Siddhant Sharma

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Education

Ashoka University — Haryana, India
Master of Science in Biology — *Aug. 2023 – Present*

University of Delhi — New Delhi, India
Bachelor of Science (Honors) in Biochemistry — *Jul. 2019 – Jun. 2022*

Publications

- Sandström, H., Ruiz-Izquierdo, F., Cappelletti, M., Dogan, R., **Sharma, S.**, Bailey, C., & Rahm, M. **(2024)**. A Thermodynamic Landscape of Hydrogen Cyanide-Derived Molecules and Polymers. *Chemrxiv.* https://doi.org/10.26434/chemrxiv-2024-ln735
- Cruz Simbron, R., **Sharma, S.**, Arya, A., Ray, J., Lozano, A., Andersen, J. L., Chen, H., & Cleaves, H. J. **(2024)**. Combined Network and High-Resolution Mass Spectrometry Analysis of the Formose Reaction Reveals Mechanisms for Emergent Behaviors. *Chemrxiv.* https://doi.org/10.26434/chemrxiv-2024-nj0p6-v2
- Zajkowski, T., Lee, M., **Sharma, S.**, Vallota-Eastman, A., Kuska, M., Malczewska, M., & Rothschild, L. J. **(2023)**. Conserved functions of prion candidates suggest a primeval role of protein self-templating. *Proteins: Structure, Function, and Bioinformatics*, 91(9), 1298-1315. https://doi.org/10.1002/prot.26558
- Kerins, E., Awiphan, S., Edmondson, K., Garrett, M., Haqq-Misra, J., Heller, R., Huston, M., Kipping, D., Kopparapu, R., Price, D. C., Siemion, **Sharma, S.,** Sneed, E.L., Socas-Navarro, H., Wilson, R. F., & Wright, J. **(2023)**. RoSETZ: Roman Survey of the Earth Transit Zone – a SETI-optimized survey for habitable-zone exoplanets. *arXiv.* https://doi.org/10.48550/arXiv.2306.10202
- Haqq-Misra, J., Schwieterman, E. W., Socas-Navarro, H., Kopparapu, R., Angerhausen, D., Beatty, T. G., Berdyugina, S., Felton, R., **Sharma, S.**, De la Torre, G. G., Apai, D. **(2022)**. Searching for technosignatures in exoplanetary systems with current and future missions. *Acta Astronautica*, (198), 194–207. https://doi.org/10.1016/j.actaastro.2022.05.040
- Arya, A., Ray, J., **Sharma, S.**, Cruz Simbron, R., Lozano, A., Smith, H. B., Andersen, J. L., Chen, H., Meringer, M., & Cleaves, H. J. **(2022)**. An open-source computational workflow for the discovery of autocatalytic networks in abiotic reactions. *Chemical Science*, 13(17), 4838-53. https://doi.org/10.1039/d2sc00256f
- Quanz, S. P., Ottiger, M., Fontanet, E., Kammerer, J., Menti, F., Dannert, F., ... & LIFE collaboration (**including Sharma, S**). **(2022)**. Large Interferometer For Exoplanets (LIFE): I. Improved exoplanet detection yield estimates for a large mid-infrared space-interferometer mission. *Astronomy & Astrophysics*, 664, A21. https://doi.org/10.1051/0004-6361/202140366
- Pandey, S., Macey, M.C., Das, D., Mohanty, A., Tiwary, S., Jose, JV., & **Sharma, S. (2022)**. Astrobiology as a driver to connect India's public, scientists, and space missions. *New Space*, 10(1), 51-67. https://doi.org/10.1089/space.2021.0041
- **Sharma, S.**, Arya, A., Cruz, R., & Cleaves II, H. **(2021)**. Automated Exploration of Prebiotic Chemical Reaction Space: Progress and Perspectives. *Life*, 11(11), 1140. https://doi.org/10.3390/life11111140

Industry Experience

Celine Biotechnologies (Early Stage Startup) — Remote
Antibody Design Consultant — *May. 2024 – July 2024*

- I am working on computationally designing effective HER2+ Bispecific T-Cell Engagers, and collaborating with CROs on the experimental pipeline development for the production, purification, and functional assays.

Kano Therapeutics (Seed Startup) — Boston, MA & Remote
Bioinformatics Consultant — *Oct. 2022 – March 2024*

- Built, and maintained an in-house computational pipeline for simulating ssDNA sequences in a coarse-grained molecular dynamics engine and elucidating the genomic descriptors for improved feature statistics. I also collaborated with the wet lab team to increase the knock-in efficiency of ssDNA production and validate the internal analysis pipeline while also being involved in product and strategy management.

Latch Bio (Series-A Startup) Remote

Biocomputing Associate *May. 2022 – Sept. 2022*

- Aided in Latch Python SDK development by fixing bugs, designing use cases, and bringing CRISPR bioinformatic workflows to the platform. I was also involved in the early Latch platform's UX/UI design improvements.

Research Experience

Summer Intern: Koita Center for Digital Health, Ashoka University March 2024 – Present

UK Biobank GWAS Pipeline *PI: **Dr. Anurag Agarwal***

- I am working with the **Simons-Ashoka Early Career Fellows** to design a GWAS analysis pipeline for UK Biobank data for lung function phenotypes.

Visiting Student: University of New South Wales, Australia Jun. 2023 – Aug. 2023

Modelling Bistability in Formose Reaction *PI: **Dr. Albert Fahrenbach***

- Under **UNSW Study Abroad Research Practicum**, I focussed on computationally modelling systems-level behaviour like bistability in the formose reaction, while also carrying out NMR, and LC-MS analysis for measuring the experimental reaction rate kinetics. I utilized a particle-in-a-cell-simulator, SMOLDYN for modelling the dynamics of sugar transport in vesicle systems. I also aided in measuring computational reaction rate kinetics through DFT calculations and building a microfluidic formose reaction system to match the computed outcomes.

Summer Fellowship: Harvard University, Massachusetts USA Jul. 2022 – Oct. 2022

Modelling the First Stages of Protocell Synthesis using RAFT-PISA *PI: **Dr. Juan Perez-Mercader***

- Under **2022 Harvard Origins Initiative Summer Undergraduate Research Prize Award**, I worked on building a coarse-grained representation of non-equilibrium kinetics for the PET-RAFT polymerization of amphiphiles, and their dissipative self-assembly into micelles, utilising MATLAB and Kinetic Monte Carlo modelling. I also did NMR analysis of a toy PET-RAFT reaction for my model.

Bachelor's Thesis: Universities Space Research Association, USA Jan 2022 – May 2022

Conserved Functions of Prion Candidates *PI: **Dr. Lynn Rothschild***

- I worked remotely with an international team to develop a computational pipeline to identify candidate prions in all high-quality proteomes available in UniProt, assessing their phylogenomic distributions, and analysing candidate-prion functional annotations.

Summer Fellowship: Chalmers University of Technology, Sweden May 2021 – Aug. 2021

Simulating the Thermodynamics of HCN-derived Polymers *PI: **Dr. Martin Rahm***

- Under **2021 Chalmers Astrophysics & Space Science Summer (CASSUM) program**, I worked on utilising quantum chemical calculations for generating a thermodynamically plausible ΔG° estimations for HCN-derived structures.

Research Associate: Blue Marble Space Institute of Science, Seattle USA May 2020 – May 2021

Automated Prebiotic Autocatalytic Chemical Reaction Networks *PI: **Dr. Henderson Cleaves***

- Under **2020 BMSIS Young Scientist Program**, I worked to build an open-source modifiable chemoinformatic workflow to model abiological chemistry. Our pipeline automates the generation of chemical reaction networks to discover novel compounds and autocatalytic processes.

Winter Internship: THSTI, Faridabad, India Nov. 2019 – Dec. 2019

DENV Infection on Megakaryopoesis *PI: **Dr. Sankar Bhattacharya***

- Under the **Shadow-a-Scientist Program,** I got experience in Mammalian Cell Culture with K562 Cell Line, and Fluorescent Microscopy at the Translational Health Science Training Institute.

Grants

Harvard Origins Initiative Summer Undergraduate Research Prize Award
$6000 awarded to 3 undergraduates for 10 weeks of Origins of Life Research at Harvard University in 2022.

NHGRI AnVIL Continued Cloud Credits Program (AC3)
$3300 computing support grant in 2022 for *"Trainee Track: Seeking Evolutionary Conservation in Prion Proteins"*
PI: Michael D. Lee (NASA AMES) **Trainee: Siddhant Sharma**

American Geophysical Association Student Travel Grant
$1000 for presenting at virtual **AGU Fall Meeting** 13–17th December 2021.

Chalmers Astrophysics & Space Science Summer (CASSUM) Research Fellowship | **Link**
$2700 awarded to 14 applicants out of 150 worldwide for 10 weeks of undergraduate research in 2021.

SETI Institute's 2020 SETI Forward Award | **Press Release**
$1500 awarded to 2 applicants, thus becoming the first international awardee.

Open Bioinformatics Foundation Travel Grant
$200 awarded for presenting at virtual **ISC-EMBS-IEEE Silesian** 10–11th December 2020.

Science Outreach

- **Sharma, S.** & Garg, M. Investigating the Role of Vitamin D in Asthma. *eLife*, 2024, 13. https://doi.org/10.7554/elife.97031
- **GoldSchmidt Student Volunteer:** I served as a student volunteer for the virtual Goldschmidt 2021, and Hybrid Goldschmidt 2022 in Hawaii, helping with communications and virtual access.
- **Europlanet Social Media Internship** I was one of the 6 social media interns supporting the communications team for the Europlanet Science Congress from 21st September – 2nd October 2021. Press Release

Conference Presentations

- Combined Network and High-Resolution Mass Spectrometry Analysis of the Formose Reaction Reveals Mechanisms for Emergent Behaviors, **Joint CO world &12th ELSI Symposium 2024**. 9 – 12th January 2024 **Poster**
- Mineral Driven Thermal Catalytic Conversion of a Representative Cosmic Polycyclic Aromatic Hydrocarbon (PAH) to a Biologically Extant Quinone, **AGU Fall Meeting 2023**. 11 – 15th December 2023 **Poster**
- Conserved Functions of Prion Candidates Suggest a Primeval Role of Protein Self-Templating, **SMBE Regional Meeting – Molecular Mechanisms in Evolution**. 14 – 17th December 2023 **Travel Grant Awarded**
- Planetary Minerals Drive Conversion of a Representative Cosmic Polycyclic Aromatic Hydrocarbon (PAH) to a Biologically Extant Quinone in Simulated Thermal Environments, **GoldSchmidt 2022**. 10–15th July 2022 **Poster**
- Thermodynamics of HCN-derived Polymers, **AGU Fall Meeting 2021**. 13–17th December 2021 **Poster**
- Pharmacoinformatics, Virtual Screening, and Molecular Dynamics Simulation towards identification of inhibitors against Human Pathogenic Lujo-virus 6GH8 Target, **16th BBCC**. 1-3rd December 2021 **Poster**
- Computationally Exploring Prebiotic Chemical Reaction Networks, **Life &Space**. 30th September 2021 **Talk**
- Exploring Uncommon Epitopes For A Stable Immune Response Through MHC1 Binding, **Applied Computational Sciences Research Symposium (ACRES)**. 24th September 2021 **Talk**
- *In-Silico* Modelling of Prebiotic Reaction Networks, **AbGradCon 2021**. 14–17th September 2021 **Talk**
- Simulating Automated Prebiotic Autocatalytic Chemical Reaction Networks, **Virtual Symposium on Theoretical and Computational Chemistry in Canada (VSTC^3) 2021**. 19–23rd July 2021 **Talk**
- *In-Silico* Modelling of Reaction Networks Involved in Prebiotic Chemistry to Understand the Origins of Life, **GoldSchmidt 2021**. 9th July 2021 **Talk**
- A Computational Simulation of Reaction Networks Involved in Life Essential Chemistry, **The Israel Society for Astrobiology and the Study of the Origin of Life (ILASOL) 2021**. 20th April 2021 **Talk**
- A Computational Simulation of a Reaction Network Involved in Prebiotic Reactions, **5th International Congress of Astrobiology, Instituto de Astrobiología Colombia**. 11–14th November 2020 **Talk**
- A Computational Simulation of Reaction Networks Involved in Alkaline Degradation of Glucose, **Astrobiology Australasia Meet (AAM) 2020**. 10th August 2020 **Flash Talk**