

SUVODIP MUKHERJEE

Lagrange Postdoctoral Fellow

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Last update: December 3, 2018

EMPLOYMENT

Institut D'Astrophysique De Paris, Paris, France *Sept, 2018-onwards*
Lagrange Postdoctoral Fellow.

**Center for Computational Astrophysics
Flatiron Institute, New York, USA** *Sept, 2017- Sept, 2018*
Flatiron Research Fellow

Institut D'Astrophysique De Paris, Paris, France *Dec, 2016- Sept, 2017*
Lagrange Postdoctoral Fellow.

EDUCATION

I.U.C.A.A. *Oct, 2016*
Ph.D.
Specialization: Cosmology
Thesis Title : Seeking Physics Beyond the Isotropic Cosmological Model
Advisor: Professor Tarun Souradeep, I.U.C.A.A.

Hyderabad Central University *June, 2011*
M.Sc.
Major: Physics.
Specialization: Quantum Field Theory, General Relativity and Particle Physics.
Thesis Title: A Study of Solutions of Dirac Equation for a Few Physical Systems.
Advisor: Professor Ashok Kapoor, Hyderabad Central University

Fergusson College, University of Pune *June, 2009*
B.Sc.
Major: Physics.
Minor: Mathematics, Electronics, Statistics.
Thesis Title: Computational Analysis of Radiation from a relativistically expanding shell originating in a Gamma Ray Burst.
Advisor: Professor Dipankar Bhattacharya, I.U.C.A.A.

CURRENT RESEARCH INTERESTS

Theoretical Astrophysics, Cosmology and Data Analysis: Cosmic Microwave Background (CMB) anisotropies, CMB spectral distortions, Axions, large scale structure formation, cosmology with gravitational waves, weak lensing, Galactic dust, Bayesian analysis.

TECHNICAL STRENGTHS

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| Computational skills: | C, Python, Fortran, Linux, Matlab (Basic), Mathematica (Basic), GNU (Basic) |
| Cosmological softwares used: | CAMB, CLASS, COSMOMC, HEALPix, PySM |
| Cosmological softwares developed: | Code for Non-Isotropic Gaussian Sky (CoNIGS), 3-D differential equation solver for axion signal in Milky Way, Axion-ILC: code for component separation of CMB, Code for stochastic magnetic field simulation |

LINK TO THE PUBLICATIONS

arXiv
INSPIRE

LIST OF PUBLICATIONS

1. Constraints on non-resonant photon-axion conversion from the Planck satellite data
Suvodip Mukherjee, Rishi Khatri and Benjamin D. Wandelt.
arXiv:1811.11177
2. Detecting graviton-graviton scattering with binary black holes from LISA
Suvodip Mukherjee, Benjamin D. Wandelt and Joseph Silk.
(Submitted to Nature-Astronomy)
3. Beyond the classical distance-redshift test: cross-correlating redshift-free standard candles and sirens with redshift surveys
Suvodip Mukherjee and Benjamin D. Wandelt.
arXiv:1808.06615
4. Polarized anisotropic spectral distortions of the CMB: Galactic and extragalactic constraints on photon-axion conversion
Suvodip Mukherjee, Rishi Khatri and Benjamin D. Wandelt.
JCAP 04 (2018) 045
5. FSD: Frequency Space Differential measurement of CMB spectral distortions
Suvodip Mukherjee, Joseph Silk and Benjamin D. Wandelt.
Mon.Not.Roy.Astron.Soc. 477 (2018) no.4, 4473
6. Making maps of cosmological parameters
Suvodip Mukherjee and Benjamin D. Wandelt.
JCAP 1801 (2018) no.01, 042
7. Reconstruction of a direction-dependent primordial power spectrum from Planck CMB data
Amel Durakovic, Paul Hunt, Suvodip Mukherjee, Subir Sarkar and Tarun Souradeep.
JCAP 1802 (2018) no.02, 012
8. Constraining stochastic gravitational wave background from weak lensing of CMB B-modes
Shabbir Shaikh, Suvodip Mukherjee, Aditya Rotti, Tarun Souradeep.
JCAP 09 (2016) 029
9. Direction dependence of cosmological parameters due to cosmic hemispherical asymmetry
Suvodip Mukherjee, Pavan K. Aluri, Santanu Das, Shabbir Shaikh and Tarun Souradeep.
JCAP 06 (2016) 042
10. Litmus Test for Cosmic Hemispherical Asymmetry in the CMB B-mode polarization
Suvodip Mukherjee and Tarun Souradeep.
Phys. Rev. Lett. 116, 221301 (2016)

11. Unified origin of hemispherical asymmetry in scalar and tensor perturbations
Suvodip Mukherjee and Tarun Souradeep.
arXiv:1504.02285
12. Hemispherical asymmetry from an isotropy violating stochastic gravitational wave background
Suvodip Mukherjee.
Phys. Rev. D 91, 062002 (2015)
13. Estimation of Inflation parameters for Perturbed Power Law model using recent CMB measurements
Suvodip Mukherjee, Santanu Das, Minu Joy and Tarun Souradeep.
JCAP 01 (2015) 043
14. Revised cosmological parameters after BICEP 2 and BOSS
Santanu Das, Suvodip Mukherjee and Tarun Souradeep.
JCAP 02 (2015) 016
15. Statistically anisotropic Gaussian simulations of the CMB temperature field.
Suvodip Mukherjee and Tarun Souradeep.
Phys. Rev. D 89, 063013 (2014)
16. Statistical isotropy violation of CMB Polarization sky due to Lorentz boost.
Suvodip Mukherjee, Aritra De and Tarun Souradeep.
Phys. Rev. D 89, 083005 (2014)

PROFESSIONAL SERVICES

Collaboration :

Co-PI, CMB-BHARAT mission proposed to Indian Space Research Organization, India

Referee for : Physical Review Letters, Physics Letters B, Physical Review-D.

Workshops Organized:

- International conference: Post Planck Cosmology October 2017.
I.U.C.A.A., Pune, India.
Organizers: Suvodip Mukherjee, Tarun Souradeep, Sanjit Mitra.
- Astronomy and Science from Moon June 2017.
IAP, Paris.
Organizers: Joseph Silk, Bernerd Foing, Benjamin D. Wandelt,
Suvodip Mukherjee, Alessandro Lupi, Salvatore Cielo

Journal Club Organizer:

- arXiv meeting, CCA, Flatiron Institute Feb-Sept, 2018.
- Cosmology Journal Club, I.A.P. Jan-Sept, 2017.
- CMB group meeting, I.U.C.A.A. Jan, 2013-Oct, 2017.

AWARDS AND FELLOWSHIPS

- Lagrange Postdoctoral Fellowship December 2016

- Internship under Balzan Fellowship, University of Oxford September 2015.
- Senior Research Fellow, CSIR, Government of India. August 2013- June 2016.
- Junior Research Fellow, CSIR, Government of India. August 2011- July 2013.
- Joint Entrance Screening Test (JEST) for PhD entrance February -2011.
- 4th prize in Science Project, India Physics Association. 2008-2009
- 2nd prize in Science Project, India Physics Association. 2007-2008
- District Award for obtaining highest marks in mathematics in X examination, CBSE 2003-2004

TEACHING EXPERIENCES

- Mentoring Mr. Shabbir Shaikh, Ph.D. student, I.U.C.A.A, Pune, India. 2016 onwards
- Hands-on Session on CMB, I.U.C.A.A. Summer School
Talk: Introduction to HEALPix May 2016.
I.U.C.A.A., Pune, India
- Project guidance to Mr. Rajorshi Chandra, I.U.C.A.A., Pune, India. May- July 2016.
- Project guidance to Mr. Debabrata Adak, I.U.C.A.A., Pune, India. May- July 2016.
- Project guidance to Mr. Karthik Prabhu, IISER, Pune, India. Jan- April 2016.
- Project guidance to Mr. Lokahith Agasthya, IISER, Pune, India. Jan- April 2016.
- Project guidance to Mr. Karthik Prabhu, IISER, Pune, India. June- July 2015.
- Project guidance to Mr. Debajyoti Sarkar, I.U.C.A.A., Pune, India. June- July 2015.
- Lecture in Training Program in Astronomy for African Scientists
Talk: Basics of Linux and GNU April 2015.
- Project guidance to Mr. Shabbir Shaikh, I.U.C.A.A., Pune, India. May- July 2014.
- Project guidance to Mr. Arpan Kundu, Presidency University, Kolkata, India. May- July 2014.
- Lecture in I.U.C.A.A. Summer School
Talk: Basics of Linux and GNU May 2014.

- Lecture on CMB in I.U.C.A.A. Summer School
Talk: Theory of CMB Polarization May 2014.
- Project guidance to Mr. Aritra De, NISER, Bhubaneswar, India. May- June 2013.
- Teaching Assistant for I.U.C.A.A. Coursework, 'Electrodynamics and radiative processes II'
lectured by Professor A.K. Kembhavi. Oct- Dec 2012.
- Teaching Assistant for I.U.C.A.A. Coursework, 'Electrodynamics and radiative processes I'
lectured by Professor Durgesh Tripathi. Aug- Oct 2012.

PARTICIPATION IN SCHOOLS, CONFERENCES AND VISITS

- IHP Trimester 2018: Analytics, Inference, and Computation in Cosmology,
Analytical Methods September-2018
Paris, France
- CMB-S4 meeting September-2018
Princeton, USA
- Eternal Multi-Messenger Workshop August-2018
New York, USA
- Marcel Grossmann Meeting-XV July-2018
Rome, Italy
- Dark Matter 2018: From the Smallest to the Largest Scales June-2018
Santander, Spain
- CMB Foreground Meeting June-2018
New York, USA
- Probing fundamental physics with CMB spectral distortions Feb-2018
CERN, Geneva
- CMB-BHARAT meeting Jan-2018
ISRO, India
- Post-Planck Cosmology Oct-2017
I.U.C.A.A., India
- PONT Cosmology Conference April-2017.
Avignon, France
- Visit to Johns Hopkins University July-Aug 2016.
Baltimore, USA
- Visit to Niels Bohr International Academy March-April 2016.
Copenhagen, Denmark
- School & Workshop on 'Large Scale Structure:
From Galaxies to the Cosmic Web February 2016.
I.U.C.A.A., India
- Visit to Johns Hopkins University Nov-Dec 2016.
Baltimore, USA

- University of Fererra May 2015.
Fererra, Italy.
- SISSA May 2015.
Trieste, Italy.
- First ICTP Advanced School on Cosmology May 2015.
Trieste, Italy.
- Advanced Workshop On Cosmological Structures From Reionization To Galaxies May 2015.
Trieste, Italy.
- IAGRG-2015. March 2015.
Bangalore, India.
- Meeting of the Astronomical Society of India 2015. February 2015.
NCRA, Pune, India.
- Workshop on Statistical Applications to Cosmology and Astrophysics February 2015.
Indian Statistical Institute, Kolkata, India.
- Visit to Indian Institute of Science Education and Research-Kolkata, India. February 2015
- Visit to Indian Institute of Technology- Kharagpur, India. February 2015
- Cosmology at the interface. January 2015.
Saha Institute of Nuclear Physics, Kolkata, India.
- Meeting of the Astronomical Society of India 2014. March 2014.
Indian Institute of Science Education and Research-Mohali, India.
- I.U.C.A.A. workshop on Python Programming in Astronomy. February 2014.
I.U.C.A.A., India.
- International workshop on:
Gravitational Wave Physics and Astronomy Workshop (GWPAW) December 2013.
I.U.C.A.A., India.
- International school and workshop: New Light in Cosmology from the CMB. July 2013.
ICTP, Trieste, Italy.
- Summer School in Astrophysics. May 2010.
I.U.C.A.A., India.
- Winter School in Astrophysics. December 2009.
TIFR, India.

LIMITED LIST OF TALKS

- IHP Trimester 2018: Analytics, Inference, and Computation in Cosmology
Workshop on Analytical Methods
Paris, France
Talk: Probing Axions from the future CMB and
Large Scale Structure Missions, Invited Speaker September-2018
- Eternal Multi-Messenger Workshop
New York, USA
Talk: Cosmology from LISA August-2018

- Marcel Grossmann Meeting-XV
 Rome, Italy
 Talk: Probing axions with CMB spectral distortion July-2018

- Marcel Grossmann Meeting-XV
 Rome, Italy
 Talk: CMB-Bharat: Case for India led CMB space mission, Invited speaker July-2018

- Dark Matter 2018: From the Smallest to the Largest Scales
 Santander, Spain
 Talk: Polarized spectral distortions from ALPs June-2018

- Probing fundamental physics with CMB spectral distortions
 CERN, Geneva
 Talk: Polarized spectral distortion of CMB from low mass ALPs Feb-2018

- Future CMB mission, ISRO
 Bangalore, India
 Talk: Goals of the next generation CMB mission October-2017.

- Post Planck Cosmology
 I.U.C.A.A., India
 Talk: Unveiling the cosmic mysteries from next generation CMB missions October-2017.

- PONT Cosmology Conference
 Avignon, France
 Talk: CMB Anomalies From Next Generation Polarization Measurements April-2017.

- State of the Universe
 TIFR, Mumbai, India
 Talk: Cosmic Hemispherical Asymmetry and its implications November 2016.

- Cosmology and Astro-particle physics seminar
 TIFR, Mumbai, India
 Talk: B mode polarization of CMB: A clinching window for Hemispherical Asymmetry September 2015.

- IAGRG-2015
 Bangalore, India
 Talk: Viability of Perturbed Power-Law model of Inflation from recent CMB measurements March 2015.

- Workshop on Statistical Applications to Cosmology and Astrophysics
 Indian Statistical Institute, Kolkata, India
 Talk: Beyond Statistically Isotropic Universe February 2015.

- Cosmology at the interface
Saha Institute of Nuclear Physics, Kolkata, India
Talk: Imprints of Isotropy Violated gravitational waves in CMB January 2015.
- Meeting of the Astronomical Society of India 2014
Indian Institute of Science Education and Research -Mohali, India.
Talk: A new probe for measurement of our local motion March 2014.

POSTERS

- Advanced Workshop On Cosmological Structures From Reionization To Galaxies May 2015.
Trieste, Italy.
- Meeting of the Astronomical Society of India 2015. February 2015.
NCRA, Pune, India.

SHORT TERM PROJECTS/INTERNSHIPS

- Imprints of Non-Isotropic Primordial Power Spectrum in CMB Measurements. May- July, 2012.
Advisor: Professor Tarun Souradeep, I.U.C.A.A., Pune, India.
- A Study of Solutions of Dirac Equation for a Few Physical Systems. Jan- Mar 2011.
Advisor: Professor Ashok Kapoor, Hyderabad Central University, Hyderabad, India.
- The Epoch of Reionization of the Universe. May- June, 2010.
Advisor: Professor Kandaswamy Subramanian, I.U.C.A.A., Pune, India.
- Computational Analysis of Radiation from a Relativistically Expanding Shell Originating in a Gamma Ray Burst. Oct, 2008- Jan, 2009.
Advisor: Professor Dipankar Bhattacharya, I.U.C.A.A., Pune, India.