

PERSONAL INFORMATION

DATE OF BIRTH: 9th August 1996
 SPOKEN LANGUAGES: English, Bengali (mother tongue), Hindi
 PRESENT ADDRESS: Département de Physique Théorique, Université de Genève,
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EDUCATION

SINCE AUGUST, 2019 PhD in Physics, Department of Physics, IISER-Pune, India

2017-2019 M.Sc. in Physics, Department of Physics, IISER-Pune, India
 (Joined the department as an Integrated M.Sc. Ph.D. student)
 CGPA - 8.2

2014-2017 B.Sc. in Physics, Department of Physics,
 Ramakrishna Mission Residential College, Narendrapur (Calcutta University)
 71% Marks

PRESENT POSITION

1. Swiss Government Excellence Fellow,
 Département de Physique Théorique, Université de Genève,
 24 quai Ernest Ansermet, 1211 Genève 4, Switzerland (Since September, 2022)
 Supervisor - Prof. Julien Carron
2. Senior Research Fellow, Department of Physics,
 Indian Institute of Science Education and Research, Pune (Since August, 2021)
 Pune-411008, India
 Supervisor - Prof. Tarun Saouradeep
3. Visiting Research Fellow,
 Astronomy and Astrophysics, (Since April, 2022)
 Raman Research Institute,
 Bengaluru-560 080, India

AWARDS & SCHOLARSHIP

1. Recipient of **Infosys Foundation Travel Award** (50,000 INR), to attend the **Future Cosmology** workshop at IESC Cargese, France and has been designated as **Infosys Foundation Fellow**.
 (March, 2023) - [Award letter](#)
2. Recipient of grant (2000 CHF) from **Société académique de Genève (SACAD)**, to attend the **Future Science with CMB x LSS** workshop at YITP, Kyoto University.
 (March, 2023) - [Award letter](#)
3. Recipient of **Swiss Government Excellence Scholarship (Research)**, Hosted by the University of Geneva
 (September 2022 - Present) - [Award Letter](#)
4. Recipient of Institute PhD fellowship from IISER-Pune, MHRD (August 2019 - August 2022)
5. Recipient of Institute M.Sc. fellowship from IISER-Pune, MHRD (August 2017 - August 2019)
6. Cleared Joint Entrance & Screening Test (JEST) for Integrated PhD, 2017 with a rank of 248.
7. Cleared IIT JAM, 2017 with a rank of 472.
8. Was awarded the certificate of merit as **Sate Topper** for having been placed among top 1% of 774 candidates of the state of West Bengal (India) in **National Graduate Physics Examination 2017** conducted by **Indian Association of Physics Teachers (IAPT)**.

9. Recipient of DST-Inspire Scholarship for College & University students by MHRD, Govt. of India (2014-2017).

PUBLICATION

1. S. Saha, L. Legrand, and J. Carron, **Cluster profiles from beyond-the-QE CMB lensing mass maps**, [arXiv:2307.11711 \[astro-ph.CO\]](#),
2. S. Saha, S. Shaikh, S. Mukherjee, T. Souradeep, and B. D. Wandelt, **Bayesian estimation of our local motion from the Planck-2018 CMB temperature map**, (2021), [arXiv:2106.07666 \[astro-ph.CO\]](#), JCAP 10 (2021) 072.

RESEARCH EXPERIENCE

1. Currently I am working on studying the weak gravitational lensing of the Cosmic Microwave Background (CMB) by galaxy clusters in small angular scales. I am developing simulations of a CMB flat sky patch, which is lensed by galaxy clusters. Also, I am working on a sophisticated estimator which is able to estimate the mass of a cluster with better significance for CMB S4-like experiments. I am building upon the clusterlens part of python module [Lensit](#) by Julien Carron.
2. In my last project, I studied signatures of statistical isotropy violation of the CMB, caused by the motion of our observation frame. From those signatures on a significantly small angular scale, we have estimated the velocity of our local motion with a high significance compared to earlier works. In a Bayesian approach of parameter estimation, Hamiltonian Monte-Carlo (HMC) technique was employed to explore the posterior distribution of our model parameters.
3. At the time of my M.Sc., I have worked on data analysis of high energy cosmic ray air-shower data with Machine Learning (ML) and Deep Learning (DL) technique. This work involved mostly making a Monte-Carlo pipe-line, which can simulate air-shower for different primaries up to detector level and also training a ML and DL model with this simulated data to classify the primary particle and determine different features of it.

SCIENCE EXPERIMENTS (DATA ANALYSIS OR FORECAST)

1. CMB-S4 (Working on the forecast of galaxy cluster mass detection and its significance)
2. Planck (Studying the violation signatures of isotropy of foreground cleaned CMB maps)
3. CMB-Bharat

CONFERENCES & SCHOOLS

1. **Third EuCAPT Annual Symposium** (May-June, 2023)
CERN, Geneva, Switzerland
Talk - **Extracting Cluster Information from small-scale CMB** [\[Link\]](#)
2. **Future Cosmology** (April, 2023)
Institut d'Etudes Scientifiques de Cargèse (IESC), France
Talk - **Dark Matter Halos under the spotlight of CMB-Lensing**
3. **Future Science with CMB x LSS** (April, 2023)
Yukawa Institute for Theoretical Physics, Kyoto University, Kyoto, Japan
Talk & Poster - **Dark Matter Halos under the spotlight of CMB-Lensing**
4. **Cosmoglobe Winter Workshop** (January, 2023)
University of Oslo, Oslo, Norway
Talk - **Inferring our local motion from Small-scale CMB**
5. **Physics of the Early Universe** (January, 2022)
International Centre for Theoretical Sciences (ICTS), Bengaluru, India
6. **School-cum-Workshop on Data Analysis in Cosmology and Astroparticle Physics** (August, 2021) (Online)
Technology Innovation Hub (TIH), Indian Statistical Institute, Kolkata
[Course Certificate](#)
7. **Summer School in Statistics for Astronomers** (June, 2021) (Online)
Penn State University
[Course Certificate](#)
8. **Pune-Mumbai Collider Meet** (March, 2019)
Indian Institute of Science Education and Research (IISER), Pune-411008, India

RELEVANT ONLINE COURSES

1. **Neural Networks and Deep Learning**
deeplearning.ai
[Course Certificate](#)
2. **Structuring Machine Learning Projects**
deeplearning.ai
[Course Certificate](#)

3. **Improving Deep Neural Networks: Hyperparameter tuning, Regularization and Optimization**
deeplearning.ai
[Course Certificate](#)

COMPUTATION SKILLS

Operating systems : Windows, Linux, macOS
Computation languages : Python, Fortran 90, Shell script
Application packages : MS Office, LaTeX
Cosmology Packages: CAMB, HEALPix (healpy)
Sampling Methods: MCMC Sampling (Metropolis-Hastings, HMC)
ML & DL Libraries : pandas, scikit-learn, tensorflow,

TEACHING EXPERIENCE

1. Teaching Assistant for the course “**Electricity & Magnetism, PHY201**” for 2nd year BS-MS students at IISER, Pune under Dr. Aparna Deshpande and Dr. Diptimoy Ghosh. (August, 2019-December, 2019).
2. Teaching Assistant for the course “**Nuclear & Particle Physics, PHY422**” for 4th year BS-MS students at IISER, Pune under Prof. Sunil Mukhi (January, 2020 - April, 2020).
3. Teaching Assistant for the course “**Group Theory in Physics PHY356**” for 4th year BS-MS students at IISER, Pune under Prof. Sudarshan Ananth (September, 2020 - January, 2021).

JOURNAL CLUBS

1. Member of weekly **Cosmology Journal Club** at Département de Physique Théorique, Université de Genève
2. Member of weekly Journal club, **Very Sirius Meeting (VSM)** at Astronomy and Astrophysics Department, Raman Research Institute
3. Organiser of **Astrophysics, Cosmology, and Particle Physics Journal Club** at IISER-Pune (September, 2019 - March, 2020)