

SATYAJEET MOHARANA

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RESEARCH INTEREST

Star Formation - Molecular Clouds - Filaments and Dense Cores - Gas Kinematics

EDUCATION

KASI UST, Republic of Korea <i>PhD Student</i> Supervisor: Prof. Chang Won Lee Thesis: Early Forming Processes of Dense Cores and Filaments in Various Environments	Sept 2024 - Present GPA: 4.35/5.00
Indian Institute of Astrophysics, Bengaluru, India <i>Research Dissertation</i> Supervisor: Prof. Gajendra Pandey Thesis: Helium Abundance of the Sun: A Spectroscopic Analysis	June 2023 - Aug 2024
Indian Institute of Science Education and Research, Berhampur, India <i>BS-MS Dual Degree</i> Major: Physical Sciences; Minor: Computer Science	Aug 2019 - July 2024 CPI: 9.4/10.0

PUBLICATIONS

Lead-authored

- TRAO-FUNS IV. Filaments and Dense Cores in the W40 and Serpens South Regions of Aquila** *ApJ*
S. Moharana et al., ApJ, 997, 117 (2026)
- Helium Abundance of the Sun: A Spectroscopic Analysis** *ApJ*
S. Moharana et al., ApJ, 974, 312 (2024)

Co-authored

- ATOMS-QUARKS Survey: Inflow and Infall in Massive Protocluster G318.049+00.086 – Evidence of Competitive Accretion** *ApJ*
S. Gupta et al. (incl. S. Moharana), ApJ, 999, 180 (2026)

ACCEPTED OBSERVING PROPOSALS (PI)

- 2025.1.00929.S:** Unveiling the Origin and Formation of Velocity-Coherent Filaments in the Serpens South Hub-Filament Region **ALMA, Cycle 12**
- R25AP003 & M26AP010:** The Formation of Filamentary Cloud and Dense Cores in the Filament: Probing Accretion, Infall, and Turbulent Dissipation **JCMT, Cycle 25A & 26A**

RESEARCH PROJECTS

- Filaments and dense cores in Serpens South Hub-Filament System** **July 2025 - June 2026**
PhD, Supervisor: Prof. Chang Won Lee, KASI

- Analyzed JCMT C¹⁸O (2–1) and Nobeyama N₂H⁺ (1–0) observations to characterize velocity-coherent filaments, dense cores, and hub structure in the Serpens South molecular cloud.
 - Derived the physical properties of filaments and dense cores, including gravitational stability, velocity gradients, longitudinal mass flows, nonthermal motions, hub-scale infall, and the CMF.
- 2. Filaments and dense cores in Aquila molecular cloud complex** **Sep 2024 - July 2025**
PhD, Supervisor: Prof. Chang Won Lee, KASI
- Analyzed TRAO C¹⁸O and N₂H⁺ (1–0) observations to identify velocity-coherent filaments and embedded dense cores in the W40 and Serpens South regions of Aquila.
 - Measured filament stability, longitudinal mass accretion, velocity gradients, and nonthermal motions to investigate the dynamical evolution of filamentary molecular clouds.
- 3. Hydrogen-deficient Carbon (HdC) stars** **Jan 2024 - Aug 2024**
MS Thesis, Supervisor: Prof. Gajendra Pandey, IIA Bengaluru
- Reduced and analyzed near-infrared spectra obtained with TANSPEC on the 3.6-m Devasthal Optical Telescope to investigate candidate hydrogen-deficient carbon stars.
 - Derived carbon and oxygen isotopic abundance ratios from CO rovibrational band heads to identify potential hydrogen-deficient carbon stars.
- 4. Solar photospheric helium abundance** **June 2023 - Jan 2024**
MS Thesis, Supervisor: Prof. Gajendra Pandey, IIA Bengaluru
- Performed high-resolution spectroscopic abundance analysis of Mg and C using atomic and molecular features in the solar photosphere.
 - Constrained the solar photospheric He/H ratio through one-dimensional LTE spectral modeling using MgH, CH, C₂ Swan, Mg I, and C I lines.

CONFERENCES

Oral Presentations

- 1. IAUS412: Hub-Filament Structures in Star Formation** **Nov 30–Dec 4, 2026**
JCMT-SURFING. Unveiling Velocity-Coherent Filaments and Dense Cores in Serpens South Hub-Filament System *Mysuru, India*
- 2. Chemical and Dynamical Properties of Prestellar Cores** **June 8–12, 2026**
Multi-scale View of Filaments and Dense Core Formation in the Serpens South Molecular Cloud with TRAO and JCMT *Kyushu University, Japan*
- 3. 61st 2026 KAS Spring Meeting** **April 8–10, 2026**
JCMT-SURFING. Unveiling Velocity-Coherent Filaments and Dense Cores in Serpens South Hub-Filament System *Suwon, Republic of Korea*
- 4. 2025 JCMT Users Meeting** **June 30–July 4, 2025**
TRAO-FUNS IV. Filaments and Dense Cores in W40 and Serpens South Regions of Aquila *Chiang Mai, Thailand*
- 5. 60th 2025 KAS Spring Meeting** **April 9–11, 2025**
TRAO-FUNS IV: Filaments and Dense Cores in W40 and Serpens South Regions of Aquila *Gyeongju, Republic of Korea*

Poster Presentations

- 1. Perspectives in Star Formation – Senior Insights, Young Visions** **Oct 13–17, 2025**
TRAO-FUNS IV. Filaments and Dense Cores in Aquila *Shanghai, China*

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| 2. 2025 EA ALMA Science Workshop
<i>TRAO-FUNS IV. Filaments and Dense Cores in Aquila</i> | Sept 22–24, 2025
<i>Kagoshima University, Japan</i> |
| 3. 42nd Annual Meeting of the ASI – 2024
<i>Helium Abundance of the Sun: A Spectroscopic Analysis</i> | Jan 31–4 Feb, 2024
<i>IISc, India</i> |

Professional Development

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| 1. 2026 ALMA Summer School
<i>ALMA Polarisation</i> | July 27–31, 2026
<i>KASI</i> |
| 2. 2026 ALMA Proposal Preparation Workshop
<i>Discussions on ALMA Proposal</i> | Feb 2–6, 2026
<i>KASI</i> |
| 3. 2025 EA ALMA Data Analysis Workshop
<i>ALMA Data Combination</i> | Sept 25–26, 2025
<i>Kagoshima University, Japan</i> |
| 4. 2025 ALMA Summer School
<i>ALMA Data Combination</i> | July 28–Aug 1, 2025
<i>Sobaeksan Observatory, Republic of Korea</i> |
| 5. 2025 ALMA Proposal Preparation Workshop
<i>Discussions on ALMA Proposal</i> | Jan 13–17, 2025
<i>KASI</i> |

TECHNICAL EXPERTISE

- **Programming**
Python (emcee, NumPy, SciPy, Astropy, Pandas, Matplotlib), MATLAB, Java, C
- **Astronomical Software/Algorithms**
CASA, Starlink, *getsf*, CARTA, SAOImage DS9, IRAF
- **Data Analysis**
Radio interferometric data reduction & imaging, Single-dish data reduction, Polarimetry, Spectroscopic abundance analysis
- **Observational Data Experience**
Interferometer (ALMA), single-dish (JCMT, TRAO, Nobeyama, *Herschel*), optical/NIR spectroscopy (DOT)

AWARDS & HONORS

- UST Outstanding Research Assistant Allowance (2026, Spring Semester)
- Selected for the PhD Program at KASI (2024 Fall Semester)
- Graduate Aptitude Test in Engineering (GATE), Physics, 2024
- IASc-INSa-NASi Summer Research Fellowship Program – 2022
- INSPIRE Fellowship (2019–2024), Department of Science & Technology (DST), Government of India
- Qualified IISER Aptitude Test (IAT), 2019; admitted to the BS-MS Program at IISER Berhampur

SERVICE & OUTREACH

- Journal Club Manager, UST-KASI Student Council, 2026
- Volunteer, National Science Day Outreach Activities, Indian Institute of Astrophysics, 2024
- Volunteer, Public Telescope Observing Sessions, Indian Institute of Astrophysics & IISER Berhampur
- Astronomy Outreach Activities for School Students, IISER Berhampur, 2021–2023
- Organized and coordinated cultural events at IISER Berhampur