Joheen Chakraborty

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Research Interests

I study a variety of topics in high-energy/time-domain/multi-messenger astrophysics:

- Observational probes of black holes and their environments: accretion and transients, quasi-periodic eruptions (QPEs), tidal disruption events (TDEs), repeating TDEs
- Gravitational-wave sources and their electromagnetic counterparts: extreme mass-ratio inspirals, ultracompact binaries

More broadly, I am interested in exploring rich and varied datasets, high-performance computing, robust statistical inference, constructing toy models with order-of-magnitude physics, and extracting physical insights from data without the ability to perform controlled experiments.

Education

Massachusetts Institute of Technology 2022-present
PhD Physics

Columbia University 2018-2022
BA Astrophysics, BA Computer Science

Awards and Honors

Name	**Award**
USRA Distinguished Undergraduate Award (2021) *Awarded annually to five US undergraduates in space sciences or engineering*	$5000
Barry M. Goldwater Scholarship (2021) *Awarded annually to ∼400 US undergraduates intending to pursue STEM PhDs*	$7500

Selected Talks

Event/Conference (*=invited)	**Location**	**Date**
BlackHolistic 2026	Oxford University	03/2026
Center for Relativistic Astrophysics Seminar	Georgia Inst. of Tech.	10/2025
*EAS meeting (Nuclear transients session)	University College Cork	06/2025
ESAC meeting (QPEs & repeating transients)	ESAC, Madrid	06/2025
AXIS community science workshop	Annapolis, Maryland	05/2025
*Ten Years to *LISA* (Galactic Binaries session)	Jet Propulsion Laboratory	05/2025
*Astronomy Tea Talk Seminar	Caltech	03/2025
15th International *LISA* Symposium	University College Dublin	07/2024
KITP workshop on TDEs	UC Santa Barbara	04/2024
HEAD 21 (Time-domain astronomy session)	Horseshoe Bay, Texas	04/2024
*IAS workshop on QPEs & TDEs	IAS, Princeton	06/2023
HEAD 20 (AGN session)	Waikōloa, Hawai'i	03/2023
AAS 237 (Exoplanets with TESS session)	Remote	01/2021
Machine Learning in Science & Engineering	Columbia University	12/2020
*TESS Science Talk	MIT	11/2020
*SETI-with-TESS collaboration meeting	UC Berkeley	10/2020

Outreach and Service

Volunteer in MIT PhysREFS	01/2024-present
Volunteer at MIT Museum	09/2023-present
Coordinator for Astronomy on Tap Boston	03/2023-12/2025
Volunteer in MIT Astrogazers	09/2022-12/2025
Officer in MIT Physics Graduate Student Council	09/2022-08/2025
Referee for ApJ, Nature Astronomy, Phys. Rev. Lett., MNRAS, PASA	

Teaching and Mentoring

Undergraduate research supervision

Luke Sylvester (MIT UROP)	02/2026-present
Brian Sun (MIT UROP)	09/2025-present
Bernard Leal (MIT Summer Research Program → U. of Arizona PhD)	06/2025-present

Teaching

TA, Data Structures & Algorithms (Columbia Computer Science Dept.)	09/2021-12/2021
Course assistant, Astrophysics of Galaxies (Columbia Astronomy Dept.)	01/2021-05/2021

Proposals and grants as Principal Investigator

PI of 9 guest observer + archival data analysis proposals totaling 1.75 Ms observing time and $447,832 funding allocation

Telescope	Target(s)	Time	Funding
NICER Cycle 8 (2026-7)	TDE archival data	—	$60,000
Chandra GO 27 (2026-7)	Ultracompact binaries	120 ks	$115,780
Swift Cycle 21 (2025-6)	Late-time TDE sample	286 ks	—
NICER Cycle 7 (2025-6)	Candidate QPE sample	100 ks	$38,500
NICER Cycle 7 (2025-6)	QPEs in ZTF19acnskyy	245 ks	$38,500
XMM-Newton AO 24 (2025-6)	QPEs in ZTF19acnskyy	440 ks	$100,613
Swift Cycle 20 (2024-5)	Late-time TDE sample	286 ks	—
XMM-Newton AO 23 (2024-5)	QPEs in XMMSL1 J0249	124 ks	$55,950
NICER Cycle 6 (2024-5)	Late-time TDE sample	150 ks	$38,489

Publications

A complete listing can be found on ADS, arXiv, or Google Scholar.
Statistics from ADS for first-author papers/all papers (updated Apr 7, 2026):
Citations=287/974, *h*-index=6/15

Invited review chapters (* denotes equal contribution):

1. T. Wevers, **J. Chakraborty***, E. Quintin*, M. Zajacek, M. Giustini, *Observations of X-ray Quasi-Periodic Eruptions*, in prep for Space Science Reviews.

First-author:

10. **J. Chakraborty**, S.A. Rappaport, R. Arcodia, *et al.*, *A positive period derivative in the quasi-periodic eruptions of ZTF19acnskyy*, ApJL, 1001, L6 (Apr. 2026). doi:10.3847/2041-8213/ae548b

9. **J. Chakraborty***, M. Masterson*, A. Mummery, *et al.*, *X-ray spectral-timing properties of tidal disruption events*, ApJ, 1000, 95 (Mar. 2026). doi.org/10.3847/1538-4357/ae4876

8. **J. Chakraborty***, L.V. Drummond*, M. Bonetti, *et al.*, *Prospects for EMRI/MBH parameter estimation using quasi-periodic eruption timings: short-timescale analysis*, ApJ, 992, 120 (Oct. 2025). doi:10.3847/1538-4357/ae003b

7. **J. Chakraborty**, P. Kosec, E. Kara, *et al.*, *Rapidly varying ionization features in a quasi-periodic eruption: a homologous expansion model for the spectroscopic evolution*, ApJ, 984, 124 (May 2025). doi:10.3847/1538-4357/adb972

6. **J. Chakraborty**, E. Kara, R. Arcodia, *et al.*, *Discovery of quasi-periodic eruptions in the tidal disruption event and extreme coronal line emitter AT2022upj: implications for the QPE/TDE rate and a connection to ECLEs*, ApJL, 983, L39 (Apr. 2025). doi:10.3847/2041-8213/adc2f8

5. **J. Chakraborty**, K.B. Burdge, S.A. Rappaport, *et al.*, *Expanding the ultracompacts: gravitational wave-driven mass transfer in the shortest-period binaries with accretion disks*, ApJ, 977, 262 (Dec. 2024). doi:10.3847/1538-4357/ad9563

4. **J. Chakraborty**, R. Arcodia, E. Kara, *et al.*, *Testing EMRI models for quasi-periodic eruptions with 3.5 years of monitoring eRO-QPE1*, ApJ, 965, 12 (Apr. 2024). doi:10.3847/1538-4357/ad2941

3. **J. Chakraborty** & D. Kipping. *Transit duration and timing variations from binary planets*, MNRAS, 519, 2 (Feb. 2023). doi:10.1093/mnras/stac3604

2. **J. Chakraborty**, E. Kara, M. Masterson, *et al.*. *Possible X-ray quasi-periodic eruptions in a tidal disruption event candidate*, ApJL, 921, L40 (Nov. 2021). doi:10.3847/2041-8213/ac313b

1. **J. Chakraborty**, A. Wheeler, & D. Kipping. *Hundreds of new periodic signals detected in the first year of* TESS *with the* `weirddetector`, MNRAS, 499, 3 (Sep. 2020). doi:10.1093/mnras/staa2928

Second- and third-author:

6. R. Arcodia, G. Miniutti, **J. Chakraborty**, *et al.*, *Even a precessing clock is right twice per orbit - the super-periods of eRO-QPE2 and challenges for quasi-periodic eruptions orbital models*, ApJ, in press.

5. E. Chickles, **J. Chakraborty**, K.B. Burdge, *et al.*, *An eclipsing 8.56 minute orbital period mass-transferring binary*, ApJ, 1000, 265 (Apr. 2026). doi:10.3847/1538-4357/ae4871

4. V. Berger, E. Kara, **J. Chakraborty**, *et al.*, *Disk-to-corona state transition and extreme X-ray variability in the tidal disruption event AT2019teq*, ApJ, 999, 2 (Mar. 2026). doi:10.3847/1538-4357/ae3006

3. L. Hernández-García, P. Sánchez-Sáez, **J. Chakraborty**, *et al.*, *NICER observations reveal doubled timescales in Ansky's quasi-periodic eruptions*, A&A Letters, 9, 895 (Nov. 2025). doi:10.1051/0004-6361/202555258

2. E. Chickles, K.B. Burdge, **J. Chakraborty**, *et al. A gravitational wave detectable candidate Type Ia supernova progenitor*, ApJ, 987, 206 (Jul. 2025). doi:10.3847/1538-4357/add34c

1. L. Hernández-García, **J. Chakraborty**, P. Sánchez-Sáez, *et al.*, *Discovery of extreme quasi-periodic eruptions in a newly accreting massive black hole*, Nature Astronomy, 9, 895 (Apr. 2025). doi:10.1038/s41550-025-02523-9

Other co-author:

15. H. Guo, Z. Yan, Y. Li, *et al.*, *Evidence for a delayed UV counterpart to X-ray quasi-periodic eruptions in Ansky*, ApJL, 1000, 2 (Apr. 2026). doi:10.3847/2041-8213/ae524b

14. F. Zaidouni, E. Kara, P. Kosec, *et al.*, *XRISM Finds the changing-look active galactic nucleus NGC 1365 in an extended low state: A dense, highly ionized outflow obscures the central source*, ApJL, 997, 1, L26 (Jan. 2026). doi:10.3847/2041-8213/ae307d

13. M. Koss, N. Aftab, S.W. Allen, *et al.*, *The Advanced X-ray Imaging Satellite (AXIS) community science book*, arXiv:2511.00253 (Nov. 2025). doi:10.48550/arXiv.2511.00253

12. R. Arcodia, P. Baldini, A. Merloni, *et al.*, *SRG/eROSITA No. 5: Discovery of quasiperiodic eruptions every* ~ 3.7 *days from a galaxy at* $z > 0.1$, ApJ, 989, 1 (Aug. 2025). doi:10.3847/1538-4357/adec9b

11. M. Masterson, E. Kara, C. Panagiotou, *et al.*, *Millihertz oscillations near the innermost orbit of a supermassive black hole*, Nature, 638, 8050 (Feb. 2025). doi:10.1038/s41586-024-08385-x

10. M. Middleton, A. Gúrpide, T.M. Kwan, *et al.*, *Quasi-periodic eruptions as Lense-Thirring precession of super-Eddington flows*, MNRAS, 537, 3 (Feb. 2025). doi:10.1093/mnras/staf052

9. B. O'Connor, D. Pasham, I. Andreoni, *et al.*, *Characterization of a peculiar Einstein Probe transient EP240408a: An exotic gamma-ray burst or an abnormal jetted tidal disruption event?*, ApJL, 979, L30 (Feb. 2025). doi:10.3847/2041-8213/ada7f5

8. P. Kosec, E. Kara, L. Brenneman, *et al.*, *Detection of a highly ionized outflow in the quasiperiodically erupting source GSN 069*, ApJ, 978, 1 (Jan. 2025). doi:10.3847/1538-4357/ad9249

7. G. Miniutti, A. Franchini, M. Bonetti, *et al.*, *Eppur si muove: Evidence of disc precession or a sub-milliparsec SMBH binary in the QPE-emitting galaxy GSN 069*, A&A, 693, A179 (Jan. 2025). doi:10.1051/0004-6361/202452400

6. M. Giustini, G. Miniutti, R. Arcodia, *et al.*, *Fragments of harmony amid apparent chaos: A closer look at the X-ray quasi-periodic eruptions of the galaxy RX J1301.9+2747*, A&A, 692, A15 (Dec. 2024). doi:10.1051/0004-6361/202450861

5. M. Nicholl, D.R. Pasham, A. Mummery, *et al.*, *Quasi-periodic X-ray eruptions years after a nearby tidal disruption event*, Nature, 634, 8035 (Oct. 2024). doi:10.1038/s41586-024-08023-6

4. R. Arcodia, I. Linial, G. Miniutti, *et al.*, *Ticking away: The long-term X-ray timing and spectral evolution of eRO-QPE2*, A&A, 690, A80 (Oct. 2024). doi:10.1051/0004-6361/202451218

3. R. Arcodia, Z. Liu, A. Merloni, *et al.*, *The more the merrier: SRG/eROSITA discovers two further galaxies showing X-ray quasi-periodic eruptions*, A&A, 684, A64 (Apr. 2024). doi:10.1051/0004-6361/202348881

2. G. Miniutti, M. Giustini, R. Arcodia, *et al.*, *Alive and kicking: A new QPE phase in GSN 069 revealing a quiescent luminosity threshold for QPEs*. A&A Letters, 674, L1 (Jun. 2023). doi:10.1051/0004-6361/202346653

1. A. Prša, A. Kochoska, K.E. Conroy, *et al.*, *TESS Eclipsing Binary Stars. I. Short cadence observations of 4584 eclipsing binaries in Sectors 1-26*, ApJS, 258, 16 (Jan. 2022). doi:10.3847/1538-4365/ac324a