Dr. Sapna Mishra

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RESEARCH INTEREST

• Galaxy evolution within the Local Group. • Diffuse gas in and around the Magellanic system. • Multiphase, extremely diffuse gas in the outskirts of galaxy clusters. • Gas inflows and outflows in and around the circumgalactic medium (CGM). • CGM of cluster galaxies and environmental effects such as ram-pressure stripping, overshooting, and pre-processing. • Strong outflows in broad absorption line quasars, including their blazar-like subclass. • Incidence rate (dN/dz) of intervening absorbers across different background sources. • Absorption line spectroscopy as a tool to probe diffuse gas across cosmic structures.

ACADEMIC POSITIONS

- **Postdoctoral Fellow, 2023–present**, Milky Way Halo research group, Space Telescope Science Institute (STScI), Baltimore, USA.
- **Postdoctoral Fellow, 2021–2023**, Inter-University Center for Astronomy & Astrophysics (IUCAA), Pune, India.
- **Post Thesis Submission Fellow, 2020–2021**, Aryabhatta Research Institute of observational sciencES (ARIES), Nainital, India.

EDUCATION

- **Ph. D, Astronomy, 2015 - 2020**, ARIES, Nainital, India. *Thesis: Probing environment of AGNs based on their feedback*; Advisor: Prof. Hum Chand.
- **Pre-Ph. D Course work in Astronomy, 2014 - 2015**, ARIES, Nainital, India.
- **Master of Science (MSc), Physics, 2012 - 2014**, Department of Physics & Astrophysics, Delhi University (DU), India.
- **Bachelor of Science (BSc), Physics honors, 2009 - 2012**, Miranda House College, DU, India.

RESEARCH GRANTS

- PI, HST Cy 33, GO + AR -18076 - Unveiling the Circumgalactic Medium of M33 (30 orbits).
- PI, HST Cy 33, GO + AR -18072 - The Fate of the Leading Arm of the Magellanic Stream (22 orbits).
- CoI, HST Cy 33, AR -18149 - Ionized Gas around the Small Magellanic Cloud.
- PI, HST Cy 32, GO - 17757 - Probing the front-side of the Circumgalactic Medium of the Large Magellanic Cloud (29 orbits, $\sim$ \$110K).
- 2024: Simon's foundation - support to attend a 2-week CGM workshop at Aspen, CO ($\sim$ \$3000).
- 2023: FONDECYT-2023 Chilean Prize fellowship (Program # 3230509).
- 2022: MILANO-BICOCCA, 2022, Italy, Research Grants type A2.

PROFESSIONAL & ACADEMIC SERVICE

- Reviewer, Space Telescope Science Institute Space Astronomy Summer Program (SASP), 2025.
- Panel Support Scientist, HST-TAC Cycle 33, Space Telescope Science Institute, 2025.
- Committee member for organizing Space Telescope Science Institute HotSci Colloquium Series 2024.
- Panel Support Scientist, JWST-TAC Cycle 3, Space Telescope Science Institute, 2024.
- Panel Support Scientist, HST-TAC Cycle 32, Space Telescope Science Institute, 2024.
- Served as a **service observer** at the Devasthal Optical Telescope (3.6m) during the COVID period, conducting observations on behalf of other proposers.

MENTORING, TEACHING & OUTREACH

- Co-mentoring junior undergraduate student Zhibin You at Johns Hopkins University (Feb 2025 – present).
- Co-mentored a PhD student on one of his thesis projects, contributing to a publication where I am the second author.

- Supervised two summer school Master's students for their dissertation projects focused on photometric and spectroscopic data reduction techniques (2017-2018).
- Provided hands-on training in optical data reduction at the ARIES Training School in Observational Astronomy (ATSOA), ARIES, Nainital, India (2016, 2017, 2018, 2019).
- Conducted training in high-resolution UVES spectral data reduction during the TMT Workshop on Large Telescope Data Handling, IUCAA, Pune, India (Jan 15–27, 2017).
- Delivered a public talks at various "Astronomy on Tap", Baltimore, and public lectures to undergraduates.
- Led public sky-gazing sessions using 1–2m class telescopes at ARIES and Devasthal observatories, India.
- Assisted incoming PhD students with telescope operations and observational techniques at ARIES, India.

TELESCOPE TIME AS PRINCIPLE INVESTIGATOR

- HST/COS Cy 33, 30 orbits, "Unveiling the Circumgalactic Medium of M33", (PID: GO + AR -18076).
- HST/COS, Cy 33, 22 orbits, "The Fate of the Leading Arm of the Magellanic Stream", (PID: GO + AR -18072).
- HST/COS, Cy 32, 29 orbits, "Probing the front-side of the Circumgalactic Medium of the Large Magellanic Cloud", (PID: GO-17757).
- ESO/FORS2, Cycle P109, "MgII tomography of cluster outskirts using 11 background quasars" (PID: 109.23G6).
- Devasthal Optical Telescope (DOT), 3.6m international telescope, India, DOT-2022-C1: "NIR spectroscopy of post-starburst galaxies to probe obscured star formation and stellar population" (PID: DOT-2022-C1-P18).
- DOT, DOT-2021-C1,"Probing connection between the emission and absorption outflows in IR-bright BAL quasars", PID: (DOT-2021-C1-P32).
- DOT, DOT-2018-C1, "Resolving the narrow emission line region of the quadruply imaged quasar: RXS J113155.4-123155" (PID: P325-2018A).
- DOT, DOT-2017-C1, "Infrared properties of the jet dominated BALQSOs" (PID: P31-2017A).
- Himalayan Chandra Telescope (HCT), 2m national telescope, India, HCT-2021-C2, "Probing the spectral variability of X-Ray bright high ionization Broad absorption line Quasars" (PID: HCT-2021-C2-P56).
- HCT, HCT-2021-C1: "Intranight monitoring of blazar counter parts of BAL quasars (PID: HCT-2021-C1-P52).
- HCT, 3 proposals in various cycles on "Probing environment of emerging Broad absorption line quasars" (PIDs: HCT-2020-C2-P27, HCT-2020-C1-P170, HCT-2019-C3-P117).

AWARDS

- 2023: FONDECYT-2023 Chilean Prize fellowship.
- 2022: MILANO-BICOCCA, 2022, Italy, Research Grants type A2.
- 2014: All India "Graduate Aptitude Test in Engineering" (GATE), India.
- 2012: All India "Joint Admission Test for Master (JAM)", India
- 2012: Selected as top 10% graduate level student in Delhi University.

SKILLS

• Observing Experience	$>$ 50 nights with 2-4m ground based Indian telescopes.
• Operating System	Linux: Ubuntu, Fedora; MACOS, Windows
• Programming Languages	`Python`, `IDL`, C, C++, `ecl−IRAF` script, Unix Shell−Scripts
• Web programming	`Php`, `mysql`, `HTML`
• External Plotting Tools	`Supermongo`, `GNUPLOT`
• Other Astronomy software	`IRAF`, `DAOPHOT`, `CLOUDY`, `Topcat`, `Esorex`, `Gasgano`, `vpfit`
• Written big dataset `SQL` casjob queries for	`SDSS`, `HST-MAST`, `SIMBAD`, `NED`

SCIENTIFIC PRESENTATIONS

- Space Telescope Science Institute, "HotSci Colloquium Series", July 2025.
- Montana State University, "XMCII: Milky Clouds over Yellowstone", May 2025.
- Space Telescope Science Institute, "Spring Symposium", May 2025, Poster/Flash Talk.
- Summer Conference 2025, Ninth Edition, May 2025 (Invited Talk).

- ACP, Aspen, "Holistic picture of CGM", September 2024.
- CfA, Harvard, "Multiphase Madness", August 2024.
- Space Telescope Science Institute, "Spring Symposium", April 2024.
- Flatiron Institute, "XMCI: Milky Clouds over Manhattan", February 2024.
- Space Telescope Science Institute, "Galaxy/AGN Journal Club", January 2024.
- Space Telescope Science Institute, "CoolSci", January 2024.
- IUCAA, India, "Galactic inflows and outflows on all Scales", February 2023
- Università Milano-Bicocca, Milan, "What matter(s) around galaxies", September 2022
- IUCAA, India, "Monthly Last Friday Talk series", January, 2022
- IISER, Tirupati, India, "Astronomical Society of India", March 2020, Poster.
- Department of Physics & Astrophysics, Delhi University, "Departmental Talk", October 2019 (Invited).
- IUCAA, India, "Recent Trends in the study of Compact Objects Theory and Observations (RETCO-IV)', April 2019, Poster.
- Institut d'Astrophysique de Paris(IAP), Paris, FR, "massive black holes in evolving galaxies: from quasars to quiescence", May 2018, Poster/Flash Talk.
- Dèpartement d'Astrophysique, Gèophysique, Universitè de Liège, Liège, Belgium, December 2017 (Invited).
- ARIES, India, "ARIES Training School in Observational Astronomy (ATSOA)", March 2018, March 2017, February 2016.
- ARIES, India, "Tuesday Seminar series", February 2017.
- IUCAA, India, "Thirty Meter Telescope (TMT) Conference", January 2017.
- ARIES, India, "Belgo-Indian Network for Astronomy and Astrophysics (BINA)", November 2016, Poster/Flash Talk.
- ARIES, India, "Tuesday Seminar series", May 2016.
- IUCAA, India, "Cloudy Workshop", September 2015.

Workshops and Schools

- AstroSat data analysis workshop, August 8-11, 2017, ARIES, Nainital, India
- TMT workshop on large telescope data handling, Jan 15-27, 2017 , IUCAA, Pune, India
- Extragalactic Relativistic Jets: Cause and Effect, FERMI satellite data reduction school, ICTS Bangalore; October 14-21, 2015
- Cloudy workshop, Sept 21-26, 2015, IUCAA, Pune, India
- Workshop on the radio data reduction, Radio Astronomy School-2015 (RAS), August 31, 2015, NCRA, Pune, India

List of publications

First-author publications

8. **Mishra, Sapna**; Fox, Andrew; Smoker, J; Lucchini, Scott; D'Onghia, Elena; 2025, ApJ, 984, 104, *"The Distance to the Magellanic Stream: Constraints from Optical Absorption along Stellar Sightlines"*.
7. **Mishra, Sapna**; Fox, Andrew; Krishnarao, Dhanesh; Lucchini, Scott; D'Onghia, Elena; Cashman, Frances; Barger, Kathleen; Lehner, Nicolas; Tumlinson, Jason, 2024, ApJ Letters, 976, L28, *"The Truncated Circum-galactic Medium of the Large Magellanic Cloud"*
6. **Mishra, Sapna**, Muzahid Sowgat, Dutta Sayak, Srianand, Raghunathan, Charlton, Jane, 2024, MNRAS, 527, 3858, *"Characterizing cool, neutral gas, and ionized metals in the outskirts of low-z galaxy clusters"*.
5. **Mishra, Sapna**, & Muzahid Sowgat, 2022, ApJ, 933, 229, *"Discovery of a Cool, Metal-rich Gas Reservoir in the Outskirts of $z \approx 0.5$ Clusters"*.
4. **Mishra, Sapna**, Gopal-Krishna, Chand H., Chand K., Kumar A., Negi V., 2021, MNRAS Letters, 2021, 507, 46, *"A search for blazar activity in broad-absorption-line quasars"*.
3. **Mishra, Sapna**, Vivek M., Chand H., Joshi R, 2021, MNRAS, 504, 3187, *"Appearance versus disappearance of broad absorption line troughs in quasars"*.
2. **Mishra, Sapna**, Krishna G, Chand H, Chand K, Ojha V, 2019, MNRAS Letters, 489, L42, *"Are there broad absorption line blazars?"*.
1. **Mishra Sapna**, Chand H, Krishna G, Joshi R., Shchekinov Y. A., Fatkhullin T. A., 2018, MNRAS, 473, 5154, *"On the incidence of MgII absorbers along the blazar sightlines"*.

Second-author publications

1. Kumar Ritish, **Mishra, Sapna**; Chand, Hum, 2025, MNRAS (under revision with first postive referee comments) *"On the incidence of weak and strong Mg II absorbers towards the Flat and Steep Spectrum Radio quasars"*.

Co-author publications[†]

5. Dutta, Sayak; Muzahid, Sowgat; Schaye, Joop; **Mishra, Sapna**; Chen, Hsiao-Wen; Johnson, Sean; Wisotzki, Lutz; Cantalupo, Sebastiano, 2024, MNRAS, 528, 3745, *"MUSEQuBES: mapping the distribution of neutral hydrogen around low-redshift galaxies"*.
4. Gopal-Krishna, Chand K., Chand H., Negi V., **Mishra, Sapna**, Britzen S., Bisht S., 2023, MNRAS, 518, 13, *"Intranight optical variability of low-mass active galactic nuclei: a pointer to blazar-like activity"*.
3. Kumar B., Negi V., Ailawadhi B., **Mishra, Sapna**, Pradhan B., Misra K., Hickson P., Surdej J., 2022, JAA, 43, 10, *"Upcoming 4m ILMT facility and data reduction pipeline testing"*.
2. Chand K., Gopal-Krishna, Omar A., Chand H., **Mishra, Sapna**, Bisht S., Britzen S, 2022, MNRAS, 511, 13, *"Intranight variability of ultraviolet emission from powerful blazars"*.
1. Ojha V., Chand H., Gopal-Krishna, **Mishra, Sapna**, Chand, K, MNRAS, 2020, 493, 3642, *"Comparative intra-night optical variability of X-ray and γ-ray detected narrow-line Seyfert 1 galaxies"*.

[†]: provided data analysis codes and mentored first authors in their application.

In preparation

1. Khaire, Vikram; **Mishra Sapna**; Pallikara Romeo; Narayanan Anand, (in prepration) *" Searching weak O VI absorption in the Intergalactic medium"*.

Conference Proceedings & GCN Circular

5. Vivek M.; Nair, Akhil; **Mishra, Sapna**, Proceedings IAU Symposium No. 378, 2024, *"AGN outflows and its variability"*

4. Kumar, Amit; Gupta, Rahul; Dastidar, Raya; Dimple; Ghosh, Ankur; **Mishra, Sapna**; et al. 2020GCN.29030, *"GRB 201203A: 1.3m DFOT, optical upper limits"*.

3. Kumar A., Aryan, A., Pandey S.B., **Mishra, Sapna**; et al. 2020GCN.27564, *"GRB 200412B: Optical afterglow detection with 1.3m DFOT"*.

2. **Sapna Mishra**, H. Chand, et al. 2018, Bulletin de la Société Royale des Sciences de Liège, 87, 325, *"Revisiting the incidence of Mg II absorbers along the blazar sightlines"*.

1. Hum Chand, Suvendu Rakshit, Priyanka Jalan, Vineet Ojha, Raghunathan Srianand, Mariappan Vivek, **Sapna Mishra** et al. 2018, Bulletin de la Soci1́été Royale des Sciences de Liège, 87, 291, *"Probing the central engine and environment of AGN using ARIES 1.3-m and 3.6-m telescopes"*.