

AMISHA RANE

Ph.D. Student in Astrophysics | University of Oklahoma
Department of Physics and Astronomy, Norman, OK

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EDUCATION

PhD. in Astrophysics

University of Oklahoma, Norman, Oklahoma.

Concentrations: Extragalactic Astronomy

Research supervisor: Dr. Nicole Nielsen

Aug 2024 – Present

CGPA: 4.0/4.0

Master of Science in Physics

Western Illinois University, Macomb, Illinois.

Concentrations: Observational Radio Astronomy

Research supervisor: Dr. Esteban Araya

Aug 2022 – July 2024

CGPA: 4.0/4.0

P.G. Diploma in Computer Science and Applications

S.N.D.T Women's University, Mumbai, India.

Aug 2021 – Aug 2022

CGPA: 9.91/10

Bachelor of Science in Physics

Ramnarain Ruia, Mumbai, India.

May 2018 – May 2021

CGPA: 9.89/10

RESEARCH EXPERIENCE

Graduate Research Assistant, University of Oklahoma

Aug 2024 – Present

Focus: Circumgalactic medium kinematics, 3D biconical outflow modeling and the baryon cycle analysis for a galaxy pair ($z \approx 0.27$).

Data: Keck/KCWI IFU, VLT/UVES.

Research Assistant, Western Illinois University

Aug 2022 – Aug 2024

Focus: Molecular gas dynamics of jets and outflows in high-mass star-forming regions ('JOURNEY').

Data: Very Large Array (VLA) broadband and high-resolution spectra.

Undergraduate Researcher, Ramnarain Ruia

May 2018 – May 2021

Conducted foundational research in both experimental astrophysics and theoretical condensed matter physics.

Gravitational Waves and LIGO | Built a miniature physical model of the observatory to simulate wave detection.

Studies of DMS and RKKY Interactions | Conducted literature review on semiconductor behavior for spintronics applications.

Master's Thesis

- Dissertation Title: High-Spectral Resolution Observations of Molecular Lines Detected in a Broadband VLA Survey.
- Dissertation advisor : Dr. Esteban Araya.

TEACHING EXPERIENCE

Graduate Teaching Assistant, Department of Physics and Astronomy

Aug 2024 – Present

- Conducting discussion sections and grading for the course ASTR 1504 Introduction to Astronomy.
- Host of Star Party events conducted every week by Department of Physics and Astronomy, University of Oklahoma.
- Grading for the course ASTR 3113 Galactic Astronomy and ASTR 1523 Life in the Universe.

STUDENTS MENTORED

- * Mentored high school student Cade Rigg for his research project 'Kinematics of Ionized Gas in an OH Outflow Source' and poster presentation of the same title.
- * 2024 WISER (WIU IMSA Summer Explorations in Research) program: Mentored high school students Elsa Torres and Maneth Perera in the Introduction to Physics Research Methods research course. Course Goal: To investigate molecular maser radiation from the Orion Nebula by analyzing data from the VOLS (VLA Orion-A Large Survey).

PUBLICATIONS

REPORTS PUBLISHED

ngVLA Science - Molecular Gas at the Core of Ionized Jets

14th December, 2023

Esteban Araya, Emmanuel Sanchez-Tovar & Amisha Rane

Publisher: NRAO Newsletter

Webpage: <https://science.nrao.edu/enews/16.12/>

NASA ADS

243rd American Astronomical Society Meeting (AAS)

January 12th, 2024

*Nature of Methanol and Ammonia Lines Detected in VLA
Broad-Band Continuum Observations towards Ionized-Jet Candidates*

Publisher: Smithsonian Institution, NASA

Webpage: <https://ui.adsabs.harvard.edu/abs/2024AAS...24340216R/abstract>

244th American Astronomical Society Meeting (AAS)

June 12th, 2024

*Testing Non-LTE Codes to Model Methanol
Observations of Ionized Jets in High-Mass Star Forming Regions*

Publisher: Smithsonian Institution, NASA

Webpage: <https://ui.adsabs.harvard.edu/abs/2024AAS...24430209P/abstract>

PROFESSIONAL MEMBERSHIPS

American Astronomical Society:	Graduate Student Member, 2023.
American Physical Society:	Graduate Student, 2023.
Physics Club, Western Illinois University:	Vice President, 2023-24.

CONFERENCES AND POSTER PRESENTATIONS

Graduate Research Showcase

February 26th, 2026

Poster Presentation:

Norman, Oklahoma

Capturing the Baryon Cycle of Galaxies in action:

Exploring gas flows at $z \sim 0.27$

244th American Astronomical Society Meeting (AAS)

June 12th, 2024

Poster Presentation (Co-author):

Madison, Wisconsin

Testing Non-LTE Codes to Model Methanol

Observations of Ionized Jets in High-Mass Star Forming Regions

243rd American Astronomical Society Meeting (AAS)

Poster Presentation:

Nature of Methanol and Ammonia Lines Detected in VLA

Broad-Band Continuum Observations towards Ionized-Jet Candidates

January 12th, 2024

New Orleans, Louisiana

American Physical Meeting Prairie section (PSAPS)

Poster Presentation:

Molecular Line Observations of Ammonia and Methanol

towards Ionized-Jet Candidates.

November 30th, 2023

Columbia, Missouri

ISAS 2023 Annual Meeting, Bradley University.

Podium Presentation:

Finding the Optimal Spectral Resolution for Analysis of Molecular

Line Observations of a Sample of High-Mass Star Forming Regions

April 27th, 2023

Peoria, Illinois.

Natural Science Research Day 2023, Western Illinois University

Poster Presentation:

Molecular Line Observations of Ammonia and Methanol towards

Ionized-Jet Candidates.

April 8th, 2023

Macomb, Illinois.

Spring 2023 Meeting of ISAAPT, Knox College

Poster Presentation:

Molecular Line Observations of Ammonia and Methanol towards

Ionized-Jet Candidates.

March 25th, 2023

Galesburg, Illinois.

Graduate Research Conference, Western Illinois University

Podium Presentation:

Finding the Optimal Spectral Resolution for Analysis of Molecular

Line Observations of a Sample of High-Mass Star Forming Regions

March 3rd, 2023

Macomb, Illinois.

TECHNICAL SKILLS

Operating Systems: Mac OS/X, Windows and Linux.

Software Experience: Python, C++, Mathematica, Java, Advanced Excel, SQL.

Scientific Packages: pPXF, 3DBarolo, XS3D, GIM2D, kcorrect, GIM2D, CASA, Jetstream, Radex

Data Analysis: IFU data processing, velocity mapping, SED template fitting, galaxy photometry.

AWARDS AND HONORS

“Chairman’s Award for Comprehensive Accomplishments”

Department of Physics, Western Illinois University

May 2024

Macomb, Illinois

“Chairman’s Award for Excellence in Service”

Department of Physics, Western Illinois University

May 2024

Macomb, Illinois

“Outstanding Second Year Graduate Student Award”

Department of Physics, Western Illinois University

May 2024

Macomb, Illinois

“Outstanding First Year Graduate Student Award”

Department of Physics, Western Illinois University

May 2023

Macomb, Illinois

“Chairman’s Award for Excellence in Research”

Department of Physics, Western Illinois University

May 2023 & May 2024

Macomb, Illinois

“Women in Science”*Department of Physics, Western Illinois University*

May 2023

*Macomb, Illinois***“Third Place Graduate Poster”***National Research Science Day, Western Illinois University,*

April, 2023

*Macomb, Illinois***“Second Place Graduate Oral Presentation”***Physics, Astronomy and Maths Division, Bradley University*

March, 2023

*Peoria, Illinois***GRANTS AND FELLOWSHIP**

“Chun Lin Graduate Research Fellowship”*Department of Physics and Astronomy, University of Oklahoma*

May 2026

*Norman, Oklahoma***“Earl Zieger Sooner Heritage Scholarship”***Department of Physics and Astronomy, University of Oklahoma*

May 2026

*Norman, Oklahoma***“College of Arts and Sciences Harwell Scholarship”***Department of Physics and Astronomy, University of Oklahoma*

December 2025

*Norman, Oklahoma***“Quantum Technology Grad Fellow”***Department of Physics and Astronomy, University of Oklahoma*

August 2024

*Norman, Oklahoma***“2023-2024 Gladwyn Barrett Scholarship”***Department of Physics, Western Illinois University*

Dec 2023

*Macomb, Illinois***“ 2022-2023 Donald R. Bride Scholarship”***Department of Physics, Western Illinois University*

Nov 2022

*Macomb, Illinois***“Introductory Summer School for Astronomy and Astrophysics”***IUCAA*

May 2021

*Pune, India***OUTREACH ACTIVITIES**

‘AstroNight’ events, Assistant Organizer*Tasks: Setting up the manual and technologically advanced telescopes and managing the crowd attending the event.***‘Star Party’ events, Host***Tasks: Handling technologically advanced telescopes and the people attending the event.***‘Exploring Upcoming Eclipses’***Guided High-School Students on Computer-based activity exploring upcoming eclipses at Western Illinois University.***‘Lewistown Middle-School Visit’***Guided High-School Students on the use of Solar telescopes at Western Illinois University.***‘Science Olympiad’***Created tests for two sections ‘Solar System’ and ‘Astronomy’ for Junior and High school student teams.***‘Oklahoma Arts Institute Retreat at Quartz Mountain.’***Volunteered for stargazing event at Quartz mountain.*