

Soumak Maitra

I am a postdoctoral researcher at DTP-TIFR, exploring large-scale structure and cosmic reionization, with a growing interest in machine learning techniques.



CONTACT

✉ soumak93@gmail.com
✉ soumak.maitra@theory.tifr.res.in
✉ soumak.maitra@tifr.res.in
☎ +91 8174997160
📍 DTP, TIFR, Homi Bhabha Road
Mumbai 400005, India
🆔 0000-0002-7684-4205
🌐 NASA/ADS publication list

SKILLS

Programming

Python

MPI

Latex

C/C++

Bash

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ML Framework

Pytorch

JAX

Tensorflow

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Operating Systems

Linux

Windows

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Simulations

GADGET-2

GADGET-3

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Observations

VLT/XSHOOTER

VLT/UVES

KECK/HIRES

HST-COS

SDSS

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Others

VPFit

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RESEARCH EXPERIENCE

📅 10/2024 - Present	📍 Tata Institute of Fundamental Research, Mumbai, India	Postdoctoral Researcher
📅 11/2021 - 8/2024	📍 INAF-Osservatorio Astronomico di Trieste, Italy	Postdoctoral Researcher
📅 08/2021 - 11/2021	📍 Inter-University Centre for Astronomy and Astrophysics, Pune, India	Enhanced Research Fellow
📅 08/2016 - 07/2021	📍 Inter-University Centre for Astronomy and Astrophysics, Pune, India Advisor: Prof. Raghunathan Srianand	Ph.D (Astrophysics)
Thesis title: <i>Probing the astrophysical and cosmological aspects of Intergalactic Medium using Quasar spectra</i>		

EDUCATION

📅 07/2014 - 07/2016	📍 Indian Institute of Technology - Kanpur, Kanpur, India Specialization in Cosmology and General Relativity GPA Obtained - 9.3/10, First Class	Master of Science (Physics)
📅 06/2011 - 06/2014	📍 Jadavpur University, Kolkata, India Percentage Obtained - 78.25/100, First Class	Bachelor of Science (Physics)
📅 05/2011	📍 B. D. Memorial Institute, Kolkata, India Percentage Obtained - 94.0/100	C.B.S.E Senior School Certificate Exam
📅 05/2009	📍 B. D. Memorial Institute, Kolkata, India Percentage Obtained - 95.2/100	C.B.S.E Secondary School Exam

RESEARCH INTERESTS

- Large-scale structure formation and cosmic reionization
- Astrophysics of the Intergalactic Medium (IGM)
- Lyman- α forest and Lyman- α emitters as cosmological probes
- Quasar absorption lines and high-redshift spectroscopy
- Machine learning in astrophysical and cosmological analysis
- N-body and hydrodynamical simulations
- Observational cosmology with high-redshift tracers

ACADEMIC ACHIEVEMENTS AND AWARDS

- 🏆 2018- Awarded UGC Senior Research Fellowship
- 🏆 2016- Awarded UGC Junior Research Fellowship for qualifying **National Eligibility Test**

CONFERENCES/WORKSHOPS AND TALKS

- 📅 January, 2025

📍 IUCAA, Pune, India

"Parameter estimation from Lyman- α forest in Fourier space using Information Maximising Neural Networks"

Talk at *AI/ML Applications in Astronomy & Astrophysics workshop*.
- 📅 December, 2024

📍 IUCAA, Pune, India

"Neural Network approach in Lyman- α forest for astrophysical & cosmological parameter inference"

Talk at *Baryons Beyond Galactic Boundaries-2024 conference*.
- 📅 June, 2022

📍 Trieste, Italy

"Higher-order clustering study of Lyman- α forest"

Poster at *"HACK100: Past, Present and Future of Astrophysical Spectroscopy"* conference.
- 📅 March, 2022

📍 Kavli IPMU, Japan

"Clustering statistics of Lyman- α forest beyond 2-point "

Talk at *Cosmic Cartography 2022 conference*.
- 📅 January, 2021

📍 TIFR, Mumbai, India

"Higher-order clustering statistics in the Intergalactic Medium using Lyman- α forest"

Invited Talk.
- 📅 September, 2018

📍 Kavli IPMU, Japan

"Three point correlation of the IGM"

Talk at *IGM2018 Conference*.
- 📅 March, 2018

📍 NISER Bhubaneswar, India

"Spatial correlations of the IGM"

Talk at *Introductory school on Galaxy formation*.
- 📅 December, 2017

📍 IUCAA, Pune, India

"Spatial correlations of the IGM"

Talk at *Galaxies in Absorption-2017* international workshop.
- 📅 February, 2018

📍 IUCAA, Pune, India

Attended *Franco-Indian Astronomy School on "From Re-ionization to large-scale structure: A multiwavelength approach"*.
- 📅 October, 2017

📍 IUCAA, Pune, India

Attended *International Workshop on Post-Planck Cosmology: Enigma, Challenges and Visions*.
- 📅 September, 2017

📍 IUCAA, Pune, India

Attended *Young Astronomers' Meet 2017*.
- 📅 August, 2017

📍 IUCAA, Pune, India

Attended *Meeting on Plasma Universe and its Structure Formation*.

DATE OF BIRTH

10 November, 1993

NATIONALITY

India

GENDER

Male

LANGUAGES

English
Hindi
Bengali

PROFESSIONAL REFERENCES

- **Girish Kulkarni:**
📍 TIFR, Mumbai, India ✉ kulkarni@theory.tifr.res.in
- **Raghunathan Srianand:**
📍 IUCAA, Pune, India ✉ anand@iucaa.in
- **Stefano Cristiani:**
📍 INAF-OATS, Italy ✉ stefano.cristiani@inaf.it
- **Matteo Viel:**
📍 SISSA, Trieste, Italy ✉ matteoviel@gmail.com
- **Roberto Trotta:**
📍 SISSA, Trieste, Italy ✉ rtrotta@sissa.it
- **Patrick Petitjean:**
📍 IAP, Paris, France ✉ ppetitje@iap.fr
- **Aseem Paranjape:**
📍 IUCAA, Pune, India ✉ aseem@iucaa.in

PUBLICATIONS AND CONFERENCE PROCEEDINGS

Three- and two-point spatial correlations of intergalactic medium at $z \sim 2$ using projected quasar triplets

👤 **S. Maitra**, R. Srianand, P. Petitjean, H. Rahmani, P. Gaikwad, T. R. Choudhury, C. Pichon

📅 2019 📖 Monthly Notices of the Royal Astronomical Society, Volume 490, Issue 3, p.3633-3653

🔗 [ADS](#), [arXiv](#)

Three- and two-point spatial correlations of IGM at $z \sim 2$: cloud-based analysis using simulations

👤 **S. Maitra**, R. Srianand, P. Gaikwad, T. R. Choudhury, A. Paranjape, P. Petitjean

📅 2020 📖 Monthly Notices of the Royal Astronomical Society, Volume 498, Issue 4, pp.6100-6119

🔗 [ADS](#), [arXiv](#)

Redshift space three-point correlation function of IGM at $z < 0.48$

👤 **S. Maitra**, R. Srianand, P. Gaikwad, N. Khandai

📅 2022 📖 Monthly Notices of the Royal Astronomical Society, Volume 509, Issue 3, pp.4585-4607

🔗 [ADS](#), [arXiv](#)

Measurement of redshift space two- and three-point correlation of $\text{Ly}\alpha$ absorbers at $1.7 < z < 3.5$: Implications on evolution of the physical properties of IGM

👤 **S. Maitra**, R. Srianand, P. Gaikwad

📅 2022 📖 Monthly Notices of the Royal Astronomical Society, Volume 509, Issue 1, pp.1536-1556

🔗 [ADS](#), [arXiv](#)

Role of ionizing background on the statistics of metal absorbers in hydrodynamical simulations

👤 Sukanya Mallik, Raghunathan Srianand, **Soumak Maitra**, Prakash Gaikwad, Nishikanta Khandai

📅 2023 📖 Monthly Notices of the Royal Astronomical Society, Volume 523, Issue 2, pp.2296-2316

🔗 [ADS](#), [arXiv](#)

Spectroscopy of QUBRICS quasar candidates: 1672 new redshifts and a Golden Sample for the Sandage Test of the Redshift Drift

👤 Stefano Cristiani, Matteo Porru, Francesco Guarneri, Giorgio Calderone, Konstantina Boutsia, Andrea Grazian, Guido Cupani, Valentina D'Odorico, Fabio Fontanot, Carlos J. A. P. Martins, Catarina M. J. Marques, **Soumak Maitra**, Andrea Trost

📅 2023 📖 Monthly Notices of the Royal Astronomical Society, Volume 522, Issue 2, pp.2019-2028

🔗 [ADS](#), [arXiv](#)

Higher order clustering of $\text{Ly}\alpha$ forest

👤 **Soumak Maitra**

📅 2023 📖 MemSAIt, Vol.94 n.2

🔗 [arXiv](#)

Role of ionizing background and galactic feedback on the redshift space clustering of OVI absorbers in hydrodynamical simulations



👤 **Soumak Maitra**, Sukanya Mallik, Raghunathan Srianand,

📅 2024 📖 Monthly Notices of the Royal Astronomical Society, Volume 530, Issue 3, May 2024, Pages 3013–3019

🔗 [ADS](#), [arXiv](#)


Parameter estimation from $\text{Ly}\alpha$ forest in Fourier space using Information Maximising Neural Network



 **Soumak Maitra**, Stefano Cristiani, Matteo Viel, Roberto Trotta, Guido Cupani

 2024  Astronomy&Astrophysics, Volume 690, October 2024

 [ADS,arXiv](#)

The Lyman- α emitter bispectrum as a probe of reionization morphology

 **Soumak Maitra**, Girish Kulkarni, Shikhar Asthana, James S. Bolton, Martin G. Haehnelt, Laura Keating

 2025  Submitted to MNRAS

 [arXiv](#)