk: *AGN X-ray Luminosity Function*, Supermassive Black Holes conference Pucon, December 07-12, 2020

Invited Talk: *Seminar on Cosmic X-ray background*, Astronomical Institute of the Czech Academy of Sciences in Prague, October 2018

Invited Talk: *Seminar on Cosmic X-ray background*, Dartmouth College, October 2018

Invited Talk: *Constraints on AGN spectral parameters*, Accretion History of AGNs, Miami, October 2019
 Talk: *Supermassive Black Holes: Environment and Evolution*, Corfu, Greece, June 2019
 Poster: 17th HEAD Meeting - [Constructing a Supermassive Black Hole Population Synthesis Model Using a Neural Network](#), March 2019
 Talk: 228th AAS Meeting - *Supermassive Black Hole Population Synthesis Model*, January 2019
 Seminar: *Accretion History of AGN: Supermassive Black Hole Growth*, Dartmouth College, October 2018
Invited Talk: *Supermassive Black Hole Growth, Accretion History of AGNs*, Miami, October 2018
 Talk: *Bayesian Statistics, Python in Astronomy Conference*, Simons Foundation, May 2018
 Poster: AGN: Hidden Monsters, Dartmouth, August 2016
 Poster: AGN: what's in a name, Garching, May 2016
 Talk: AAS 228th Meeting, San Diego, May 2016
 Talk: AAS 227th Meeting, Florida, January 2016
 Talk: ARCHES Scientific Workshop, Paris, November 2015

PUBLICATIONS (PLEASE CHECK [THIS](#) LINK FOR THE MOST UPDATED INFORMATION)

First Author:

- 1) [Probing the Structure and Evolution of BASS AGN through Eddington Ratios](#)
Published by ApJL, November 2022
- 2) [BAT AGN Spectroscopic Survey. XXX: Distribution Functions of X-ray Luminosity, Black Hole Mass and Eddington Ratios](#)
Published by ApJS, July 2022
- 3) [The Accretion History of AGN III: AGN Radiative Efficiency and Contribution to Reionization](#)
Published by ApJ, November 2020
- 4) [Accretion History of AGN II: Constraints on AGN Spectral Parameters using the Cosmic X-ray Background](#)
Published by ApJ, January 2020
- 5) [The Accretion History of AGN I: Supermassive Black Hole Population Synthesis Model](#)
Published by ApJ, January 2019
- 6) [AGN Populations in Large-volume X-Ray Surveys: Photometric Redshifts and Population Types Found in the Stripe 82X Survey](#)
Published in ApJ, December 2017

Work in Progress:

[StackFast: Chandra and NuSTAR X-ray Stacking Software](#)
Software publicly available, paper in prep, expected submission in July 2023

As co-author:

- Full library of refereed publications (33) can be found at this [link](#)
1. On the cosmic evolution of AGN obscuration and the X-ray luminosity function: XMM-Newton and Chandra spectral analysis of the 31.3 deg² Stripe 82X (Submitted to ApJ, Peca et al. 2022)
 2. BASS XXXVII: The Role of Radiative Feedback in the Growth and Obscuration Properties of Nearby Supermassive Black Holes (Published by ApJ, Ricci et al. 2022)
 3. Compton-Thick AGN in the NuSTAR era VI: The observed Compton-thick fraction in the Local Universe (Published by ApJ, Torres-Alba et al. 2021)
 4. Compton-Thick AGN in the NuSTAR era VII. A joint NuSTAR, Chandra and XMM-Newton analysis of two nearby, heavily obscured sources (Published by ApJ, Train et al. 2021)
 5. A Large Population of Luminous Active Galactic Nuclei Lacking X-Ray Detections: Evidence for Heavy Obscuration? (Published by ApJ, Carroll et al. 2021)
 6. BAT AGN Spectroscopic Survey-XX: Molecular Gas in Nearby Hard X-ray Selected AGN Galaxies (Accepted by ApJ, November 2020, Koss et al. 2020)
 7. Probing black hole accretion tracks, scaling relations and radiative efficiencies from stacked X-ray active galactic nuclei (Published by MNRAS, Shankar et al. 2020)
 8. The Clustering of X-Ray Luminous Quasars (Published by ApJ, Powell et al. 2020)
 9. The spectral energy distributions of active galactic nuclei (Published in MNRAS, Brown et al. 2019)
 10. Photometric redshifts for X-ray-selected active galactic nuclei in the eROSITA era (Published by MNRAS, Brescia et al. 2019)
 11. The Accretion History of AGN: A Newly Defined Population of Cold Quasars (Published by ApJ, Kirkpatrick et al. 2019)
 12. SDSS-IV eBOSS Spectroscopy of X-Ray and WISE AGNs in Stripe 82X: Overview of the Demographics of X-Ray- and Mid-infrared-selected Active Galactic Nuclei (Published in ApJ, LaMassa et al. 2019)
 13. The Fourteenth Data Release of the Sloan Digital Sky Survey (Published in ApJ, 2017, Abolfathi et al.)
 14. X-ray constraints on the fraction of obscured active galactic nuclei at high accretion luminosities (Published in MNRAS, Georgakakis et al. 2017)
 15. The Hunt for Red Quasars: Luminous Obscured Black Hole Growth Unveiled in the Stripe 82 X-ray Survey (Published in ApJ, LaMassa et al. 2017)
 16. The Chandra COSMOS Legacy Survey: Energy Spectrum of the Cosmic X-Ray Background and Constraints on Undetected Populations (Published in ApJ, Cappelluti et al. 2016)
 17. The 31 Deg² Release of the Stripe 82 X-Ray Survey: The Point Source Catalog (Published in ApJ, LaMassa et al. 2016)
 18. The Hubble Space Telescope Treasury Program on the Orion Nebula Cluster (Published in ApJ, Robberto et al. 2013)