


SANSKRITI DAS

KIPAC Fellow at Stanford University

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RESEARCH INTEREST

Broad Interest: Galaxy formation, evolution, and feedback; Circumgalactic Medium (CGM)

- **Traces of Galactic feedback in the hot CGM:** Detailed phase characterization of the highly ionized ($\geq 10^{5.5}$ K) CGM of the Milky Way using X-ray emission imaging spectroscopy and X-ray absorption grating spectroscopy. Instruments used: *Chandra*, *XMM-Newton*, *Suzaku*
- **Governing parameter of galaxy evolution:** Hot ($\geq 10^6$ K) CGM of spiral galaxies in X-ray emission imaging spectroscopy. Instruments used: *XMM-Newton*, *Suzaku*
- **Self-similarity vs galactic feedback:** Sunyaev-Zel'dovich effect in the CGM of spiral galaxies. Instruments used: *Atacama Cosmology Telescope*, *Planck*, *WISE*, *Very Large Array*
- **The role of neutral CGM in the star formation:** Deep search for diffuse ($< 10^{19}$ cm $^{-2}$) 21-cm line emission in the CGM of spiral galaxies. Instruments used: *Green Bank Telescope*, *Westerbork Synthesis Radio Telescope*
- **Missing baryons:** Warm-hot ionized medium (CGM, intragroup and intergalactic medium) in X-ray absorption grating spectroscopy. Instruments used: *Chandra*, *XMM-Newton*

EDUCATION

- Ph.D. (Astronomy), “Feeding and Feedback in the Circumgalactic Medium (CGM) of Low-redshift Spiral Galaxies: a gastronomical tale in X-ray, 21-cm, and Sunyaev-Zel'dovich Effect”, Advisor: Smita Mathur, Co-advisor: Adam Leroy, The Ohio State University, USA August 2022
- M.S. (Astronomy), The Ohio State University, USA December 2019
- M.Sc. (Physics), Indian Institute of Technology Bombay (IIT), Mumbai, India August 2017
- B.Sc. (Physics), Presidency University, Kolkata, India August 2015

PUBLICATION

Refereed (10 first author, h-index = 9, i10-index = 9)

(Students I have mentored are marked with *)

18. Lara-Díez A. J., Krongold Y., Mathur S., **Das S.** *et al.*, 2023, “A Sub-solar Fe/O Gas Component at $\log(T/K) \sim 7.5$ in the Milky Way’s Circumgalactic Medium”, *MNRAS*(submitted)
17. McClain R., Mathur S., **Das S.** *et al.*, 2023, “Super-virial Temperature of the Milky Way CGM toward NGC 3783”, *MNRAS*(submitted)
16. **Das S.**, Rickel M.*, Leroy A. *et al.*, 2023, “Detection of diffuse HI emission in the circumgalactic medium of NGC 891 and NGC 4565 - II”, *MNRAS*(submitted)
15. Mathur S., **Das S.**, Gupta A., & Krongold Y., 2023, “Probing the hot circumgalactic medium of external galaxies in X-ray absorption II: a luminous spiral galaxy at $z \sim 0.225$ ”, *MNRAS*, **525**, L11–16
14. Gupta A., Mathur S., Kingsbury J., **Das S.** & Krongold Y., 2023, “Thermal and chemical properties of the eROSITA bubbles from Suzaku observations”, *Nature Astron.*, **7**, 799–804

13. Bhattacharyya S.*, **Das S.**, Gupta A., Mathur S. & Krongold Y., 2023, “The hot circumgalactic medium of the Milky-Way: new insights from XMM-Newton observations”, *ApJ*, **952**, 41–55
12. **Das S.**, Chiang Y.K. & Mathur S., 2023, “Detection of thermal Sunyaev-Zel’dovich Effect in the circumgalactic medium of low-mass galaxies - a surprising pattern in self-similarity and baryon sufficiency”, *ApJ*, **951**, 125–144
11. Lara-DI A. J., Mathur S., Krongold Y., **Das S.** & Gupta A., 2023, “Detection of a Super-Viral Hot Component in the Milky Way Circumgalactic Medium Along Multiple Sight-Lines by Using the Stacking Technique”, *ApJ*, **946**, 55–62
10. **Das S.**, Mathur S., Gupta A. & Krongold Y., 2021, “The Hot Circumgalactic Medium of the Milky Way: Evidence for Supervirial, Virial, and Subvirial Temperatures; Nonsolar Chemical Composition; and Nonthermal Line Broadening”, *ApJ*, **918**, 83–97
9. Gupta A., Kingsbury J., Mathur S., **Das S. et al.**, 2021, “Supervirial Temperature or Neon Overabundance? *Suzaku* Observations of the Milky Way Circumgalactic Medium”, *ApJ*, **909**, 164–173
8. Mathur S., Gupta A., **Das S.**, Krongold Y. & Nicastro F., 2021, “Probing the Hot Circumgalactic Medium with Broad O VI and X-Rays”, *ApJ*, **908**, 69–74
7. **Das S.**, Mathur S., Gupta A., Nicastro F. & Krongold Y., 2021, “Empirical estimates of the Galactic halo contribution to the dispersion measures of extragalactic fast radio bursts using X-ray absorption”, *MNRAS*, **500**, 655–662
6. **Das S.**, Sardone A., Leroy A. *et al.*, 2020, “Detection of the Diffuse H I Emission in the Circumgalactic Medium of NGC 891 and NGC 4565”, *ApJ*, **898**, 15–27
5. **Das S.**, Mathur S. & Gupta A., 2020, “The Warm-Hot, Extended, Massive Circumgalactic Medium of NGC 3221: An *XMM-Newton* Discovery”, *ApJ*, **897**, 63–71
4. **Das S.**, Mathur S., Gupta A., Nicastro F. & Krongold Y., 2019, “Multiple Temperature Components of the Hot Circumgalactic Medium of the Milky Way”, *ApJ*, **887**, 257–266
3. **Das S.**, Mathur S., Gupta A. *et al.*, 2019, “Evidence for a Massive Warm-Hot Circumgalactic Medium around NGC 3221”, *ApJ*, **885**, 108–120
2. **Das S.**, Mathur S., Nicastro F. & Krongold Y., 2019, “Discovery of a Very Hot Phase of the Milky Way Circumgalactic Medium with Non-solar Abundance Ratios”, *ApJL*, **882**, L23–29
1. **Das S.** & Ray A., 2017, “Modeling Type II-P/II-L Supernovae Interacting with Recent Episodic Mass Ejections from Their Pre-supernova Stars with MESA and SNEC”, *ApJ*, **851**(2), 138–147

Conference proceedings

- **Das S.** & Ray A., 2017, “Evolution & Explosion of Massive Stars Leading to IIP-IIL SNe with MESA & SNEC”, *Proc. of the IAU Symposium*, **331**, 11–16

In preparation

5. **Das S.**, Mohapatra R., Ponnada S. & Hummels C. 2023, “Turbulence in the warm-hot circumgalactic medium of the Milky Way” (draft available upon request)
4. Lara-DI A. J., Krongold Y., Mathur S., **Das S. et al.**, 2024, “Constraining the location of the super-virial circumgalactic medium of the Milky Way
3. **Das S.**, Rickel M.*, Leroy A. *et al.*, 2024, “Is the diffuse H I in the CGM ubiquitous? A deep search around local galaxies” (draft available upon request)

2. Gupta, A., Mathur, S., **Das S.** *et al.*, 2023, “Super-virial Temperature or Neon Overabundance? II: Shadow Observations of the Milky Way Circumgalactic Medium”
1. Rickel M.*, **Das S.**, Pingel N. *et al.*, 2024, “Diffuse H I emission in the CGM of NGC 891 and NGC 4565 - III: azimuthal distribution”

FELLOWSHIPS, AWARDS AND RESEARCH INTERNSHIPS

- [KIPAC postdoctoral fellowship](#), Stanford University, USA September 2022 - August 2025
- [Presidential Graduate Fellowship](#), The Ohio State University, USA August 2021 – July 2022
- [Allan K. Markowitz Award in Observational Astronomy](#), The Ohio State University 2020
- [University Fellowship](#), The Ohio State University, USA August 2017 – July 2018
- [Visiting Students’ Research Program](#), Tata Institute of Fundamental Research, India 2016
- [Visiting Students’ Program](#), Inter-University Center for Astronomy & Astrophysics, India 2015
- [Student Technical Training Program](#), Giant Meterwave Radio Telescope, India 2014
- [Scholarship for Higher Education](#), Department of Science & Technology, India 2012–2017

TELESCOPE TIME/GRANTS AWARDED

As a Principal Investigator

1. *XMM-Newton*, Exposure time: 430 ks (\$91,400) 2022
2. *Green Bank Telescope*, Exposure time: [86 hours](#) Fall 2021
3. *Green Bank Telescope*, Exposure time: [172 hours](#) Spring 2021
4. *Green Bank Telescope*, Exposure time: [58 hours](#) Fall 2020
5. *Green Bank Telescope*, Exposure time: [20 hours](#) Spring 2020

As a Co-investigator

1. *Chandra* observing program, “Characterizing X-ray emission of the North Polar Spur”, Exposure time: 30 ks 2023
2. *Chandra* observing program, “Constraining the Nature of the Super-virial Temperature Phase of the Milky-Way CGM”, Exposure time: 40 ks 2022
3. NASA ADAP (Astrophysical Data Analysis Program), “Constraining the thermal structure of the eROSITA Bubbles with archival *Suzaku* data” 2021
4. NASA ADAP, “Understanding the chemical enrichment and heating of the circumgalactic medium of the Milky Way with *XMM-Newton*” 2021
5. *Chandra* archival program, ‘Where is the super-virial hot gas? Disentangling the location of the hot circumgalactic medium of the Milky Way’ 2021
6. *Chandra* archival program, “Understanding the chemical enrichment and heating of the circumgalactic medium with observations of the Milky Way” 2019

TALKS AND POSTERS

Invited talks

1. Astrophysics seminar, Indian Institute of Science, Bengaluru, India November 2022

2. Colloquium, School of Astrophysics, Presidency University, Kolkata, India November 2022
3. Colloquium, National Center for Radio Astrophysics, Pune, India October 2022
4. Seminar, Inter-University Center for Astronomy & Astrophysics, Pune, India October 2022
5. Seminar, Department of Astronomy & Astrophysics, Tata Institute of Fundamental Research, Mumbai, India October 2022
6. Physics seminar, Indian Institute of Technology Bombay, Mumbai, India October 2022
7. KIPAC Tea, Stanford University, USA January 2022
8. Science Happy Hour, CIERA, Northwestern University, USA December 2021
9. Presidency Alumni Lecture Series, Presidency University, Kolkata, India April 2021

Contributed talks

1. [High Energy Astrophysics Division \(HEAD\) Frontier Seminar Series](#) (virtual) December 2023
2. [KIPAC@20 conference](#), California, USA September 2023
3. [High-resolution X-ray spectroscopy: A *Chandra* workshop](#), Massachusetts, USA August 2023
4. [The X-ray Universe](#), Greece (attended virtually) June 2023
5. [Athena: Exploring the Hot and Energetic Universe](#), Spain (attended virtually) November 2022
6. [HEAD Frontier Seminar Series](#) (virtual) September 2021
7. American Astronomical Society (AAS) 237th meeting (virtual) January 2021
8. AAS 236th meeting (virtual) June 2020
9. [WHIM and cluster outskirts: lost and found baryons of the universe](#), Alabama, USA June 2018

Contributed posters

1. [Surveying the Milky Way: The Universe in Our Own Backyard](#) (virtual) October 2023
2. AAS HEAD 20th divisional meeting, Hawai'i, USA March 2023
3. POSTER (POster Symposium Targeting Early-career Researchers)– presented 2 posters on [Cold CGM](#) and [Hot CGM](#) (virtual) May 2022
4. AAS HEAD 19th divisional meeting, Pittsburg, Pennsylvania, USA March 2022
5. [20 years of *Chandra* symposium](#), Boston, Massachusetts, USA December 2019
6. AAS HEAD 17th divisional meeting, Monterey, California, USA March 2019
7. AAS HEAD special meeting, Chicago, Illinois, USA March 2018

PRESS COVERAGE

- [Science & Astronomy in Space.com News](#), “Titanic cosmic bubbles blown by the Milky Way are surprisingly complex” May 2023
- [Ohio State News](#), “Galactic bubbles are more complex than imagined, researchers say” May 2023
- [Astronomy news in Sky & Telescope](#), “New observations show ultra-hot gas around the Milky Way. Stellar explosions may have driven this gas out of our galaxy” June 2020
- [Astronomy news in Sky & Telescope](#), “Galaxies swim in the hot gas that extends much farther out than their stars — and plays an important role in the galaxy’s evolution” June 2020

- [Ohio State News](#), “The Milky Way Has One Very Hot Halo” June 2020
- Press conference, AAS 236th meeting, “Evidence for a massive hot circumgalactic medium enveloping a large, luminous galaxy” ([video](#) and [presentation](#)) June 2020
- [Ohio State News](#), “What’s a halo made of? Scientists have new insights on the Galactic kind: Study finds new elements, hotter temperatures in the Milky Way” January 2020
- [Science & Technology News](#), XMM-Newton, European Space Agency, “XMM-Newton discovers scorching gas in Milky Way’s halo” January 2020

MENTORING/ADVISING POSITIONS

- Advisor, [Directed undergraduate thesis research \(honors\)](#), OSU August 2023 - July 2024
- Mentor, [Directed undergraduate non-thesis research \(honors\)](#), OSU January 2022 - July 2023
- Advisor, [Summer undergraduate research program](#), OSU May-July 2021
- Mentor, [Polaris mentorship program](#), OSU August-December 2020
- Co-advisor, Summer undergraduate research program, OSU May-July 2020
- Student-mentor of first-year Astronomy graduate students, OSU 2021-22; 2020-21; 2019-20

TEACHING POSITIONS

- Examination arranger and grader, [Cosmology](#), OSU Fall 2019
- Lab teaching associate, [From Planets to the Cosmos](#), OSU Fall 2019

OUTREACH AND COMMUNITY SERVICE

- Panelist, *XMM-Newton* proposal review November 2023
- Volunteer, Solar eclipse viewing, KIPAC, Stanford University October 2023
- Volunteer, Make Your Own Pulsar, College of San Mateo Science Festival September 2023
- Speaker, Multi-wavelength observations in Astronomy, [Summer undergraduate research program](#), Stanford University August 2023
- Speaker, [SPINWIP](#) (Stanford Program for Inspiring the Next generation of Women In Physics) lecture on Black Holes, Stanford University July 2023
- Panelist, *Chandra* proposal review June 2023
- Application reviewer, SPINWIP, Stanford University May 2023
- Volunteer, [KIPAC Community Day](#), Stanford University April 2023
- Application reviewer, [KIPAC Post-baccalaureate Fellowship](#), Stanford University April 2023
- Judge, Student poster competition, AAS HEAD 20th divisional meeting March 2023
- Application reviewer, [Cal-Bridge Summer](#), KIPAC, Stanford University February 2023
- Referee, Astrophysical journal (main) September 2021
- Judge, [Chambliss undergraduate iposter competition](#), AAS 237th meeting January 2021
- Speaker, “[Making space for all](#)” webinar, The Ohio State University April 2020
- Volunteer, [Breakfast of Science Champions](#), The Ohio State University November 2019

4. Volunteer, [Friends of Ohio State Astronomy & Astrophysics](#) October 2019, May 2019, and October 2017
3. Volunteer, [SciAccess: The Science Accessibility conference](#) June 2019
2. Volunteer, [WestFest: Sustainability and Outreach Festival](#), Ohio State University May 2019
1. Co-instructor, [Summer Institute](#), Ohio Supercomputer Center June 2018

MEMBERSHIP

- Founding member and coordinator of [Cosmology and Astronomy Researchers of Indian Nationality And Sisters \(CARINAS\)](#)
- [Life member](#), Astronomical Society of India
- Student Member, American Astronomical Society

WORKSHOPS ATTENDED

- Culturally Inclusive Mentoring: Optimizing Cultural Awareness and Responsiveness in Research Mentoring Relationships, Office of Postdoctoral Affairs, Stanford University February 2023
- Fundamentals of Gaseous Halos, Kavli Institute for Theoretical Physics Jan 11 - Mar 5 2021

LEADERSHIP/ORGANIZATIONAL POSITIONS

- Election coordinator, Graduate student representative, Astronomy Department, OSU 2021
- Departmental Coordinator, Institute Students' Companion Program, Indian Institute of Technology, Bombay, India 2016-2017
- Departmental Coordinator, Placement Cell, Presidency University, Kolkata, India 2014-2015
- Coordinator, Physics League, Presidency University, Kolkata, India 2012-2015

SHORT-TERM PROJECTS

- Detection and localization of short γ -ray bursts in *CZTI-Astrosat*, TIFR, Mumbai, India 2016
- Simulating HI-H₂ transition in the ISM of local galaxies, IUCAA, Pune, India 2015
- Testing receiver systems of upgraded Giant Meter-wave Radio Telescope in interferometric mode, GMRT, National Center for Radio Astronomy, Pune, India 2014
- Detection of exoplanets from *Kepler* light curves, Presidency University, Kolkata, India 2013

TECHNICAL SKILLS

- Software and public code: Proficient in DS9, CIAO, XMM-SAS, HEASoft, and GBTIDL. Working knowledge in MIRIAD, MESA, SNEC, CLOUDY, VPFIT, and IRAS
- Coding: Proficient in python, pandas, and FORTRAN (F77, F90). Working knowledge in C, C++