DR. LITON MAJUMDAR

CONTACT INFORMATION **(Reach me at)**

Reader-F
National Institute of Science Education and Research (NISER)
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Exoplanets and Planetary Formation Group
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RESEARCH INTERESTS

(Exo)-Planet Formation
Exoplanets and their Atmospheres & Interiors
Molecular Astrophysics/Astrochemistry

EDUCATION

Ph.D., Astronomy & Astrophysics, November 2014, University of Calcutta, Kolkata, West Bengal, India

Post M.Sc., Astronomy & Astrophysics, 2010, Grade A, S. N. Bose National Centre for Basic Sciences, Kolkata, West Bengal, India

M.Sc., Physics, 2009, 1st Class, University of Calcutta, Kolkata, India

B.Sc. (Honours), Physics, 2007, 1st Class, University of North Bengal, West Bengal, India

PROFESSIONAL APPOINTMENTS

Reader-F — 1 July 2021 to Present
Exoplanets and Planetary Formation Group
National Institute of Science Education and Research (NISER), India

Assistant Professor — 24 June 2019 to 30 June 2021
Exoplanets and Planetary Formation Group
National Institute of Science Education and Research (NISER), India

NASA Post Doctoral Program Fellow — 10 July 2017 to 23 June 2019
Interstellar and Heliospheric Physics group (3263)
NASA Jet Propulsion Laboratory, USA
California Institute of Technology

CNRS Post Doctoral Researcher — Dec 2014 to June 2017
Laboratoire d'astrophysique de Bordeaux
University of Bordeaux, France

VISITING APPOINTMENTS

Visiting Scientist 24 June 2019 to 30 Sep 2022
Interstellar and Heliospheric Physics group (3263)
NASA Jet Propulsion Laboratory, USA
California Institute of Technology

Visiting Associate 1 August 2020 to Present
Inter-University Centre for Astronomy and Astrophysics (IUCAA)
Pune, India

HONOURS, AWARDS AND FELLOWSHIPS

- Visiting Researcher Fellowship, Leverhulme Centre for Life in the Universe (LCLU), University of Cambridge, UK, December 2023.
- Fellow of the Royal Astronomical Society (FRAS)
- Visiting Associate of the IUCAA, Pune, India
- Regular Member of SKA India Consortium (SKAIC), NCRA-TIFR, Pune, India, August 2020 to present —
- Registered Faculty Member of the Homi Bhabha National Institute (HBNI) in Physical Sciences, August 2019 to present —
- Ramanujan Fellowship, Science and Engineering Research Board (SERB), Department of Science and Technology (DST), Government of India in 2019
- The ALMA Ambassador, North American ALMA Science Center (NAASC), National Radio Astronomy Observatory (NRAO), USA in 2019
- International Astronomical Union (IAU) Grant to attend the IAUS 350 in Cambridge, United Kingdom in 2019
- Thirty Meter Telescope (TMT) Early-Career Initiative Researcher in 2018
- NASA Post Doctoral Program Fellowship in 2017
- Post Doctoral Fellowship (3 yrs), Niels Bohr Institute, University of Copenhagen, Denmark in 2017 (Offer Declined)
- Post Doctoral Fellowship (3 yrs), Instituto de Ciencia de Materiales de Madrid (ICMM), Consejo Superior de Investigaciones Científicas (CSIC), Madrid, Spain in 2017 (Offer Declined)
- CNRS Post Doctoral Fellowship under the European Research Council Grant 3DICE, France in 2014
- The Committee on Space Research (COSPAR) Grant to attend the COSPAR Assembly in Moscow, Russia in 2014
- International Astronomical Union (IAU) Grant to attend the IAU General Assembly XXVIII in Beijing, China in 2012
- Grant Recipient Ph.D. Student, 39th COSPAR Scientific assembly in Mysore, India in 2012
- International Astronomical Union (IAU) Grant to attend the IAU SYMPOSIUM 280 in Toledo, Spain in 2011
- Qualified in GATE Examination
- Qualified in JEST Examination
- Swami Krishnamayananda Award, Ramakrishna Mission Residential College (Autonomous) (Ranked 15 in the list of best colleges in India by NIRF in 2019), Narendrapur, Kolkata, India for best academic performances during all four semesters of M.Sc

- Gold Medal, Ramakrishna Mission Residential College (Autonomous), Narendrapur, Kolkata, India for securing first class first position in M.Sc

GRANTS AWARDED AS A PRINCIPAL INVESTIGATOR (PI)

- **NASA ROSES Emerging Worlds Program (EW) Grant 2018 (18-EW18-2-0083):** "Following the multi-isotope trail to understanding the formation and early evolution of our Solar System" —171,928 USD for Year 1; 143,397 USD for Year 2; 190,870 USD for Year 3 (2019-2021) **(Total-3.6 Crores in INR)**.

- **NASA SOFIA Cycle 7 Priority 1 Observing Proposal Grant 2018 (07-0070 (US))**: "Where is the Water?" —72,700 USD for one year **(Total- 50 Lakhs in INR)**.

- **NSF ALMA Ambassador Program Grant 2019**: The North American ALMA Science Center (NAASC) selected me as an ALMA Ambassador 2019 and a 10,000 USD monetary grant was offered in support of my independent research program as well **(Total-7 Lakhs in INR)**.

- **DST/SERB Ramanujan Grant 2019 (SB/S2/RJN-009/2019)**: "Tracing the Ingredients for a Habitable Earth from Interstellar Space through Planet formation: Exo-planets, Star and Planet formation" Eligible for a fellowship grant of Rs.1,35,000/- per month (including HRA component), research grant of Rs.7,00,000/- p.a and overheads of Rs.60,000/- p.a for 5 years **(Total-1.19 Crores in INR)**.

- **DST/SERB Start-up Research Grant (SRG) 2021 (SRG/2021/002116)**: "The formation and evolution of complex organic molecules in extraterrestrial environments: Exploring the role of molecular astrophysics in the origin of life", research grant of Rs. 21,70,344/- for 2 years **(Total- 21.70 Lakhs in INR)**.

- **DST/SERB Mathematical Research Impact Centric Support (MATRICS) 2022 (MTR/2021/000864)**: "Measurement of Dust Growth in Protoplanetary Disks: Understanding the Origins of Planet Formation", research grant of Rs. 2,00,000/-p.a and overheads of Rs. 20,000-p.a for 3 years **(Total- 6.6 Lakhs in INR)**.

- **Breakthrough Listen Funding (University of Oxford, UK) 2024 (R82799-CN013)**: "Multifaceted Search for Extraterrestrial Intelligence", research grant of 30,492 USD for one year **(Total- 26 Lakhs in INR)**.

GRANTS AWARDED AS A CO INVESTIGATOR (CO-I)

- **NASA SOFIA Cycle 7 Priority 1 Observing Proposal Grant 2018 (07-0028 (US))**: "Probing Feedback and the ISM Structure in the Carina Nebula Complex?" —112,600 USD for one year **(Total- 83.3 Lakhs in INR)**.

- **NASA ROSES Astrophysics Data Analysis Program (ADAP) Grant 2019**

(18-2ADAP18-0072): "Reduction and Data Distribution of SOFIA [OI] Observations, [OI] Kinematics, and Oxygen Abundance " —172,711 USD for Year 1; 213,536 USD for Year 2 (2020-2021) **(Total-2.85 Crores in INR)**.

- **NASA ROSES Exoplanet Research Program (XRP) Grant 2024 (24-XRP242-0016:** "Modeling the multi-isotopic ratios in the atmospheres of exoplanets" Exoplanet Research Program —202,356 USD for one year **(Total- 1.7 Crore in INR)**.

RESEARCH INDEX

Citations: 1253, **h-index**: 24, **i10-index**: 38 Link for Google Scholar
No. of publications in peer-reviewed journals: 57, 10 first-authored; 16 second-authored; 31 co-authored

PUBLICATIONS IN REFERRED JOURNALS

*Publications with: * = PhD Students; ** = MS Students; *** = Postdocs*

1. P. Kashyap*, **L. Majumdar**, A. Dutrey, S. Guilloteau, K. Willacy, E. Chapillon, R. Teague , D. Semenov, T. Henning, N. Turner, R. Sahai, Á. Kóspál, A. Coutens, V. Piétu , P. Gratier, M. Ruaud, N. T. Phuong, E. Di Folco, Chin-Fei Lee, and Y.-W. Tang, Chemistry in the GG Tau A Disk: Constraints from H2D+, N2H+, and DCO+ High Angular Resolution ALMA Observations, 2024, **The Astrophysical Journal (ApJ)**, 976, 258

2. N. G. C. Brunken, E. F. van Dishoeck, K. Slavicinska, including **L. Majumdar**, JOYS+ study of solid-state 12C/13C isotope ratios in protostellar envelopes: Observations of CO and CO2 ice with the James Webb Space Telescope, 2024, **Astronomy & Astrophysics (A&A)**, 18, A163

3. Tian-Yu Tu, P. Rayalacheruvu*, **L. Majumdar**, Y. Chen, P. Zhou, M. Santander-García, A Yebes W-band Line Survey towards an Unshocked Molecular Cloud of Supernova Remnant 3C 391: Evidence of Cosmic-Ray-Induced Chemistry, 2024, **The Astrophysical Journal (ApJ)**, 974, 262

4. Y. Chen , W. R. M. Rocha, E. F. van Dishoeck, including **L. Majumdar** et al., JOYS+: The link between the ice and gas of complex organic molecules: Comparing JWST and ALMA data of two low-mass protostars, 2024, **Astronomy & Astrophysics (A&A)**, 34, A205

5. D. Dubey**, **L. Majumdar**, A Comparative Simulation Study of Hot and Ultrahot Jupiter Atmospheres Using Different Ground-based High-resolution Spectrographs with Cross-correlation Spectroscopy, 2024, **The Astrophysical Journal (ApJ)**, 972, 165

6. T. Suzuki, K. Furuya, Y. Aikawa, T. Shibata, **L. Majumdar**, Chemical evolution of complex organic molecules in turbulent protoplanetary discs: effect of stochastic ultraviolet irradiation, 2024, **Monthly Notices of the Royal Astronomical Society (MNRAS)**, 532, 1796

7. M. L. van Gelder, M. E. Ressler, E. F. van Dishoeck, including **L. Majumdar**, G. Perotti, and W. R. M. Rocha, JOYS+: Mid-infrared detection of gas-phase SO2 emission in a low-mass protostar, 2024, **Astronomy & Astrophysics (A&A)**, 682, A78

8. W. R. M. Rocha, E. F. van Dishoeck, M. E. Ressler, including **L. Majumdar**, V. J. M. le Gouellec, L. E. U. Chu, B. W. P. Lew, Th. Henning, and G. Wright, JWST Observations of Young protoStars (JOYS+): Detecting icy complex organic molecules and ions I. CH4, SO2, HCOO-, OCN-, H2CO, HCOOH, CH3CH2OH, CH3CHO, CH3OCHO, and CH3COOH, 2024, **Astronomy & Astrophysics (A&A)**, 683, A124

9. K. Taniguchi, P. Rayalacheruvu*, T. Yonetsu, T. Takekoshi, including **L. Majumdar**, M. Saito, I. Rodríguez-Montoya, D. Sánchez-Arguelles, and R. Kawab, Large-scale Mapping Observations of DCN and DCO+ toward Orion KL, 2024, **The Astrophysical Journal (ApJ)**, 963, 12

10. T. Suzuki, **L. Majumdar**, P. F. Goldsmith, K. Tokuda, H. Minamoto, M. Ohishi, M. Saito, T. Hirota, H. Nomura, and Y. Oya, Survey of CH3NH2 and its Formation Process, 2023, **The Astrophysical Journal (ApJ)**, 954, 189

11. K. Taniguchi, **L. Majumdar**, P. Caselli, S. Takakuwa, T. Hsieh, M. Saito, Z. Li, K. Dobashi, T. Shimoikura, F. Nakamura, J. C. Tan, and E. Herbst, Chemical Differentiation around Five Massive Protostars Revealed by ALMA: Carbon-chain Species and Oxygen/Nitrogen-bearing Complex Organic Molecules, 2023, **The Astrophysical Journal Supplementary Series (ApJS)**, 267, 4

12. G. Esplugues, A. Fuente, D. Navarro-Almaida, M. Rodríguez-Baras, **L. Majumdar**, P. Caselli, V. Wakelam, E. Roueff, R. Bachiller, S. Spezzano, P. Rivière-Marichalar, R. Martín-Doménech and G. M. Muñoz Caro, Gas phase Elemental abundances in Molecular cloudS (GEMS) VI. A sulphur journey across star-forming regions: study of thioformaldehyde emission, 2022, **Astronomy & Astrophysics (A&A)**, 662, A52

13. S. Dash**, **L. Majumdar**, K. Willacy, S. Tsai, N. Turner, P. B. Rimmer, M. S. Gudipati, W. Lyra, and A. Bhardwaj, Linking Atmospheric Chemistry of the Hot Jupiter HD 209458b to Its Formation Location through Infrared Transmission and Emission Spectra, 2022, **The Astrophysical Journal (ApJ)**, 932, 20

14. K. Taniguchi, K. I. Tanaka, Y. Zhang, R. Fedriani, J. C. Tan, S. Takakuwa, F. Nakamura, M. Saito, **L. Majumdar**, and E. Herbst, Vibrationally Excited Lines of HC_3N Associated with the Molecular Disk around the G24.78+0.08 A1 Hypercompact H II Region, 2022, **The Astrophysical Journal (ApJ)**, 931, 99

15. K. Taniguchi, **L. Majumdar**, A. Plunkett, S. Takakuwa, D. C. Lis, P. F. Goldsmith, F. Nakamura, M. Saito, and E. Herbst, Chemical Compositions in the Vicinity of Protostars in Ophiuchus, 2021, **The Astrophysical Journal (ApJ)**, 922, 152

16. P. B. Rimmer, **L. Majumdar**, A. Priyadarshi, S. Wright, S. N. Yurchenko, Detectable Abundance of Cyanoacetylene (HC_3N) Predicted on Reduced Nitrogen-rich Super-Earth Atmospheres, 2021, **The Astrophysical Journal Letters (ApJL)**, 921, L28

17. N. T. Phuong, A. Dutrey, E. Chapillon, S. Guilloteau, J. Bary, T. L. Beck, A. Coutens, O. Denis-Alpizar, E. Di Folco, P. N. Diep, **L. Majumdar**, J. -P. Melisse, C. -W. Lee, V. Pietu, T. Stoecklin, Y. -W. Tang, An unbiased NOEMA 2.6 to 4 mm survey of the GG Tau ring: First detection of CCS in a protoplanetary disk, 2021, **Astronomy & Astrophysics (A&A)**, 653, L5

18. D. Navarro-Almaida, A. Fuente, **L. Majumdar**, V. Wakelam, P. Caselli, P. Rivière-Marichalar, S. P. Treviño-Morales, S. Cazaux, I. Jiménez-Serra, C. Kramer, A. Chacón-Tanarro, J. M. Kirk, D. Ward-Thompson, M. Tafalla, Evolutionary view through the starless cores in Taurus: Deuteration in TMC 1-C and TMC 1-CP, 2021, **Astronomy & Astrophysics (A&A)**, 653, A15

19. Y. Seo, C. D. Dowell, P. F. Goldsmith, J. L. Pineda, **L. Majumdar**, Probing Polarization and the Role of Magnetic Fields in Cloud Destruction in the Keyhole Nebula, 2021, **The Astrophysical Journal (ApJ)**, 917, 57

20. K. Taniguchi, **L. Majumdar**, S. Takakuwa, M. Saito, D. C. Lis, P. F. Goldsmith, and E. Herbst, Carbon-chain Chemistry versus Complex-organic-molecule Chemistry in Envelopes around Three Low-mass Young Stellar Objects in the Perseus Region, 2021, **The Astrophysical Journal (ApJ)**, 910, 141

21. E. Mullikin, H. Anderson, N. O'Hern, M. Farrah, C. R. Arumainayagam, E. F. van Dishoeck, P. A. Gerakines, A. I. Vasyunin, **L. Majumdar**, P. Caselli, and C. N. Shingledecker, A New Method for Simulating Photoprocesses in Astrochemical Models, 2021, **The Astrophysical Journal (ApJ)**, 910, 72

22. V. Wakelam, P. Gratier, M. Ruaud, R. Le Gal, **L. Majumdar**, J.-C. Loison, and K. M. Hickson, Chemical compositions of five Planck cold clumps, 2021, **Astronomy & Astrophysics (A&A)**, 647, A172

23. K. Taniguchi, E. Herbst, **L. Majumdar**, P. Caselli, J. Tan, Z. Li, T. Shimoikura, K. Dobashi, F. Nakamura, M. Saito, Carbon Chain Chemistry in Hot-core Regions around Three Massive Young Stellar Objects Associated with 6.7 GHz Methanol Masers, 2021, **The Astrophysical Journal (ApJ)**, 908, 100

24. T. Suzuki, Y. Shinnaka, **L. Majumdar**, T. Shibata, Y. Shilbaike, H. Nomura, H. Minamoto, Possibility of concentration of nonvolatile species near the surface of comet 67P/Churyumov-Gerasimenko, 2021, **Astronomy & Astrophysics (A&A)**, 645, A134

25. P. A. Strøm, D. Bodewits, M. M. Knight, F. Kiefer, G. H. Jones, Q. Kral, L. Matrà, E. Bodman, M. T. Capria, I. Cleeves, A. Fitzsimmons, N. Haghighipour, J. H. D. Harrison, D. Iglesias, M. Kama, H. Linnartz, **L. Majumdar**, E. J. W. de Mooij, S. N. Milam, C. Opitom, I. Rebollido, L. K. Rogers, C. Snodgrass, C. Sousa-Silva, S. Xu, Z. Lin, and S. Zieba, Exocomets from a Solar System Perspective, 2020, **Publications of the Astronomical Society of the Pacific (PASP)**, 132, 101001

26. C. N. Shingledecker, G. Molpeceres, V. M. Rivilla, **L. Majumdar**, J. Kastner, Isomers in Interstellar Environments. I. : The Case of Z- and E-Cynaomethanimine, 2020, **The Astrophysical Journal (ApJ)**, 897, 158

27. K. Taniguchi, A. Guzman, **L. Majumdar**, M. Saito, K. Tokuda, Chemical composition in the IRAS 16562–3959 high-mass star-forming regions, 2020, **The Astrophysical Journal (ApJ)**, 898, 54

28. N. T. Phuong, A. Dutrey, E. Di Folco, S. Guilloteau, A. Pierens, J. Bary, T. L. Beck, E. Chapillon, O. Denis-Alpizar, P.N. Diep, **L. Majumdar**, V. Pietu, Y. -W. Tang, Planet-induced spirals in the circumbinary disk of GG Tauri A, 2020, **Astronomy & Astrophysics Letter (A& A)**, 635, L9.

29. V. Wakelam, E. Chapillon, A. Dutrey, S. Guiloteau, W. Iqbal, A. Coutens, **L. Majumdar**, Protoplanetary disks: Sensitivity of the chemical composition to various model parameters, 2019, **Monthly Notices of the Royal Astronomical Society (MNRAS)**, 484, 1563.

30. Y. Seo, **L. Majumdar**, P. F. Goldsmith, Y. L. Shirley, K. Willacy, D. Ward-Thompson, R. Friesen et al., An Ammonia Spectral Map of the L1495-B218 Filaments in the Taurus Molecular Cloud: II CCS & HC_7N Chemistry and Three Modes of Star Formation in the Filaments, 2019, **The Astrophysical Journal (ApJ)**, 871, 134.

31. **L. Majumdar**, P. Gratier, V. Wakelam, E. Caux, K. Willacy, M. E. Ressler, Detection of $HOCO^+$ in the protostar IRAS 16293-2422, 2018, **Monthly Notices of the Royal Astronomical Society (MNRAS)**, 477, 525.

32. **L. Majumdar**, J. C. Loison, M. Ruaud, P. Gratier, V. Wakelam, A. Coutens, Methyl isocyanate CH_3NCO: An important missing organic in current astrochemical networks, 2018, **Monthly Notices of the Royal Astronomical Society Letters (MNRAS)**, 473, L59.

33. I. Andron, P. Gratier, **L. Majumdar**, T. Vidal, A. Coutens, J. C. Loison, V. Wakelam, Methyl cyanide (CH_3CN) and propyne (CH_3CCH) in the low-mass protostar IRAS 16293-2422, 2018, **Monthly Notices of the Royal Astronomical Society (MNRAS)**, 481, 5651.

34. K. Taniguchi, M. Saito, **L. Majumdar**, T. Shimoikura, K. Dobashi, H. Ozeki, F. Nakamura, T. Hirota, T. Minamidani, Y. Miyamoto, H. Kaneko, Chemical Diversity in Three Massive Young Stellar Objects Associated with 6.7 GHz CH_3OH Masers, 2018, **The Astrophysical Journal (ApJ)**, 866, 150.

35. N. T. Phuong, E. Chapillon, **L. Majumdar**, S. Guilloteau, V. Pietu, V. Wakelam, P. N. Diep, T. Beck, J. Barry, The first detection of H_2S in protoplanetary disk: The dense GG Tau A ring, 2018, **Astronomy & Astrophysics Letter (A&A)**, 616, L5.

36. T. Suzuki, **L. Majumdar**, M. Ohishi, M. Saito, T. Hirota, V. Wakelam, An expanded gas-grain model for interstellar glycine, 2018, **The Astrophysical Journal (ApJ)**, 863, 51.

37. T. Suzuki, M. Ohishi, M. Saito, T. Hirota, **L. Majumdar**, V. Wakelam, The difference in abundance between N-bearing and O-bearing species in high-mass star forming regions, 2018, **The Astrophysical Journal Supplementary Series (ApJS)**, 237, 42.

38. **L. Majumdar**, P. Gratier, M. Ruaud, V. Wakelam, C. Vastel, O. Sipila, F. Hersant, A. Dutrey, S. Guolloteau, Chemistry of TMC-1 with multiply deuterated species and spin chemistry of H_2, H_2^+, H_3^+ and their isotopologues, 2017, **Monthly Notices of the Royal Astronomical Society (MNRAS)**, 466, 4470.

39. **L. Majumdar**, P. Gratier, I. Andron, V. Wakelam, E. Caux, A study of singly deuterated cyclopropenylidene c-C_3HD in protostar IRAS 16293-2422, 2017, **Monthly Notices of the Royal Astronomical Society (MNRAS)**, 467, 3525.

40. P. Gorai, A. Das, **L. Majumdar**, B. Sivaraman, S. K. Chakrabarti, E. Herbst, The Possibility of Forming Propargyl Alcohol in the Interstellar Medium, 2017, **Molecular Astrophysics (MA)**, 6, 36.

41. **L. Majumdar**, P. Gratier, T. Vidal, V. Wakelam, J. C. Loison, K. M. Hickson, E. Caux, Detection of CH_3SH in protostar IRAS 16293-2422, 2016, **Monthly Notices of the Royal Astronomical Society (MNRAS)**, 458, 1859.

42. P. Gratier, **L. Majumdar**, M. Ohishi, E. Roueff, J. C. Loison, K. M. Hickson, V. Wakelam, A new reference chemical composition for TMC-1, 2016, **The Astrophysical Journal Supplementary Series (ApJS)**, 225, 25.

43. T. Suzuki, M. Ohishi, T. Hirota, M. Saito, **L. Majumdar**, V. Wakelam, Survey observation of a possible Glycine Precursor Methanimine CH_2NH, 2016, **The Astrophysical Journal (ApJ)**, 825, 79.

44. V. Wakelam, M. Ruaud, F. Hersant, A. Dutrey, D. Semenov, **L. Majumdar**, S. Guolloteau, Importance of the H_2 abundance in protoplanetary disk ices for the molecular layer chemical composition, 2016, **Astronomy & Astrophysics (A&A)**, 594, A35.

45. A. Das, D. Sahu, **L. Majumdar**, S. K. Chakrabarti, Deuterium enrichment of the interstellar grain mantle, 2015, **Monthly Notices of the Royal Astronomical Society (MNRAS)**, 455, 540.

46. **L. Majumdar**, P Gorai, A. Das, S. K. Chakrabarti, Potential formation of three pyrimidine bases in interstellar regions, 2015, **Astrophysics and Space Science (ApSS)**, 360, 64.

47. A. Das, **L. Majumdar**, D. Sahu, P. Gorai, B. Sivaraman, S. K. Chakrabarti, Methyl Acetate and its singly deuterated isotopomers in the interstellar medium, 2015, **The Astrophysical Journal (ApJ)**, 808, 21.

48. S. K. Chakrabarti, **L. Majumdar**, A. Das, S. Chakrabarti, Search for interstellar Adenine, 2015, **Astrophysics and Space Science (ApSS)**, 357, 90.

49. D. Sahu, A. Das, **L. Majumdar**, S. K. Chakrabarti, Monte Carlo simulation for the formation of molecular hydrogen and its deuterated forms, 2015, **New Astronomy (New A)**, 38, 23.

50. B. Sivaraman, N. Radhika, A. Das, G. Goopakumar, **L. Majumdar**, S. K. Chakrabarti, K. P. Subramanian, M. Hada, Infrared Spectra and Chemical Abundance of Methyl Propionate in Icy Astrochemical Conditions, 2015, **Monthly Notices of the Royal Astronomical Society (MNRAS)**, 448, 1372.

51. A. Das, **L. Majumdar**, S. K. Chakrabarti, D. Sahu, Deuterium enrichment of the interstellar medium, 2015, **New Astronomy (New A)**, 35, 53.

52. **L. Majumdar**, A. Das, S. K. Chakrabarti, Formation of different isotopomers of Chloronium in the interstellar medium, 2014, **The Astrophysical Journal (ApJ)**, 782, 73.

53. **L. Majumdar**, A. Das, S. K. Chakrabarti, Spectroscopic characteristics of the cyanomethyl anion and its deuterated derivatives, 2014, **Astronomy & Astrophysics (A&A)**, 562, 56.

54. A. Das, **L. Majumdar**, S. K. Chakrabarti, R. Saha, S. Chakrabarti, Formation of cyanoformaldehyde in interstellar space, 2013, **Monthly Notices of the Royal Astronomical Society (MNRAS)**, 433, 3152.

55. A. Das, **L. Majumdar**, S. K. Chakrabarti, S. Chakrabarti, Chemical evolution during the process of proto-star formation by considering a two dimensional hydrodynamic model, 2013, **New Astronomy (New A)**, 23, 118.

56. **L. Majumdar**, A. Das, S. K. Chakrabarti, S. Chakrabarti, Study the chemical evolution and spectral signatures of some interstellar precursor molecules of adenine, glycine and alanine, 2013, **New Astronomy (New A)**, 20, 15.

57. **L. Majumdar**, A. Das, S. K. Chakrabarti, S. Chakrabarti, Hydro-chemical study of the evolution of interstellar pre-biotic molecules during the collapse of molecular clouds, 2012, **Research in Astronomy and Astrophysics (RAA)**, 12, 1613.

PUBLICATIONS IN PROCEEDINGS

1. A. M. Glauser, S. P. Quanz, including **L. Majumdar**, The Large Interferometer For Exoplanets (LIFE): a space mission for mid-infrared nulling interferometry, 2024, Proceedings of the SPIE, 13095, 21

2. N. Dzyurkevich, W. Lyra, **L. Majumdar**, Tracing the early planet formation with molecular lines: chemistry of vortex in the protoplanetary disks, 2018, Origins: From the Protosun to the First Steps of Life. Proceedings of the International Astronomical Union, 345, 285

3. **L. Majumdar**, V. Wakelam, P. Gratier, E. Caux, J.-C. Loison, K Willacy, Possibility of protostellar inheritance of organics to Jupiter-family comet 67P/C-G, 2018, **cosp**, 42, 2130.

4. **L. Majumdar**, V. Wakelam, P. Gratier, E. Caux, K. Willacy, M. Ruaud, C. Vastel, A. Dutrey, S. Guilloteau, An extended public deuterium fractionation model for the astrochemical community, 2018, **cosp**, 42, 2131.

5. **L. Majumdar**, V. Wakelam, P. Gratier, E. Caux, J.-C. Loison, K Willacy, The chemical link between comet 67P/C-G and low mass protostar IRAS 16293-2422: Integrative Studies in Observational Astronomy and Chemical-Dynamical Modeling, 2018, **cosp**, 42, 2132.

6. **L. Majumdar**, V. Wakelam, P. Gratier, E. Caux, K. Willacy, M. E. Ressler, Chemistry in Protostellar regions: New implications for JWST MIRI/NIRSpec, 2018, **cosp**, 42, 2133.

7. T. Suzuki, M. Ohishi, **L. Majumdar**, V. Wakelam, M. Saito, T. Hirota, An Expanded Gas-Grain Model for Interstellar Glycine, 2018, **cosp**, 42, 3309.

8. P. Gorai, S. K. Chakrabarti, A. Das, **L. Majumdar**, E. Herbst, B. Sivaraman, Serach for Propargyl Alcohol in the Interstellar Medium, 2018, **cosp**, 42, 1253.

9. A. Das, D. Sahu, **L. Majumdar**, S. K. Chakrabarti, Deuterium enrichment of interstellar dusts, 2016, **cosp**, 41, 401.

10. P. Gorai, S. K. Chakrabarti, A. Das, **L. Majumdar**, D. Sahu, B. Sivaraman, Search for Deuterated methyl acetate in the ISM, 2016, **cosp**, 41, 731.

11. **L. Majumdar**, S. K. Chakrabarti, A. Das, On the detection of different chlorine bearing molecules in ISM through Herschel/HIFI, 2014, **cosp**, 40, 1949.

12. **L. Majumdar**, S. K. Chakrabarti, A. Das, S. Chakrabati, Existence of some pre-biotic molecules in and around the Interstellar Medium, 2014, **cosp**, 40, 1948.

13. **L. Majumdar**, S. K. Chakrabarti, A. Das, Physics and Chemistry on interstellar dust, 2014, **cosp**, 40, 1947.

14. **L. Majumdar**, S. K. Chakrabarti, A. Das, S. Chakrabati, Chemical evolution of life making molecules in extreme environments, 2014, **cosp**, 40, 1946.

15. **L. Majumdar**, S. K. Chakrabarti, A. Das, Structure, spectroscopy and chemistry on interstellar dust, 2014, **cosp**, 40, 1945.

16. A. Das, S. K. Chakrabarti, **L. Majumdar**, D. Sahu, Chemical composition of interstellar dust, 2014, **cosp**, 40, 625.

17. A. Das, S. K. Chakrabarti, **L. Majumdar**, D. Sahu, Co-relation of the degree of Ionization of a molecular cloud with the depletion of the neutral species on the interstellar dust, 2014, **cosp**, 40, 624.

18. D. Sahu, S. K. Chakrabarti, A. Das, **L. Majumdar**, Explaining the deuterium fractionation of Water: Modeling and observations, 2014, **cosp**, 40, 2842.

19. D. Sahu, S. K. Chakrabarti, A. Das, **L. Majumdar**, Effective formation of simple molecules like H_2, D_2, HD on grain surfaces and various consequences, 2014, **cosp**, 40, 2841.

20. **L. Majumdar**, A. Das, S. K. Chakrabarti, S. Chakrabarti, Chemical evolution and spectroscopy of some complex molecules which could be treated as the precursor of some bio-molecules in the interstellar medium, 2013, **IAUS**, 292, 250.

21. **L. Majumdar**, A. Das, S. K. Chakrabarti, S. Chakrabarti, A 2D hydrodynamic simulation coupled to chemical evolution around star forming region: A time dependent study, 2013, **AIP Conf. Proc.**, 1543, 242.

22. **L. Majumdar**, A. Das, S. K. Chakrabarti, S. Chakrabarti, Quantum Chemical approach to study the spectral properties of some important precursor of bio-molecules, 2013, **AIP Conf. Proc.**, 1543, 266.

23. R. Saha, **L. Majumdar**, A. Das, S. K. Chakrabarti, S. Chakrabarti, Formation of the nucleobases around the Star forming region, 2013, **AIP Conf. Proc., 1543**, 251.

24. D. Sahu, A. Das, **L. Majumdar**, S. K. Chakrabarti, Role of Ambipolar Diffusion towards the chemical evolution of molecular cloud, 2013, **AIP Conf. Proc.**, 1543, 236.

25. **L. Majumdar**, S. K. Chakrabarti, A. Das, S. Chakrabarti, A quantum chemical approach to set a guideline for the observation of different pre-biotic molecules in the interstellar space, 2012, **cosp**, 39, 1154.

26. **L. Majumdar**, S. K. Chakrabarti, A. Das, S. Chakrabarti, Formation of some of the bases of DNA in the interstellar space during the molecular cloud collapse, 2012, **cosp**, 39,1153.

27. **L. Majumdar**, S. K. Chakrabarti, A. Das, S. Chakrabarti, Spectral signature and chemical evolution of some complex molecules which could be treated as the precursor of some bio-molecules in the ISM, 2012, **cosp**, 39, 1152.

28. S. K. Chakrabarti, A. Das, **L. Majumdar**, S. Chakrabarti, A 2D hydrodynamic simulation coupled with the chemical evolution to study the physics and Chemistry of the ISM, 2012, **cosp**, 39, 288.

29. S. K. Chakrabarti, A. Das, **L. Majumdar**, S. Chakrabarti, Synthesis of prebiotic molecules and origin of life, 2012, **cosp**, 39, 289.

30. R. Saha, S. K. Chakrabarti, A. Das, **L. Majumdar**, S. Chakrabarti, Effect of photo-dissociation on the composition of the grain mantle, 2012, **cosp**, 39, 1647.

31. **L. Majumdar**, A. Das, S.K Chakrabarti, S. Chakrabarti, Chemical Evolution around star forming region: A time dependent study, 2011, **IAUS**, 280, 400.

PUBLICATIONS IN BOOKS

1. **L. Majumdar**, The Interstellar Molecular Complexity., 2018, In: B. Mukhopadhyay, S. Sasmal (eds), Exploring the Universe: From Near Space to Extra-Galactic. Astrophysics and Space Science Proceedings, vol 53, pp 439-452, Springer.

PUBLICATIONS IN WHITE PAPERS

1. M. Gudipati, S. Milam, A. R. Hendrix, B. Henderson, H. Linnartz, **L. Majumdar**, M. Nuevo, D. M. Paardekooper, E. M. Sciamma-O'Brien, R. Smith, N. Turner, K. Willacy, From Interstellar Ice Grains to Evolved Planetary Systems: The Role of Laboratory Studies, Astro2020: Decadal Survey on Astronomy and Astrophysics, science white papers, no. 518; Bulletin of the American Astronomical Society, Vol. 51, Issue 3, id. 518 (2019).

RESEARCH HIGHLIGHTS (SCIENCE MAGAZINE)

1. Research highlighted as Principal Investigator in Nature India with the headline "Discovery of the Birthplace of Baby Exoplanets" (DOI: 10.1038/d44151-024-00200-w).
2. Research highlighted as Principal Investigator in Nature India with the headline "Atmospheric Chemistry of a Jupiter-like Exoplanet Revealed" (DOI: 10.3847/1538-4357/ac67f0).
3. Research highlighted in Nature India with the headline "Glimpse of Planets Around a Multiple Star System," which discusses the first discovery of a circumbinary planetary system (i.e., planets orbiting multiple star systems). This study helps us understand how such planetary systems, different from our Solar System, can form and survive. (DOI: 10.1038/nindia.2020.95)
4. **Discovery of a Circumbinary Planetary System Using ALMA**, a press release from CNRS (French National Center for Scientific Research), the largest fundamental science agency in Europe.
5. Postdoctoral research paper (first-authored, work carried out in France) highlighted in **Physics Today**, a publication of the American Institute of Physics, with the headline "How an Organic Molecule Forms in Space" (DOI: 10.1063/PT.6.1.20171109b).
6. Postdoctoral research at NASA Jet Propulsion Laboratory (first-authored, work carried out in the USA) highlighted in the NASA Postdoctoral Program Quarterly Newsletter, Volume 1, Issue 4 - January 2018.
7. Postdoctoral research paper (first-authored, work carried out in the USA) produced one of 12 approved scientific studies to receive the ngVLA Second Round Award (as PI) with the proposal entitled $HOCO^+$ Emission as a Diagnostic of Planet-forming Regions of Disks: Bridging ngVLA and the James Webb Space Telescope (JWST), demonstrating how NASA's JWST mission and ngVLA could be linked to address key scientific questions. The ngVLA Community Studies Program was launched by the National Radio Astronomy Observatory (NRAO) to enable contributions from scientific and engineering communities in developing the final concept for the ngVLA.

8. Ph.D. research paper (first-authored, work carried out in India) highlighted in **Nature India** with the headline "Space Recipe for Life-making Molecules" (DOI: 10.1038/nindia.2013.28).

9. Ph.D. research paper (second-authored, work carried out in India) highlighted in **Nature India** with the headline "Heavier Hydrogen Unveils Secrets of Protostars" (DOI: 10.1038/nindia.2014.155).

10. Study of the chemical evolution and spectral signatures of interstellar precursor molecules of adenine, glycine, and alanine, published in 2013 in the *New Astronomy Journal*, was **one of the five most highly cited papers during 2014, 2015, and up to June 2016**.

11. Chemical evolution during the process of protostar formation, modeled using a two-dimensional hydrodynamic approach and published in 2013 in the *New Astronomy Journal*, was **one of the five most highly cited papers during 2014, 2015, and up to June 2016**.

PROFESSIONAL SERVICE

Referee for publications in peer-review journals:

- Nature Astronomy
- The Astrophysical Journal (ApJ)
- The Astrophysical Journal Letters (ApJL)
- Astronomy and Astrophysics (A&A)
- Monthly Notices of the Royal Astronomical Society (MNRAS)
- The Planetary Science Journal (PSJ)
- Planetary and Space Science
- Icarus
- Astrobiology
- ACS Earth and Space Chemistry
- Advances in Space Research
- Frontiers in Astronomy and Space Sciences
- Journal of Astrophysics and Astronomy
- Indian Journal of Physics
- Origins of Life and Evolution of Biospheres

Reviewing fellowship applications:

- Reviewer of NASA Fellowship Applications
- Reviewer of NASA Post Doctoral Program Applications
- Reviewer of NASA Future Investigators in Earth and Space Science and Technology (FINESST) Astrophysics Program Applications

Reviewing grants, mission proposal, telescope time and panelist:

- Reviewer of NASA Astrophysics Research and Analysis Program (APRA)
- Reviewer of NASA ROSES Exoplanet Research Program (XRP)
- Reviewer for the National Science Foundation (NSF), USA, in Galactic Astronomy, including the Structure of the Milky Way, the Interstellar Medium, Galactic Clusters, and Star Formation Panel

- Invited Panel Member of the NASA Exoplanet Research Program (XRP)
- Invited Panel Member of the NASA Emerging Worlds Program (EW)
- Invited Panel Member of the NASA Astrophysics Research and Analysis Program (APRA)
- Invited Panel Member of the NASA Astrophysics Data Analysis Program (ADAP)
- Invited Technical Secretary of the ALMA Proposal Review Committee (APRC) in 2019
- Invited Virtual Panel Member of the 2019 NASA Postdoctoral Program (NPP)
- Invited Member of the ALMA Proposals Review Committee (APRC) in 2020
- Panelist for the Division for Planetary Sciences (DPS) of the American Astronomical Society virtual workshop (organized by the Professional Development Committee) on Postdoctoral Opportunities in National Labs, Research Institutes & Universities: A Community Conversation, Jun 22, 2021
- Reviewer of Giant Metrewave Radio Telescope (GMRT) observation proposals
- Reviewer of ALMA Telescope observation proposals
- Reviewer of ARIES 3.6m Devasthal Optical Telescope observation proposals
- Reviewer of DST-SERB Core Research Grant (CRG) of 2022
- Review Committee member of the Payloads of the "ExoWorlds" Mission, Department of Space, ISRO, Government of India, 2024
- Review Committee member of the Chandrayaan-3 Payloads (SHAPE: Spectro-polarimetry of HAbitable Planet Earth) data release, Department of Space, ISRO, Government of India, 2024

Membership of Professional Organizations:

- Life Member of the Astronomical Society of India (L2281)
- Member of the ACS Astrochemistry Subdivision
- COSPAR Associate
- International Astronomical Union (IAU)
- American Geophysical Union (AGU)

In Organizing Conferences and Workshops (National and International):

- Member of the Scientific Organising Committee of SETI Goa Workshop 2024, Breakthrough Listen Initiative at the University of Oxford, December 13-15, 2024, Goa, India.
- Member of the Scientific Organising Committee of Star Formation Studies in India, January 08 - January 11, 2024, S. N. Bose National Centre for Basic Sciences, Kolkata.
- Chair of the Strange New Worlds: The Exploration of Exoplanets conference, IISER Pune, 17 to 19 August, 2023.
- Member of the Scientific Organising Committee of Meteoroids, Meteors and Meteorites: Messengers from Space Symposium, Physical Research Laboratory, Ahmedabad, 1 to 3 November, 2023.
- Member of the Scientific Organising Committee of Astronomical Society of India (ASI) for the triennium 2022-2025.

- Primary Convener of the AGU Session Down the icy road: The journey of ices from interstellar clouds to planetary systems, American Geophysical Union (AGU) Fall Meeting 2020, San Francisco, 7 to 11 December, 2020.
- Chairperson of the Organizing Committee for ALMA Community Day Event —2019 at NASA Jet Propulsion Laboratory, Pasadena, USA on 27 March 2019.
- Member of the Local Organizing Committee for KIDA 2015 at CNES headquarters, Paris, France from 5-7 May 2015. Link
- Member of the Local Organizing Committee for Chemical Evolution of Star Forming Region and Origin of Life —ASTROCHEM 2012 at S.N. Bose National Centre for Basic Sciences, Kolkata, India from 10-13 July 2012.

INVOLVEMENT IN INTERNATIONAL SCIENTIFIC NETWORKS

- Co-investigator of the Guaranteed Time Observation (GTO) Program —1236 of NASA's next flagship astrophysics mission James Webb Space Telescope (JWST) to study physics and chemistry of protostellar binaries in Perseus.

- Member of the **"The Chemistry in Disks (CID)"** Project which is an international consortium among the Max Planck Institute for Astronomy (Heidelberg, Germany), Laboratoire d'astrophysique de Bordeaux (Bordeaux, France), Institute de Radio astronomie Millimetrique (Grenoble, France), SETI Institute (Mountain View, USA), Institute of Astronomy and Astrophysics (Taiwan, China), Jena Observatory (Jena, Germany), University of Virginia (Charlottesville, USA), and Konkoly Observatory (Budapest, Hungary).

- Member of the **"From Qualitative to Quantitative: Exploring the Early Solar System by Connecting Comet Composition and Protoplanetary Disk Models"**, Project of International Space Science Institute (ISSI), Bern between University of Bern (Switzerland); American University, University of Missouri at Saint Louis, Catholic University of America, NASA Jet Propulsion Laboratory & NASA Goddard Center for Astrobiology (USA); Institute de Planetologie et d'Astrophysique de Grenoble, Universite d'Orleans (France); Leiden University, University of Groningen (Netherlands); Queen's University, Belfast (UK).

- Member of the **" Square Kilometre Array (SKA) Cradle of Life"** International Science Working Group (SWG) which provide input to the Square Kilometre Array Organisation (SKAO) on issues relating to the design, commissioning, and future operations of the SKA to address many fundamental science questions using SKA in the future such as (i) What accounts for the diversity in planetary systems? (ii) Are terrestrial planets common in the habitable zone? (iii) Do gas giant planets form in the inner disk or do they migrate there? (iv) What are the implications for Earth-like planets?

MAJOR OBSERVING PROPOSAL AWARDS AS PRINCIPAL INVESTIGATOR

- **IRAM 30-meter:** Summer Cycle (2015) —Looking for the Sulfur reservoir in IRAS 16293-2422 (Rank A)
- **ALMA Cycle 3**: —Searching for H_2D^+ in the circumbinary disk surrounding GG Tau A (Rank B)
- **IRAM 30-meter:** Winter Cycle (2016) —Ortho-to-Para ratio of H_2CO as a

thermometer for disk chemistry (Rank A)

- **NOEMA:** Winter Cycle (2016) —Looking for the cold organic reservoir in disks (Rank A)
- **ARO 12-meter:** Semester 2017B —Chemical diversity of starless and protostellar cores (Rank A)
- **NRO 45-meter:** Semester 2017 —Survey of a direct amino acid (chiral + non-chiral) precursor NH_2OH around two low-mass stars (Rank A)
- **NRO 45-meter:** Semester 2018 —Phosphorus-bearing molecules in solar-type protostars (Rank A)
- **NRO 45-meter:** Semester 2018 —Survey of the interstellar aromatic molecule Benzonitrile (cyclic-C_6H_5CN) in dark clouds (Rank A)
- **ARO12-meter:** Spring 2018A semester —Phosphorus-bearing Molecules in Solar-type Protostars: Bridging ARO with JWST and ROSETTA (Rank A)
- **ALMA Cycle 6:** —Searching for Nitrogen bearing organic Formamide: Bridging the Disk composition with Comet 67P/Churyumov-Gerasimenko (Rank B)
- **SOFIA Cycle 7:** —Where is the Water (Rank A)
- **ALMA Cycle 7:** —Searching for H_2D^+ in the circumbinary disk surrounding GGTau A (Rank B)
- **ALMA Cycle 7:** —Searching for Nitrogen bearing organic Formamide in HD 163296 (Rank B)
- **ALMA Cycle 8:**. —Searching for H_2D^+ in the circumbinary disk surrounding GGTau A (Rank A)

TECHNICAL SKILLS

Astronomy & Astrophysics (Theory & Observations)

- GILDAS/CLASS for reduction and analysis of single dish telescope & interferometric data both for continuum and spectral lines (IRAM-30m, ARO-12m, and NOEMA)
- CASA for ALMA data analysis both for continuum and spectral lines
- CASSIS and XCLASS for line analysis of single dish telescope and interferometric data
- LIME, RADMC3D, DiskFit, Radex and RadLite for LTE/Non-LTE radiative transfer modeling of thermal dust and spectral line emissions
- Thermo-chemical/gas-grain codes to model the physical and chemical environment of dark clouds, protostars and protoplanetary disks
- Infrared data analysis (Keck/NIRSPEC, Spitzer/IRS, Herschel/PACS) and spectro-astrometric observations and high dynamic range data reduction

Planetary and Exoplanetary Science (Theory & Observations)

- Photochemistry code to model the atmospheres of Solar-system planets and exoplanets
- Radiative transfer code to calculate transmission and emission spectra of exoplanets for clear and cloudy planets.
- Radiative transfer code to calculate the atmospheric temperature profile in radiative-convective equilibrium
- Inverse retrieval code for exoplanetary atmospheres for analyzing HST & ground-based high-resolution observations
- Gas-grain chemical code with isotopic fractionation to study origin of isotopic fractionation in primitive solar system materials

Programming

- Fortran (Expert), Python (Expert), Shell, LATEX, Xmgrace, Gnuplot.

PLENARY TALKS

- From Molecular Clouds to Planetary Systems: A new era of ALMA and JWST, February 23, 2021, Astronomical Society of India Meeting 2021, India.

- Exoplanetary atmospheres and their link to planetary formation, February 3, 2022, National Space Science Symposium (NSSS 2022) of Indian Space Research Organization (ISRO), hosted by IISER Kolkata, India.

INVITED TALKS

- Exoplanets and the Search for Life in the Universe, December 13-15, 2024, SETI Goa Workshop 2024, Breakthrough Listen and University Oxford, Goa, India.

- Unveiling the Origins, Atmospheres, and Interiors of Exoplanets: The New Frontier, 2 - 4 Dec, 2024, Astronomy from Moon in the era of Indian lunar missions, ASI Symposium 001, Raman Research Institute, Bengaluru.

- Exoplanet Origins, Atmospheres and Interiors: The New Frontier, 26-28 August 2024, The 1st Indo-Thai Symposium on Astrophysics and Technological Development (ITSA 2024), Chiangmai, Thailand.

- Unveiling the Origins and Atmospheres of Exoplanets, March 6, 2024, ASIAA Colloqium, Academia Sinica Institute of Astronomy and Astrophysics (ASIAA), Taipei, Taiwan.

- Constraining the initial conditions for the formation of extra-solar planets and their atmospheres, January 08 - January 11, 2024, Star Formation Studies in India (SF2024) Conference, S. N. Bose National Centre for Basic Sciences, Kolkata, India.

- Unravelling the mysteries of exoplanets: Origins, Atmospheres, and Interiors, December 14, 2023, University of Manchester, UK.

- Unveiling the Origins, Atmospheres, and Interiors of Exoplanets, December 12, 2023, Imperial College London, UK.

- Linking planetary atmospheres to planet formation, December 7, 2023, Leverhulme Centre for Life in the Universe, University of Cambridge, UK.

- Worlds Without End: Exoplanets, Habitability, and the New Frontier, November 2, 2023, SPASE: Space, Planetary, Astronomical Sciences & Engineering Colloquium, IIT Kanpur, India.

- Constraining the initial conditions for exoplanet formation, July 18, 2023, Astrophysics Colloquium, NASA Jet Propulsion Laboratory (JPL), Pasadena, USA.

- Protoplanetary disk model for Emissions from GAS and Ice absorption Simulations

(PEGASIS): Astrochemistry in the era of ALMA and JWST, March 20, 2023, Interstellar Medium, Matter Cycle and Astrochemistry (MICMAC) Colloquium, Institut de Recherche en Astrophysique et Planetologie (IRAP), Toulouse, France.

- The Search for Habitable Worlds in the era of JWST, December 7, 2022, Eminent Guest Lecture Series: An Odyssey of Physics, SRM University, Andhra Pradesh, India.

- The New Frontier: Exoplanets and the Origin of Habitable Worlds, March 2, 2022, Astrophysics Seminar at the Department of Physics, Indian Institute of Science (IISC), Bangalore, India.

- Frontiers of Astrobiology: An Astronomer's Perspective, February 18-19, 2022, Origins of Life and Evolving Chemical Systems Meeting, India.

- The Journey of molecules from star-forming regions to exoplanets, April 27, 2021, Centre for Exoplanet Science, School of Physics & Astronomy, University of St Andrews, United Kingdom.

- Astrochemistry in the modern era of mm/sub-mm astronomy, February 19, 2021, Astronomical Society of India Meeting 2021, India.

- Tracing the origin of planetary systems with multi-wavelength astronomy, May 31, 2019, Centro de Astrobiologia, CSIC, Madrid, Spain.

- Chemical composition and physical properties of gases and volatiles in protostellar envelopes and planet-forming disks: a new era of JWST, May 6, 2019, Max Planck Institute for Extraterrestrial Physics, Garching, Germany.

- Multi-wavelength astronomy and the origin of planetary systems, March 5, 2019, Institute of Astronomy and Astrophysics, ASIAA, Taipei, Taiwan.

- Astrochemistry and the origin of the planetary systems, February 9, 2019, NRAO and University of Virginia Joint Colloquium, Charlottesville, USA.

- Building stars, planets and the ingredients for life in space, November 30, 2018, California State University, Los Angeles, USA.

- Possibility of protostellar inheritance of organics to Jupiter-family comet 67P/C-G, 2018, COSPAR 2018 42nd Assembly, Pasadena, USA.

- Chemistry from clouds to disks and chemical composition of comets, August 2017, NASA Jet Propulsion Laboratory, Pasadena, USA.

- Deuterium enrichment of the interstellar medium, March 21, 2017, University of Cergy Pontoise, Cergy Pontoise, France.

- Deuterium fractionation from clouds to protoplanetary disks: modeling and

observation, March 22, 2017, Observatoire de Paris, Université Pierre et Marie Curie, France.

- The kinetic database for astrochemistry: present and future, November 26, 2015, Max Planck Institute for Extraterrestrial Physics (MPE), Garching, Germany.

- Chemical evolution of interstellar medium: modeling and observation, May 12, 2015, Institut de Recherche en Astrophysique et Planetologie (IRAP), Toulouse, France.

CONTRIBUTED TAILKS

- Linking Gas-Giant Atmospheres with Planetary Formation Constrained by JWST Observations, IAU General Assembly, IAUS 393 Symposium: Planetary Science, Exoplanets in the Era of James Webb Space Telescope, Cap Town, South Africa - August 13 - 15, 2024.

- Linking Atmospheres of HD209458b with its formation, 2023 Kavli - IAU Astrochemistry Symposium - Astrochemistry VIII - From the First Galaxies to the Formation of Habitable Worlds, 10-14 July 2023.

- The physical and chemical origins of planetary systems such as our own, September 9-11, 2020, Australasian Astrobiology Meeting, Virtual International Conference.

- The chemical link between comet 67P/C-G and low mass protostar IRAS 16293-2422, July, 2018, COSPAR 42nd Assembly, Pasadena, USA.

- Deuterium fractionation in the ISM: modeling and observation, July, 2018, COSPAR 42nd Assembly, Pasadena, USA.

- Chemistry in protostellar regions: new implications for JWST MIRI/NIRSpec, July, 2018, COSPAR 42nd Assembly, Pasadena, USA.

- Deuterium fractionation from molecular clouds to protoplanetary disks: modeling and observation, March 18-22, 2018, ACS Astrochemistry Meeting, New Orleans, USA.

- Protonated Carbon Dioxide Emission as a Diagnostic of Planet-Forming Regions of Disks, June 26-29, 2018, Astrophysical Frontiers in the Next Decade and Beyond, Portland, USA.

- The chemical link between comet 67P/C-G and low mass protostar IRAS 16293-2422, Nov 29-Dec 1, 2017, The origin of galaxies, stars, and planets in the era of ALMA, Caltech, Pasadena, USA.

- Deuterated spin chemistry from cloud to protoplanetary disk: modeling and future observation, July 8, 2016, EWASS Meeting (Session S8), Athens, Greece.

- A new comprehensive astrochemical model including deuteration and nuclear spin state processes, May 13, 2016, LAB Bordeaux, France.

- Deuteration and Spin Chemistry in Protoplanetary Disks, May 24, 2015, CID Meeting, Bordeaux, France.

- Chemistry of star forming regions including deuteration: modelling and observations, May 5-7, 2015, Kinetic Database for Astrochemistry (KIDA) workshop Paris, France.

- Physics and Chemistry on interstellar dust, August 2-10, 2014, COSPAR B 0.5 (Session: Dust and Rings (in the Solar System and Beyond)), Moscow, Russia.

- Existence of some pre-biotic molecules in and around the interstellar medium, August 2-10, 2014, COSPAR B0.6 (Session: Astrobiology: Life Signs Detections within Planetary Exploration), Moscow, Russia.

- On the detection of different chlorine bearing molecules in ISM through Herschel/HIFI, August 2-10, 2014, COSPAR E1.8 (Session: The Herschel (Far-IR) Heritage: High-z Universe, Star Formation, ISM, Stars, ...), Moscow, Russia.

- Role of interstellar dusts towards the chemical enrichment of the ISM, Nov 19-20, 2013, Light Scattering Techniques and Application to Astronomy and other Areas, S. N. Bose National Centre for Basic Sciences, Kolkata, India.

- Study the interstellar processes leading to the deuterium enrichment, 2013, ISRO Respond Meeting, PRL, Ahmedabad, India.

- Guidelines for astronomical detections of new complex molecules in the interstellar medium, 2013, Chemical Evolution and Origin of life, IIT Roorkee, India.

- Formation of some of the bases of DNA in the interstellar space during the molecular cloud collapse, July 15-16, 2012, COSPAR F3.5 (Session: Chemical Evolution of star forming Regions: Observations, Experiment and theory), Mysore, India.

- A quantum chemical approach to set a guideline for the observation of different pre-biotic molecules in the ISM, July 17-18, 2012, COSPAR F3.2 (Session: Prebiotic Chemistry and the Origin of Life), Mysore, India.

- Spectral signature and chemical evolution of some complex molecules which could be treated as the precursor of some bio-molecules in the ISM, July 15-16, 2012, COSPAR F3.5 (Session: Chemical Evolution of star forming Regions: Observations, Experiment and theory), Mysore, India.

- Quantum chemical approach to study the spectral properties of some important precursor of bio-molecules, July 10-13, 2012, ASTROCHEM 2012 Conference, S.N.Bose National Centre for Basic Sciences, Kolkata, India.

- Formulation of three dimensional total variation diminishing scheme to solve hyperbolic system of equations, Dec 1, 2010, S. N. Bose National Centre for Basic Sciences, Kolkata, India.

TEACHING

- EP603 (Planetary Sciences), NISER Bhubaneswar, 2021 Winter + Summer
- EP642 (Numerical Methods and Data Analysis), NISER Bhubaneswar, 2021 Winter
- EP682 (Formation and Evolution of Planetary System), NISER Bhubaneswar, 2021 Summer, 2022 Winter
- EP683 (Exoplanets), NISER Bhubaneswar, 2022 Winter (Ph.D. Students)

OUTREACH

- Chair in organizing the **National Space Day Celebration Event 2024**, NISER Bhubaneswar, August, 2024.
- Outreach Talk "Search for Life in the Universe" , National Space Day Celebration Event 2024, NISER Bhubaneswar, August, 2024.
- Co-Chair in organizing the **NISER Chandrayaan-2** Outreach Program on September 7, 2019.
- Outreach Talk "Are we alone in the Universe" at **NISER Chandrayaan-2** Outreach Program on September 7, 2019.
- Popular Astronomy and Planetary Science Talk **"Current Challenges and Progresses in Astronomy and Planetary Science"** at Centurion University of Technology and Management (CUTM), Odisha on Nov 2, 2019.
- Are we alone in this Unverse?, September 5, 2020, Barasat College, West Bengal State University, Kolkata, India.
- Hands-on Science demonstrations in 18th West Bengal Science Congress (2011), Kolkata, India.
- Hands-on Science demonstrations in 100th Indian Science Congress (2013), Kolkata, India.
- Organizer of the Annual Laboratoire d'astrophysique de Bordeaux, France JPO Science Festival in 2015.

PRESS HIGHLIGHTS

- Research conducted as a **Principal Investigator** was featured in in one of India's leading national newspapers, **"The Telegraph"**, with the headline **"Indian scientists discover planet-forming regions near young star GG Tau A"** in 2024.
- Research conducted as a **Principal Investigator** was featured in in one of India's leading national newspapers, **"The New Indian Express"**, with the headline **"NISER scientists zero in on exoplanet formation"** in 2024.
- Research conducted as a **Principal Investigator** was featured in in one of India's leading national electronic media, **"Times of India"**, with the headline **"India makes breakthrough discovery in solar system with three suns"** in 2024.
- Research conducted as a **Principal Investigator** was featured in in one of India's leading national electronic media, **"The Economic Times"**, with the headline **"Unbelievable! India discovers solar system with three Suns: Here's all you need to know"** in 2024.

- Research conducted as a **Principal Investigator** was featured in in one of India's leading national electronic media, **"India Today"**, with the headline **"Indian team makes stunning discovery in a solar system with three suns"** in 2024.
- Research conducted as a **Principal Investigator** was featured in in one of India's leading national electronic media, **"NDTV World"**, with the headline **"Scientists From India, A Telescope In Chile, And An Astronomical Discovery"** in 2024.
- Research conducted as a **Principal Investigator** was featured in in one of India's leading national electronic media, **"INDIA TV"**, with the headline **"Indian scientists makes cosmic breakthrough, discover a rare triple-star system"** in 2024.
- Research conducted during my PhD was featured in one of India's leading national newspapers, **"The Hindu"**, with the headline **"Life from the Stuff Between the Stars"** in 2013.
- Research conducted during my PhD was also featured in another prominent Indian national newspaper, **"The Telegraph"**, with the headline **"Seed of Life"** in 2013.

MENTORING

Ph.D. Students and Postdoctoral Fellows			
Ph.D. Students	**Affliation**	**Year**	**Research Area**
R. Prathap	*National Institute of Science Education and Research (NISER), Bhubaneswar, India*	2021-	Planet Formation (Theory and Observations)
P. Ghosh	*National Institute of Science Education and Research (NISER), Bhubaneswar, India*	2021-	Exoplanets (Theory and Observations)
P. Kashyap	*National Institute of Science Education and Research (NISER), Bhubaneswar, India*	2022-	Planet Formation (Observations)
M. Patra	*National Institute of Science Education and Research (NISER), Bhubaneswar, India*	2024-	Exoplanets (Observations)
Postdocs	**Affliation**	**Year**	**Research Area**
Namrata Rani	*National Institute of Science Education and Research (NISER), Bhubaneswar, India*	2022-2023	Computational Astrochemistry and Astrobiology
Satyam Srivastav	*Institute of Science, Banaras Hindu University, Varanasi, India & National Institute of Science Education and Research (NISER), Bhubaneswar, India*	2023-2024	Computational Astrochemistry and Astrobiology

MENTORING	Project Students		
Current Funded Project Students	**Affliation**	**Year**	**Project Topic**
Maitrey Sharma	*National Institute of Science Education and Research (NISER), Bhubaneswar, India*	2024-	Planet Formation (SERB Project)
Tonmoy Deka	*Indian Institute of Science Education and Research (IISER), Thiruvananthapuram, India*	2023-	Exoplanets (SERB Project)
Dibya Bharati Pradhan	*National Institute of Science Education and Research (NISER), Bhubaneswar, India*	2024-	Exoplanets (SERB Project)
Oommen P Jose	*National Institute of Science Education and Research (NISER), Bhubaneswar, India*	2024-	Exoplanets (SERB Project)
Sambit Mishra	*National Institute of Science Education and Research (NISER), Bhubaneswar, India*	2024-	Exoplanets (SERB Project)
Shubham Dey	*National Institute of Science Education and Research (NISER), Bhubaneswar, India*	2024-	Exoplanets (SERB Project)

MENTORING	MS Students		
Current MS Students	**Affliation**	**Year**	**Project Topic**
Anjana Shaju	*Indian Institute of Science Education and Research (IISER), Mohali, India*	2024-	Exoplanets (MS Thesis)
Sudipta Mridha	*Indian Institute of Science Education and Research (IISER), Kolkata, India*	2023-	Exoplanets (MS Thesis)
Debayan Das	*Indian Institute of Science Education and Research (IISER), Kolkata, India*	2023-	Exoplanets (MS Thesis)
Harshit Krishna	*Indian Institute of Science Education and Research (IISER), Mohali, India*	2024-	Exoplanets (MS Project)
Tasneem Basra Khan	*National Institute of Science Education and Research (NISER), Bhubaneswar, India*	2024-	Exoplanets (MS Project)
Swastik Dewan	*National Institute of Science Education and Research (NISER), Bhubaneswar, India*	2024-	Exoplanets (MS Project)

MS Students			
Past MS Students	**Affliation**	**Year**	**Project Topic**
Spandan Dash	*National Institute of Science Education and Research (NISER), Bhubaneswar, India*	2019- 2021	Exoplanets (Pre-PhD Thesis)
Akshay Priyadarshi	*National Institute of Science Education and Research (NISER), Bhubaneswar, India*	2019- 2021	Exoplanets (MS Thesis)
Kishore Sourav	*National Institute of Science Education and Research (NISER), Bhubaneswar, India*	2020- 2022	Exoplanets (MS Thesis)
Suyash C Fokane	*National Institute of Science Education and Research (NISER), Bhubaneswar, India*	2020- 2022	Planet Formation (MS Thesis)
Dwaipayan Dubey	*Indian Institute of Science Education and Research (IISER), Kolkata, India*	2021-2023	Exoplanets (MS Thesis)
Rahul Arora	*National Institute of Science Education and Research (NISER), Bhubaneswar, India*	2021- 2023	Exoplanets (MS Thesis)
N. Mehta	*Indian Institute of Science Education and Research (IISER), Thiruvananthapuram, India*	2020-2023	Exoplanets (MS Thesis)
S. Ilhe	*Indian Institute of Science Education and Research (IISER), Kolkata, India*	2022-2023	Planet Formation (MS Thesis)
Baibhav Srivastava	*Indian Institute of Science Education and Research (IISER), Berhampur, India*	2022- 2023	Planet Formation (MS Thesis)
Varun Manilal	*National Institute of Science Education and Research (NISER), Bhubaneswar, India*	2021- 2023	Planet Formation (MS Thesis)
Chandan Kumar Sahu	*National Institute of Science Education and Research (NISER), Bhubaneswar, India*	2022- 2024	Exoplanets (MS Thesis)
Maitrey Sharma	*National Institute of Science Education and Research (NISER), Bhubaneswar, India*	2022- 2024	Exoplanets (MS Thesis)
Sambit Mishra	*Indian Institute of Science Education and Research (IISER), Berhampur, India*	2023-2024	Exoplanets (MS Thesis)