

Dr. Divita Gupta

✉ gupta@ph1.uni-koeln.de | 🌐 decodingastrochemysteries-divitagupta.com

EDUCATION

2013 – 2018 **Indian Institute of Science Education and Research, Mohali, India (IISER Mohali)** Dual BS-MS in Chemistry
CPI: 9.4/10

GRANTS AND AWARDS

2023–ongoing Marie Skłodowska-Curie Fellowship
2023 ACS Astrochemistry Subdivision Travel Award Offer
2023 RSC Researcher Development and Travel Grant
2022 Best Thesis Award from RSC Spectroscopy and Dynamics Interest Group
2022 Honourable mention for PhD prize from International Astronomical Union- Division B: Facilities, Technologies and Data Science
2021 Snyder Astrochemistry Award at International Symposium of Molecular Spectroscopy (ISMS)
2019 International Astronomical Union travel grant (IAU S350)
2017 Lindau Nobel Laureate Meeting; Funded by DFG, Germany and DST, India.
2018 CSIR-JRF Fellow; All India Rank: 48
2013–2018 KVPY Scholar, Fellowship in Basic Sciences funded by DST, India
2018 S N Kaul Award for best all-round performance in the graduating batch of 2018, IISER Mohali
2018 Certificate of Excellence for highest GPA in the graduating batch in Chemistry, IISER Mohali
2015, 2017 Certificate of Academic Excellence, IISER Mohali
2014 C.N.R. Rao Scholarship, IISER Mohali

RESEARCH EXPERIENCE

2023 – ongoing	Marie Skłodowska-Curie Fellow , Universität zu Köln	Germany
2022 – 2023	Postdoctoral researcher, Universität zu Köln	Germany
2018 – 2021	PhD student, Institute of Physics Rennes	France
March 2020	Visiting researcher, University of Leeds	UK
2017 – 2018	Masters thesis, IISER Mohali	India
December 2017	Visiting researcher, National Synchrotron Radiation Research Center	Taiwan
May–July, 2017	Research intern, Institute of Physics Rennes	France
June–July, 2016	Research intern, Physical Research Laboratory Ahmedabad	India
May–July, 2015	Research intern, National Centre for Radio Astrophysics-TIFR Pune	India

Postdoctoral Research: High-resolution rovibrational and rotational spectroscopy of ions using cold 22-pole ion traps. Low-temperature reaction kinetics of ionic species of astrophysical relevance. Advisor: Prof. Stephan Schlemmer.

Doctoral Research: Low-temperature gas-phase kinetics of reactions relevant to astrochemistry using the CRESU technique coupled to pulsed-laser photolysis laser-induced fluorescence (PLP-LIF) and to chirped-pulse microwave spectroscopy. Advisor: Prof. Ian Sims.

Visiting Researcher: Understanding MESMER (Master equation solver) to calculate multi-channel reaction rates. Advisor: Prof. Dwayne Heard. VUV and photolysis experiments on astrochemically relevant ices. Advisor: Dr. Bhalamurugan Sivaraman.

Masters thesis Research: Ethylene glycol-water interactions using Matrix Isolation FT-IR Spectroscopy & ab-initio calculations. Advisor: Prof. K. S. Viswanathan.

Research Internships: Study of rotational energy transfer during inelastic collisions. Advisor: Prof. Ian Sims. Ethylene glycol-water interactions on ISM cold dust analogs. Advisor: Dr. Bhalamurugan Sivaraman. Spectral line commissioning of a 15m radio dish & HI mapping of the galactic plane. Advisors: Prof. J. Chengalur & Dr. N. Ramanujam

PUBLICATIONS

1. Silva, W. G. D. P.; **Gupta, D.**; Plaar, E.; Doménech, J. L.; Schlemmer, S. and Asvany, O.; High resolution rovibrational and rotational spectroscopy of H_2CCCH^+ . (2023) *Molecular Physics*, e2296613
2. Schlemmer, S.; Plaar, E.; **Gupta, D.**; Silva, W. G. D. P.; Salomon, T. and Asvany, O.; High-resolution spectroscopy of the ν_3 antisymmetric C-H stretch of C_2H_2^+ using leak-out action spectroscopy. (2023) *Molecular Physics*, e2241567
3. Silva, W. G. D. P.; Cernicharo, J.; Schlemmer, S.; Marcelino, N.; Loison, J.-C.; Agúndez, M.; **Gupta, D.**; Wakelam, V.; Thorwirth, S.; Cabezas, C.; Tercero, B.; Doménech, J. L.; Fuentetaja, R.; Kim, W.-J.; de Vicente, P. and Asvany, O.; Discovery of H_2CCCH^+ in TMC-1. (2023) *Astronomy & Astrophysics Letters*, 676, L1
4. **Gupta, D.**; Silva, W. G. D. P.; Domenech, J. L.; Plaar, E.; Thorwirth, S.; Schlemmer S. and Asvany, O.; High-resolution rovibrational and rotational spectroscopy of singly deuterated cyclopropenyl cation, $c\text{-C}_3\text{H}_2\text{D}^+$. (2023) *Faraday Discussions*, 245, 298-308.
5. Wilkins, O.; **Gupta, D.** and Bertin, M. (2023). Highlights from Faraday Discussion: Astrochemistry at high resolution, Baltimore, USA (2023). *Chemical Communications*, 59(88), 13083-13088.
6. Rahul, K. K.; Ambresh, M.; Sahu, D.; Meka, J. K.; Chou, S. -L.; Wu, Y. -J.; **Gupta, D.**; Das, A.; Lo, J. -I.; Cheng, B. -M.; Raja Sekhar, B. N.; Bhardwaj, A.; Mason, N. J. and Sivaraman, B.; N-Graphene synthesized in astrochemical ices. (2023) *European Physical Journal D*, 77: 24.
7. Sita, M. L.; Changala, P. B.; Xue, C.; Burkhardt, A. M.; Shingledecker, C. N.; Lee, K. L. K.; Loomis, R. A.; Momjian, E.; Siebert, M. A.; **Gupta, D.**; Herbst, E.; Remijan, A. J.; McCarthy, M. C.; Cooke, I. R.; McGuire, B. A. Discovery of Interstellar 2-Cyanoindene ($2\text{-C}_9\text{H}_7\text{CN}$) in GOTHAM Observations of TMC-1. (2022) *The Astrophysical Journal Letters*, 938, L12
8. Hays, B. M.; **Gupta, D.**; Guillaume, T.; Abdelkader Khedaoui, O.; Cooke, I. R.; Thibault F.; Lique, F. and Sims, I. R.; Collisional excitation of HNC by He found to be stronger than for structural isomer HCN in experiments at the low temperatures of interstellar space. (2022) *Nature Chemistry*, 14, 811-815.
9. Messinger, J. P.; **Gupta, D.**, Cooke, I. R.; Okumura, M. and Sims I. R.; Low-temperature rate coefficients for the reaction between CN and toluene. (2020) *The Journal of Physical Chemistry A*, 24, 39, 7950-7958.
10. Hays, B. M.; Guillaume, T.; Hearne, T. S.; Cooke, I. R.; **Gupta, D.**; Abdelkader Khedaoui, O.; Le Picard, S. D. and Sims, I. R.; Design and performance of an E-band chirped pulse spectrometer for kinetics applications: OCS-He pressure broadening. (2020) *Journal of Quantitative Spectroscopy and Radiative Transfer*, 250, 107001.
11. Cooke, I. R.; **Gupta, D.**; Messinger, J. P.; Sims I. R.; Benzotrile as a proxy for benzene in the cold ISM: low-temperature rate coefficients for $\text{CN} + \text{C}_6\text{H}_6$. (2020) *The Astrophysical Journal Letters*, 891, L41.
12. **Gupta, D.**; Cheikh Sid Ely, S.; Cooke, I. R.; Guillaume, T.; Abdelkader Khedaoui, O.; Hearne, T. S.; Hayes, B. M. & Sims, I. R.; Low Temperature Kinetics of the Reaction Between Methanol and the CN Radical. (2019) *The Journal of Physical Chemistry A*, 123, 46, 9995-10003.
13. Thombre, R.; **Gupta, D.**; Pavithraa, S.; Lo, J. -I.; Chen, S. -L.; Wu, Y. -J.; Rahul, K. K.; Cheng, B. -M.; Hill, H.; Bhardwaj, A.; Raja Sekhar, B. N.; Mason, N. J.; Sivaraman, B.; Vacuum ultraviolet photoabsorp-

tion spectra of an in-situ synthesized peptide precursor – hydroxylamine on a cold astrochemical dust analogue. (2022) *European Physical Journal D*, 76, 53.

14. Kothari, M.; Kulkarni, L. G.; **Gupta, D.**; Thombre, R. (2022). Extremophiles in Sustainable Bioenergy Production as Microbial Fuel Cells. In A. Gunjal, R. Thombre, & J. Parray (Ed.), *Physiology, Genomics, and Biotechnological Applications of Extremophiles* (pp. 286–307). IGI Global.

Submitted & in preparation:

15. Guillaume, T.; Hays, B. M.; **Gupta, D.**; Cooke, I. R.; Khedaoui, O.; Hearne, T.; Drissi, M.; Sims, I. R.; Product-specific reaction kinetics in continuous uniform supersonic flows probed by chirped-pulse microwave spectroscopy. (*Submitted*).
16. **Gupta, D.**; Drissi, M.; Abdelkader Khedaoui, O.; Guillaume, T.; Hays, B. M.; Cooke, I. R.; Macario, A.; Rafael A. Jara-Toro; François Lique; Sims, I. R.; Product branching ratio in the low-temperature reaction of CN with propene measured using chirped-pulse microwave spectroscopy in a uniform supersonic flow. In prep, 2024.
17. Schmid, P.; **Gupta, D.**; Asvany, O.; Roncero, O. and Schlemmer, S. A state selective reaction story: probing $\text{H}_3^+ + \text{H}_2$. In prep, 2024.
18. Abdelkader Khedaoui, O.; Hays, B. M.; Cooke, I. R.; Hearne, T.; **Gupta, D.**; Guillaume, T.; Drissi, M.; Sims, I. R.: Improving the sensitivity of chirped pulse Fourier transform mm-wave detection in uniform supersonic flows. In prep, 2024.

RELEVANT PRESENTATIONS

1. **Invited talk**, “High-resolution spectroscopy of C_3H_3^+ ions relevant to astrochemistry”, American Chemical Society Fall 2023 Meeting, San Francisco, U.S.A., August 2023.
2. **Invited talk**, “High-resolution spectroscopy of astrophysically-relevant hydrocarbon ions”, Dust, Ice, Gas Astrochemistry Meeting, online, November 2022.
3. **Department talk**, “Solving the cosmic puzzle using laboratory astrochemistry”, Indian Institute of Science, Bangalore, India, January 2024.
4. **Department talk**, “High-resolution infrared spectroscopy of C_3H_3^+ ions: From theory to lab (to space?)”, Space Science and Astrobiology division of the NASA Ames Research Center, August 2023.
5. **Department of Chemical Sciences seminar**, “Low-temperature Kinetic Measurements to Unravel Cosmic Chemistry”, IISER Mohali, India, February 2022.
6. **Early career researcher talk**, “Exploring the kinetics of gas-phase reactions involving CN radical at astrophysically relevant temperatures”, Physical Research Laboratory, India (zoom), April 2021.
7. **Oral contribution**, “High resolution spectroscopy of astrochemically relevant ions”, 42nd Astronomical Society of India Meeting, Bangalore, India.
8. **Oral contribution**, “High-resolution rovibrational and rotational spectroscopy of singly deuterated cyclopropenyl cation, $c\text{-C}_3\text{H}_2\text{D}^+$ ”, Astrochemistry at high-resolution Faraday Discussion, Baltimore, United States.
9. **Oral contribution**, “High-resolution rovibrational spectroscopy of cyclopropenyl cation: The ν_4 C–H antisymmetric stretching band”, Physics and Chemistry of Star Formation: The Dynamical ISM Across Time and Spatial Scales, Puerto Varas, Chile.
10. **Oral contribution**, “Laboratory measurements of gas-phase reactions involving aromatic molecules at low temperatures”, European Conference on Laboratory Astrophysics (ECLA), Capri, Italy, Sep 2021.

11. **Oral contribution**, "Observing chemical reactions in low-temperature supersonic flows using chirped pulse Fourier transform millimeter spectroscopy", International Symposium on Molecular Spectroscopy (ISMS), online, June 2021.
12. **Oral contribution**, "Low-temperature kinetics measurements of the gas-phase reactions between aromatic species and the CN radical", ISMS, online, June 2021.
13. **Oral contribution**, "Kinetics of the reactions between aromatic molecules and the CN radical at astrophysically relevant temperatures", RSC Faraday joint interest group conference (online), March 2021.
14. **Oral contribution**, "Laboratory measurements of gas-phase reaction kinetics with CN radical at low temperatures" Astrochemistry Discussions (online), August 2020.
15. **Oral contribution** "Laboratory measurements of gas-phase reactions between aromatic species and the CN radical at low temperatures", PCMI biennial conference, online, July 2020
16. **Oral contribution**, "Matrix Isolation-FTIR and Ab-Initio Studies of Ethylene Glycol and Ethylene Glycol:Water complexes", Astrochemistry in THz meeting India, October 2017.

17. **Poster**: "Product branching ratio measurements for CN + propene at low temperature using chirped-pulse microwave spectroscopy in a uniform supersonic flow", QUADMARTS, Rennes, France, November 2021.
18. **Poster**: "Probing low-temperature reaction products using chirped pulse Fourier transform millimeter wave spectroscopy", Journées de Spectroscopie Moléculaire (JSM), Rennes, France, June 2021.
19. **Poster**: "Kinetics of the reaction between the CN radical and methanol at low temperatures using the CRESU technique", IAU S350 Laboratory Astrophysics, UK, April 2019.
20. **Poster**: "Vacuum Ultraviolet photoabsorption of molecules with astrochemical and astrobiological relevance: Benzonitrile and Hydroxylamine", IAU S350 Laboratory Astrophysics, UK, April 2019.

TEACHING AND MENTORING

Aug 2022-November 2023: Supervisor of a master's thesis project student, Universität zu Köln.

April 2023- July 2024: Tutor for Masters course on "Molecular Physics II" with Prof. Stephan Schlemmer & Dr. Oskar Asvany, Universität zu Köln.

October 2022- February 2023 & October 2023- February 2024: Tutor for Masters course on "Molecular Physics I" with Prof. Stephan Schlemmer & Dr. Oskar Asvany, Universität zu Köln.

Summer 2019: Supervisor of a summer intern, Université de Rennes 1.

December 2020 – January 2021 & October – November 2019: Instructor (50%; design & teaching) for 2nd year Masters course on "Scientific and Technical Communication in English", Université de Rennes 1.

January 2020 – April 2021: Teaching Assistant for 1st year Masters course on "Molecular Spectroscopy" with Prof. Ian Sims, Université de Rennes 1.

October – November 2019: Teaching Assistant for 2nd year Masters and Ph.D. course on "Data Analysis" with Prof. Ian Sims, Université de Rennes 1.

January – April 2018: Teaching Assistant for 2nd year Masters laboratory course on Analytical Chemistry with Prof. Sabyasachi Rakshit & Prof. Sanchita Sengupta, IISER Mohali.

August – November 2017: Teaching Assistant for 2nd year Masters laboratory course on Physical Chemistry with Prof. K.S. Viswanathan, IISER Mohali.

OUTREACH AND LEADERSHIP ROLES

1. **Astronomy on Tap public talk**, 'Solving the cosmic jigsaw puzzle', Cologne, Germany (March 2024)

2. **Outreach talk**, 'Introduction to Astrochemistry and Experimental Astrophysics', High school students organised via Avurtana Learning Pvt. Ltd., Bangalore, India, September 2023
3. **Outreach Talk**, 'Product-specific reaction kinetics of CN in uniform supersonic flows probed by chirped-pulse microwave spectroscopy', PhD day, Université de Rennes 1, November, 2021.
4. **Outreach talk**, 'Exploring the low-temperature chemistry in space', Curie (Chemistry) Club, IISER Mohali, February 2022.
5. **Outreach talk**, 'Gas-phase astrochemistry- kinetics of reactions in cold ISM', Astronomy Club, IISER Mohali, February 2022.
6. **Outreach talk**, 'Exploring the Universe Beyond Astrophysics: Understanding Astrochemistry', Astronomy Club, IISER Mohali (online), March 2021.
7. **Invited outreach talk**, 'How Rocket Science proved Arrhenius (Partially) Wrong', Sacred Heart College, Tirupattur, India (online), July 2021.

LEADERSHIP/SERVICE ROLES

1. **Member** SFB1601 Diversity Board, Cologne, 2023-*ongoing*.
2. **Organizing Team member** Astronomy on Tap, Cologne, 2024-*ongoing*.
3. **Conference volunteer**, QUADMARTS, Rennes, France, November 2021.
4. **Conference volunteer**, Journées de Spectroscopie Moléculaire (JSM), Rennes, France, June 2021.
5. **Co-organizer** PhD day, Université de Rennes 1, November, 2020.
6. **Co-organiser** "Women in Astrochemistry" event under Astrochemistry Discussions May, 2020.
7. **Head coordinator** of an outreach event for 600+ school children, IISER Mohali, 2017
8. **Cultural Secretary** Led all the institute clubs and organized various cultural events, IISER Mohali, September 2015–August 2016.
9. **Co-convener, Astronomy Club** Coordinated multiple activities/talks relevant to astronomy, IISER Mohali, September 2014–August 2015.
10. **Conference volunteer**, Astronomical Society of India meeting, IISER-Mohali, 2014

Last updated: March 19, 2024