Curriculum Vitae

Dr. SOMNATH DUTTA

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EDUCATION & BACKGROUND

Academia Sinica Institute of Astronomy and Astrophysics — **Jul 2023 – present**
Support Scientist — *Taiwan*

Academia Sinica Institute of Astronomy and Astrophysics — **Apr 2019 – Jun 2023**
Post Doc — *Taiwan*

Indian Institute of Science Education and Research — **Nov 2018 – Mar 2019**
Post Doc — *Tirupati, India*

S N Bose National Centre for Basic Sciences — **Aug 2017 – Jul 2018**
Extended Senior Research fellow — *Kolkata, India,*

S N Bose National Centre for Basic Sciences — **Aug 2012 – July 2017**
PhD Student — ***Kolkata, India***

Language and skills

- **Computer Languages:** Python, C
- **Language:** English (fluent), Bengali (native), Hindi (fluent)
- **Softwares:** CASA, CARTA, IRAF, TOPCAT, DS9

RESEARCH INTERESTS

- *Star Formation, Outflows, Jets, Planet Formation, Star cluster formation, Variable stars, Transient objects.*
- *Instrumentation on Fast Radio Burst (FRB) detection and localization of their origin*

Key Projects

- **The BURSTT project (400-800 MHz)** is an instrumentation project aimed at detecting and localizing fast radio bursts.
- **Millimeter/submillimeter (**220-360 GHz), which is an Atacama Large Millimeter/submillimeter Array (ALMA) project focused on studying dense core, young protostellar jets, and planet formation.
- **Multiwavelength (submillimeter, Radio, Infrared)**, which aims to study star formation and the time-series variability of protostars.

PUBLICATIONS

First Author

1. "ALMA Survey of Orion Planck Galactic Cold Clumps (ALMASOP): Molecular Jets and Episodic Accretion in Protostars" **Dutta S.,** Lee C.-F., Johnstone D., and ALMASOP collaboration, 2024, Astronomical Journal, 167, 72; DOI 10.3847/1538-3881/ad152b
2. "ALMA Survey of Orion Planck Galactic Cold Clumps (ALMASOP): Evidence for a Molecular Jet Launched at an Unprecedented Early Phase of Protostellar evolution", **Dutta S.**, Lee C.-F., Hirano N., Liu T., Johnstone D., Liu S.-Y., Tatematsu K., et al., 2022b, The Astrophysical Journal, volume 931, page 130, https://doi.org/10.3847/1538-4357/ac67a1
3. "ALMA Survey of Orion Planck Galactic Cold Clumps (ALMASOP): Detection of a dense SiO jet in the evolved protostellar phase", **Dutta S.**, Lee Chin-Fei, Johnstone Doug, Liu Tie, Hirano Naomi, Liu Sheng-Yuan, et al., The Astrophysical Journal, 2022a, volume 925, page 11. doi:10.3847/1538-4357/ac3424
4. "ALMA Survey of Orion Planck Galactic Cold Clumps (ALMASOP) II. Survey overview: a first look at 1.3 mm continuum maps and molecular outflows", **Dutta S.,** Lee Chin-Fei, Liu Tie, Hirano Naomi, Liu

Sheng-Yuan, Tatematsu Ken'ichi, Kim Kee-Tae, et al., 2020, The Astrophysical Journal Supplement Series, vol. 251, page. 20, doi:10.3847/1538-4365/abba26

5. "Optical photometric variable stars towards Cygnus OB7", **Dutta S.**, Mondal S., Joshi S., Das RK., Monthly Notices of the Royal Astronomical Society, 2019, vol. 487, page. 1765 (DOI:10.1093/mnras/stz1385)
6. "The Planck Cold Clump G108. 37-01.06: A Site of Complex Interplay between H II Regions, Young Clusters, and Filaments", **Dutta S.**, Mondal S., Samal MR., Jose J., The Astrophysical Journal, 2018b, vol. 864, page. 154 (DOI:10.3847/1538-4357/aadb3e)
7. "Optical photometric variable stars towards the Galactic H II region NGC 2282", **Dutta S.**, Mondal S., Joshi J., Jose J., Das RK., Ghosh G., Monthly Notices of the Royal Astronomical Society, 2018a, vol. 476, page. 2813, (DOI:10.1093/mnras/sty329)
8. "The young cluster NGC 2282: a multiwavelength perspective", **Dutta S.,** Mondal S., Jose J., Das RK., Samal MR., Ghosh S., Monthly Notices of the Royal Astronomical Society, 2015, vol. 454, page. 3597 (DOI:10.1093/mnras/stv2190)

Co-Author

9. "The First Ka-band (26.1–35 GHz) Blind Line Survey toward Orion KL", Liu X., Liu T., Shen Z., including **Dutta S.**, et al., 2024, ApJS, 271, 3. doi:10.3847/1538-4365/ad1601
10. "Understanding the relative importance of magnetic field, gravity, and turbulence in star formation at the hub of the giant molecular cloud G148.24+00.41", Rawat V., Samal M.~R., et al., including **Dutta, S.** 2024, MNRAS.tmp. doi:10.1093/mnras/stae053
11. "The Giant Molecular Cloud G148.24+00.41: Gas Properties, Kinematics, and Cluster Formation at the Nexus of Filamentary Flows", Rawat V., Samal M.~R., et al., including **Dutta, S.** 2024, MNRAS.tmp. doi:10.1093/mnras/stae060
12. "ALMA Survey of Orion Planck Galactic Cold Clumps (ALMASOP): Discovery of an Extremely Dense and Compact Object Embedded in the Prestellar Core G208.68-19.92-N2", Hirano N., Sahu D., Liu S.-Y., Liu T., Tatematsu K., **Dutta S.,** Li S., et al., 2024, ApJ, 961, 123. doi:10.3847/1538-4357/ad09e2
13. "ALMA Survey of Orion Planck Galactic Cold Clumps (ALMASOP): The Warm-envelope Origin of Hot Corinos", Hsu, Shih-Ying including **Dutta, Somnath,** 2023, 956, 120. doi: 10.3847/1538-4357/acefcf
14. "ALMA Survey of Orion Planck Galactic Cold Clumps (ALMASOP): A forming quadruple system with continuum 'ribbons' and intricate outflows", Luo, Qiu-yi ; Liu, Tie including Dutta, S. et al., 2023, Astrophysical Journal Letters, 952, 2, DOI: 10.3847/2041-8213/acdddf
15. "ALMA Survey of Orion Planck Galactic Cold Clumps (ALMASOP): Density Structure of Centrally Concentrated Prestellar Cores from Multiscale Observations", Sahu D., Liu S.-Y., including Dutta, S. et al., 2023, The Astrophysical Journal, 945, 156 (DOI: 10.3847/1538-4357/acbc26
16. "A Q-band line survey towards Orion KL using the Tianma radio telescope", Liu, Xunchuan; including Dutta Somnath, 2022 ApJS, volume 263, page 13; DOI 10.3847/1538-4365/ac9127
17. "ALMA Survey of Orion Planck Galactic Cold Clumps (ALMASOP): How do dense core properties affect the multiplicity of protostars?" Luo Qiu-yi, including Dutta S., et al., 2022, The Astrophysical Journal, volume 931, page 158, impact factor: 5.874, https://doi.org/10.3847/1538-4357/ac66d9
18. "Nobeyama Survey of Inward Motions toward Cores in Orion Identified by SCUBA-2", Tatematsu K., Yeh Y.-T., Hirano N., Liu S.-Y., Liu T., **Dutta S.**, Sahu D., et al., 2022, The Astrophysical Journal, vol. 931, page 33, https://doi.org/10.3847/1538-4357/ac6100
19. "ALMA Survey of Orion Planck Galactic Cold Clumps (ALMASOP): Deriving Inclination Angle and Velocity of the Protostellar Jets from their SiO Knots" Kai-Syun Jhan, including Dutta S., et al., 2022, The Astrophysical Journal Letters, vol. 931, page. L5, https://doi.org/10.3847/2041-8213/ac6a53
20. ATOMS: ALMA Three-millimeter Observations of Massive Star-forming regions -- VIII. A search for hot cores by using C2H5CN, CH3OCHO and CH3OH lines, Qin, Sheng-Li; including **Dutta**, S., et al., 2022, Monthly Notices of the Royal Astronomical Society, vol. 511, page. 3463. doi:10.1093/mnras/stac219
21. "ALMA Survey of Orion Planck Galactic Cold Clumps (ALMASOP): A Hot Corino Survey toward Protostellar Cores in the Orion Cloud", Hsu, Shih-Ying; including **Dutta S.**, et al., 2022, The Astrophysical Journal, vol. 927, page 218. doi:10.3847/1538-4357/ac49e0

22. "A Comprehensive Study of the Young Cluster IRAS 05100+3723: Properties, Surrounding Interstellar Matter, and Associated Star Formation ", Yadav R.~K., Samal M.~R., Including **Dutta S.,** et al. 2022, The Astrophysical Journal, vol. 926, page 16. doi:10.3847/1538-4357/ac3a78
23. "ATOMS: ALMA Three-millimeter Observations of Massive Star-forming regions -- V. Hierarchical fragmentation and gas dynamics in IRDC G034.43+00.24", Liu, Hong-Li, including **Dutta** S., et al. 2022, Monthly Notices of the Royal Astronomical Society, vol. 510, page 5009. doi:10.1093/mnras/stab2757
24. "The JCMT Transient Survey: Four Year Summary of Monitoring the Submillimeter Variability of Protostars", Lee Yong-Hee, including **Dutta** S., et al. 2021, The Astrophysical Journal, vol. 920, page 119. doi:10.3847/1538-4357/ac1679
25. "Planck Galactic Cold Clumps at High Galactic Latitude-A Study with CO Lines", Xu Fengwei, including **Dutta S.,** et al., 2021, The Astrophysical Journal, vol. 920, page 103. doi:10.3847/1538-4357/ac1686
26. "Molecular Cloud Cores with High Deuterium Fractions: Nobeyama Mapping Survey", Tatematsu, K., including **Dutta S.,** et al. 2021, The Astrophysical Journal Supplement Series, vol. 256, page. 25.
27. "Spectroscopic and photometric monitoring of a poorly known high-luminous OH/IR star: IRAS 18278+0931", Ghosh S., Mondal S., Das R., **Dutta S.,** 2021, The Astronomical Journal, vol. 161, page 198. doi:10.3847/1538-3881/abe544
28. "ALMA Survey of Orion Planck Galactic Cold Clumps (ALMASOP): Detection of Extremely High-density Compact Structure of Prestellar Cores and Multiple Substructures Within", Sahu D., Liu S.-Y., Liu T., including **Dutta S.,** et al., 2021, The Astrophysical Journal, vol. 907, page L15, doi:10.3847/2041-8213/abd3aa
29. "Sustaining Star Formation in the Galactic Star Cluster M 36?" Panja A., Chen W.~P., **Dutta S.,** Sun Y., Gao Y., Mondal S., 2021, The Astrophysical Journal, volume 910, page 80. doi:10.3847/1538-4357/abded4
30. "Fast photometric variability of very low mass stars in IC 348: detection of superflare in an M dwarf", Ghosh S., Mondal S., **Dutta S.,** Das R., Joshi S., Lata S., Khata D., et al., 2021, Monthly Notices of the Royal Astronomical Society, vol. 500, page. 5106, doi:10.1093/mnras/staa3574.
31. "Census of the Young Stellar Population in the Galactic H II Region Sh2-242", Panja A., Mondal S., **Dutta S.,** Joshi S., Lata S., Das RK., 2020, The Astronomical Journal, vol. 159, page. 153 (DOI:10.3847/1538-3881/ab737a)
32. "ALMA Survey of Orion Planck Galactic Cold Clumps (ALMASOP): I. Detection of New Hot Corinos with ACA" Hsu SY., Liu S.-Y., including **Dutta S.,** et al. 2020, volume 898, page 107, The Astrophysical Journal (DOI:10.3847/1538-4357/ab9f3a)
33. "Phase-dependent Photometric and Spectroscopic Characterization of the MASTER-Net Optical Transient J212444. 87+ 321738.3: An Oxygen-rich Mira", Ghosh S., Mondal S., Das R., Banerjee DPK., Ashok NM., Hambsch, FJ., **Dutta S.,** The Astronomical Journal, 2018, volume 155, page 216, (DOI:10.3847/1538-3881/aab902)

Successful Telescope Proposals

Sub-millimeter Observations:

ALMA: ----------

2022.1.01437.S : **(PI)** Jet launching Scenario at the early phase of protostars
2022.1.00514.S: (Co-I) Searching for complex organic molecules in Orion cold cores
2021.2.00094.S: (Co-I) Searching for complex organic molecules in Orion cold cores
2021.1.00723.S: (Co-I) Probing the physical condirtion of the extremely high density prestellar core G208.68-19.20-N2
2021.1.00546.S: (Co-I) Unveiling the kinematics of a highly dense prestellar core with substructures at 1000 au scale
2018.1.00302.S:(Delegee) Fragmentation and substructures of dense cores close to the onset of star formation in the Orion complex

JCMT: ----------

M21AP040: **(PI)** Mapping B-field structure around the protostellar system HH 212

M22BP055: (Co-PI) Understanding the role of magnetic field in the formation and stability of dense clumps in massive molecular clouds

M21BP061: (Co-PI) Understanding star formation in elephant trunk-like structures: a pilot study with SCUBA-2

M20BP035: (Co-PI) Understanding star formation in elephant trunk-like structures: a pilot study with SCUBA-2

M20AL006: (Co-PI) Submilimeter Polarization And Chemistry in Earliest star formation (SPACE)

M20AL007: (Co-PI) The JCMT Transient Survey: Fainter Objects, Higher Masses, Longer Timescales

SMA: ----------

2019B-A005: **(PI)** Mapping B-field structure in the envelope of the protostellar system HH 111

2019B-A007 (Co-PI) Magnetic fields in the central regions of prestellar cores

Optical and Near Infrared: (Indian National Facilities)

3.6-m DOT ARIES, India:	2021	8 hours	(Project PI: Somnath Dutta; Proposal PI: S. Joshi)
2m-HCT, IIA, India:	2013-2016	20+ nights	(PI: Somnath Dutta)
1.3m DFOT, ARIES, India:	2014-2015	14+ nights	(PI: Somnath Dutta)
1.04m ST, ARIES, India:	2014	5+ nights	(PI: Somnath Dutta)
1.2m Mt. Abu, India:	2013	7 nights	(Co-PI: Somnath Dutta)

ACADEMIC SOCIETY AND CONTRIBUTIONS

- **Member of "JCMT Time Allocation Committee (TAC)"**, 2021 – 2024 (Six Semester)
- **Life member of Astronomical Society Of India:** Membership number L2444
- **Thesis defense committee:** Two Master students' Thesis (2021, 2023),
- **Journal Reviewer:** Nature Astronomy, The Astrophysical Journal Supplement Series (ApJS), The Astrophysical Journal Letters (ApJL), Monthly Notice of Royal Astronomical Society (MNRAS), Astronomy & Astrophysics (A&A)
- **Telescope Proposal Reviewer:** ALMA observations proposals, JCMT observations proposals (JCMT TAC member), 3.6 m DOT (India)

ACHIEVEMENTS AND AWARDS

@ Employment as Support scientist for data processing and instrument calibration, 2023 to present

@ Post Doc Fellowship at ASIAA, Taiwan, April 2019 – present

@ Post Doc Fellowship at IISER-Tirupati, India, 2018-2019

@Awarded eSRF, SRF and JRF Fellowships at S. N. Bose Centre, Kolkata 2017-2018

ACADEMIC REFEREES

Dr. Ue-Li Pen
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