Dr. Sapna Mishra

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RESEARCH INTERESTS • Galaxy evolution in the Local Group. • Circumgalactic Medium. • Study of Magellanic Clouds and Stream. • Satellite–host galaxy interactions and environmental effects. • AGN feedback (outflows and jets). • Quasar absorption line spectroscopy.

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**, **A**ryabhatta **R**esearch **I**nstitute of observational scienc**ES** (ARIES), Nainital, India.

EDUCATION

- **Ph. D, Astronomy, 2015 - 2020**, ARIES, Nainital, India. *Thesis: Probing Environment of AGNs Based on Their Feedback Processes*; 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

- **2025:** HST Cycle 33 (PI: Mishra), GO+AR–18076, *Funding* $\sim$ \$130K.
- **2025:**, HST Cycle 33 (PI: Mishra) GO+AR–18072, *Funding* $\sim$ \$120K.
- **2025:**, HST Cycle 33 (PI: Fox) AR–18149, *Funding* $\sim$ \$50K.
- **2024:**, HST Cycle 32 (PI: Mishra), GO–17757, *Funding* $\sim$ \$110K.
- **2024:** Simons Foundation Support to attend the CGM Workshop, Aspen Center for Physics; *Funding* $\sim$ \$3,000
- **2023:** FONDECYT Postdoctoral Fellowship 2023 (Chile) *Program #3230509, Funding* \$110400.
- **2022:** MILANO–BICOCCA Research Grant (Type A2) (Italy)

TELESCOPE TIME AS PRINCIPAL INVESTIGATOR

- **HST/COS (Cycle 33): 30 orbits**, *Unveiling the Circumgalactic Medium of M33*, *PID: GO+AR-18076*.
- **HST/COS (Cycle 33): 22 orbits**, *The Fate of the Leading Arm of the Magellanic Stream*, *PID: GO+AR-18072*.
- **HST/COS (Cycle 32): 29 orbits**, *Probing the Front-side of the Circumgalactic Medium of the Large Magellanic Cloud*, *PID: GO-17757*.
- **ESO/FORS2 (Cycle P109): 17 hours**, *Mg II Tomography of Cluster Outskirts Using 11 Background Quasars*, *PID: 109.23G6*.
- **Devasthal Optical Telescope (DOT, 3.6m, Cycle 22A): 2 Nights**, *NIR Spectroscopy of Post-starburst Galaxies to Probe Obscured Star Formation and Stellar Populations*, *PID: DOT-2022-C1-P18*.
- **DOT (Cycle 21A): 4 Nights**, *Probing the Connection Between Emission and Absorption Outflows in IR-bright BAL Quasars*, *PID: DOT-2021-C1-P32*.
- **DOT (Cycle 2018A): 16 Hours**, *Resolving the Narrow Emission-Line Region of the Quadruply Imaged Quasar RXS J113155.4-123155*, *PID: P325-2018A*.
- **DOT (Cycle 2017 A): 4 Nights**, *Infrared Properties of Jet-dominated BALQSOs*, *PID: P31-2017A*.
- **Himalayan Chandra Telescope (HCT, 2m, Cycle 21-C2): 3 Nights**, *Probing Spectral Variability of X-ray Bright High-ionization BAL Quasars*, *PID: HCT-2021-C2-P56*.

- **HCT (Cycle 21-C1):3.5 Nights**, *Intranight Monitoring of Blazar Counterparts of BAL Quasars*, *PID: HCT-2021-C1-P52.*
- **HCT (Multiple cycles): ≈ 12 Nights**, *Probing Environments of Emerging Broad Absorption Line Quasars*, *PIDs: HCT-2020-C2-P27; HCT-2020-C1-P170; HCT-2019-C3-P117.*

AS Co-INVESTIGATOR

- **NRAO/GBT (Cycle 26A): 370 hours** , *Mapping Cool Clouds in the Milky Way's Nuclear Wind*, *PID: GBT26A-224.*

PRESS RELEASE

- Mishra et al., 2024b research featured as a question on the **American TV quiz show Jeopardy** (Feb-12-2025).
- NASA's Hubble Sees Aftermath of Galaxy's Scrape with Milky Way.
- Hubble sees aftermath: Encounter blew away most of smaller galaxy's gaseous halo.

PROFESSIONAL & ACADEMIC SERVICE

- **Member**, AMERICAN ASTRONOMICAL SOCIETY.
- **Member**, Working Group on High-Resolution Multi-Object Spectrograph (HRMOS) for the VLT.
- **Reviewer**, Chambliss Student Poster Competition, 247th AAS Meeting (2026).
- **Reviewer**, Space Astronomy Summer Program (SASP), Space Telescope Science Institute (2025).
- **Panel Support Scientist**, HST Telescope Allocation Committee (HST–TAC), Cycle 33, STScI (2025).
- **Committee Member**, Organizing Committee for the STScI HotSci Colloquium Series (2024).
- **Panel Support Scientist**, JWST Telescope Allocation Committee (JWST–TAC), Cycle 3, STScI (2024).
- **Panel Support Scientist**, HST Telescope Allocation Committee (HST–TAC), Cycle 32, STScI (2024).
- **Service Observer**, Devasthal Optical Telescope (3.6m), conducted observations on behalf of external proposers during the COVID period.

MENTORING

- **Feb 2025 – present: Zhibin You**, Undergraduate student, Johns Hopkins University (USA) Undergraduate credit research project: *"Probing the Small-Scale Routly–Spitzer Effect in the Milky Way ISM."*
- **Aug 2025 – present: Khushi Mehta** (remote), Central University of Himachal Pradesh (India) Master's dissertation project: *"Probing the Circumgalactic Medium of Virgo Cluster Galaxies."*
- **2023 – 2025: Ritish Kumar** (remote), Central University of Himachal Pradesh (India) Graduate research project: *"On the Incidence of Weak and Strong Mg II Absorbers Toward Flat and Steep Spectrum Radio Quasars."*
- **2017 – 2018: Sri Devi** and **Parth Nair**, Master's students in Physics Summer dissertation projects: *"Photometric and Spectroscopic Variability of BAL Quasars."*

TEACHING & OUTREACH

- **Graduate-Level Instruction (IUCAA, India)** Taught three online graduate-course lectures on Astronomical Instruments (June 2022).
- **Lecturer, ARIES Training School in Observational Astronomy (ATSOA)** Delivered spectroscopy lectures (theory and observation) (2016, 2017, 2018, 2019).
- **Hands-on Data-Reduction Instructor, ATSOA** Provided 14-day intensive training in optical data reduction (2016–2019).
- **Instructor, TMT Workshop on Large Telescope Data Handling (IUCAA)** Conducted training in high-resolution UVES spectral data reduction (Jan 15–27, 2017).
- **Mentor for Incoming Ph.D. Students (ARIES, India)** Guided students in telescope operations, observing techniques, and data handling.

Outreach & Public Engagement

- Delivered invited **public talks** at "Astronomy on Tap" (Baltimore) and **undergraduate outreach lectures**.

- Led **public sky-gazing sessions** using 1–2m class telescopes at ARIES and Devasthal observatories, India.

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:** $\sim$ 100 nights with 1-4m ground based 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

- **2026:**
  - Galaxies and AGN Seminar and Journal Club, JHU & STScI, USA, 24-Feb, 2026 (invited).
  - Center for Particle Physics and Astronomy, Royal Holloway, University of London, 28-Jan, 2026 (invited).
  - 247th AMERICAN ASTRONOMICAL SOCIETY, Phoenix, Arizona, Jan 2026.
  - 247th AMERICAN ASTRONOMICAL SOCIETY, Phoenix, Arizona, Jan 2026 (Splinter).
- **2025:**
  - Aix Marseille Université institutes, "Workshop on the Network for Ultraviolet Astronomy", Oct 2025.
  - 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).
- **2024:**
  - 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.
- **2023:** IUCAA, India, "Galactic inflows and outflows on all Scales", February 2023
- **2022:**
  - Università Milano-Bicocca, Milan, "What matter(s) around galaxies", September 2022
  - IUCAA, India, "Monthly Last Friday Talk series", January, 2022.
- **Pre–2020:**
  - 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.
  - ARIES, India, "ARIES Training School in Observational Astronomy (ATSOA)", March 2019.

- Institut d'Astrophysique de Paris(IAP), Paris, FR, "massive black holes in evolving galaxies: from quasars to quiescence", May 2018, Poster/Flash Talk.
- ARIES, India, "ARIES Training School in Observational Astronomy (ATSOA)", March 2018.
- Dèpartement d'Astrophysique, Gèophysique, Universitè de Liège, Liège, Belgium, December 2017 (Invited).
- ARIES, India, "ARIES Training School in Observational Astronomy (ATSOA)", March 2019, 2018, March 2017, February 2016.
- ARIES, India, "Tuesday Seminar series", February 2017.
- IUCAA, India, "Thirty Meter Telescope (TMT) Conference", January 2017.
- ARIES, India, "ARIES Training School in Observational Astronomy (ATSOA)", March 2017.
- ARIES, India, "Belgo-Indian Network for Astronomy and Astrophysics (BINA)", November 2016, Poster/Flash Talk.
- ARIES, India, "ARIES Training School in Observational Astronomy (ATSOA)", March 2016.
- 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

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List of publications

First-author publications

1. **Mishra, Sapna**; Khaire, Vikram; Pallikara, Romeo; Narayanan, Anand; Fox, Andrew (under revision in ApJ) *"Discovery of Weak O VI Absorption in Underdense Regions of the Low-Redshift Intergalactic Medium"*.
2. **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"*.
3. **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"*.
4. **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"*.
6. **Mishra, Sapna**; Gopal-Krishna; Chand, H.; Chand, K.; Kumar, A.; Negi, V., 2021, MNRAS Letters, 507, 46, *"A search for blazar activity in broad-absorption-line quasars"*.
7. **Mishra, Sapna**; Vivek, M.; Chand, H.; Joshi, R., 2021, MNRAS, 504, 3187, *"Appearance versus disappearance of broad absorption line troughs in quasars"*.
8. **Mishra, Sapna**; Krishna, G.; Chand, H.; Chand, K.; Ojha, V., 2019, MNRAS Letters, 489, L42, *"Are there broad absorption line blazars?"*.
9. **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. † Zhibin, You; **Mishra, Sapna**; Fox, Andrew (to be submitted in ApJ) *"Probing the Small-Scale Routly-Spitzer Effect in the Milky Way ISM"*.

2. ‡ Fox, Andrew; **Mishra, Sapna**; Cashman, Frances; French, David; Richter, Philipp; Bordoloi, Rongmon; Lehner, Nicolas; Tumlinson, Jason; Borthakur, S., 2026, ApJ (accepted) *"Low Metallicity Gas on the Outskirts of the Local Group: the Circumgalactic Medium of Sextans B"*.

3. † Kumar, Ritish; **Mishra, Sapna**; Chand, Hum, 2025, MNRAS, 542, 119, *"On the incidence of weak and strong Mg II absorbers towards the Flat and Steep Spectrum Radio quasars"*.

Co-author publications

1. Lucchini, Scott; Han, Jess; **Mishra, Sapna**; Fox, Andrew; 2025 (submitted to ApJ), *"The LMC Corona as Evidence for a First Passage"*.

2. ‡ 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"*†

3. 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"*†

4. ‡ 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"*.

5. ‡ 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"*†

6. ‡ Ojha, V.; Chand, H.; Gopal-Krishna; **Mishra, Sapna**; Chand, K., 2020, MNRAS, 493, 3642, *"Comparative intra-night optical variability of X-ray and γ-ray detected narrow-line Seyfert 1 galaxies"*.

†: Primary mentor; ‡: Significant contribution in analysis/observation.

Conference Proceedings (refereed)

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

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 Sociĺété 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"*.