Aditya Rotti

3.206, Alan Turing Building
Jodrell Bank Centre for Astrophysics
University of Manchester Oxford road
Manchester, M133 9PL
United Kingdom

Telephone : +44 (0) 784 635 3554
Email : adityarotti@gmail.com
: aditya.rotti@manchester.ac.uk

Employment

Mar. 2018 - ongoing	Post-doctoral research associate Jodrell Bank Centre for Astrophysics (JBCA) University of Manchester, Manchester, U.K Advisor: Jens Chluba
Oct. 2014 - Dec. 2017	Post-doctoral researcher Florida State University, Tallahassee, FL, U.S.A Advisor: Asst. Prof. Kevin Huffenberger

Education

2008-2014	Doctor of Philosophy in Physics (Cosmology) Inter University Centre for Astronomy and Astrophysics (IUCAA), Pune, India Thesis: Weak lensing probes of cosmology. Advisor: Prof. Tarun Souradeep
2006-2008	Master of Science in Physics Department of Physics, University of Pune, Pune, India
2002-2005	Bachelor of Science. St. Josephs College of Arts and Science, Bangalore University, Bangalore, India

Awards, fellowships and grants

- ⋆ Received the Postdoctoral Scholars Career Development Travel Award of 1000 USD from Florida State University, Office of Post-doctoral Affairs. (2016)
- ⋆ Received the V. V. Narlikar Best Thesis Award (2015)
  (Best PhD. thesis in India, in GR and related areas, awarded every 2 years.)
- ⋆ Balzan grant supporting visit to New College Oxford Johns Hopkins Centre for Cosmological Studies (2013)
- ⋆ APS-IUSSTF Physics student visitation program. (2012)
  [Travel and support grant for academic visit to Johns Hopkins University, Baltimore from 15th July 2013 to 30th September 2013.]
- ⋆ Junior and Senior Research Fellowship awarded by the Council of Scientific and Industrial Research (CSIR), India. (2008 - 2013)

Research interests

- Statistical modeling of galactic and extra-galactic foreground.
  - Developing novel foreground cleaning tools.
  - Probes of residual foregrounds in 'cleaned' maps
- Galaxy clusters
- Observational tests of statistical isotropy of the universe
- Weak gravitational lensing
- Stochastic gravitational wave background

Collaborations

Planck, HFI Core Team Member

- Lead the analysis of Planck maps to search for violations from statistical isotropy using the bipolar spherical harmonic representation of the two point correlation function.
  - Developed optimized searches for signature of large scale modulation in Planck maps.
  - Measured the Doppler boost vector from Planck maps.
  - Carried out searches of the quadrupolar anomaly in Planck maps, confirming a null result.

Long term academic visits

- Academic visit to Max Planck Institute for Astrophysics (MPA) from $1^{\rm st}$ Sept. 2012 to $31^{\rm st}$ Oct. 2012 to collaborate with Prof. Eiichiro Komatsu's group.
- Academic visit to Johns Hopkins University, Baltimore from $15^{\rm th}$ July 2013 to $30^{\rm th}$ Sept. 2013 to collaborate with Prof. Marc Kamionkowski's group.
- Academic visit to Jet Propulsion Laboratory (JPL), California Institute of Technology from $1^{\rm st}$ Oct. 2013 to $30^{\rm th}$ Nov. 2013 to collaborate with the U.S Planck team.

Teaching experience/project supervision

- Guided the master's thesis project of Hamsa Padmanabhan titled "A comparison of lensing efficiency of gravitational waves and large scale structure". Work completed and published in Physical Review D.
- Guided a project student, Saurabh Kumar, in the project titled "Orthogonal BipoSH measures: Scrutinizing sources of isotropy violation". Work completed and published in Physical Review D.
- Directed a set of 3 high school children through their summer school project, a program initiated by the IUCAA science popularization team. Introduced them to concepts of vibrations and waves via simple experiments. Devised simple experiments using lasers and wrote a computer program to help visualize Lissajous figures.

References

Jens Chluba
JBCA, University of Manchester
Manchester, U.K

Email : jens.chluba@manchester.ac.uk
Webpage : http://www.jb.man.ac.uk/∼jchluba

Prof. Kevin Huffenberger
Florida State University, Tallahassee,
FL, U.S.A

Email : khuffenberger@fsu.edu
Webpage : http://astrophysics.physics.fsu.edu/∼huffenbe

Prof. Tarun Souradeep
IUCAA, Pune, India

Email : tarun@iucaa.in
Webpage : www.iucaa.in/∼tarun

Work in progress

- Quantifying the effects of cluster temperature statistics on Compton-y power spectrum.
  Collaborators: M. Remazeilles (JBCA), B. Bolliet (JBCA) and J. Chluba (JBCA)
- High precision foreground modeling using current and future multi-frequency microwave maps.
  Collaborators: M. Remazeilles (JBCA) and J. Chluba (JBCA)
- A real space tool for analysis of spin-2 fields on the sphere.
  Collaborators: K. Huffenberger (FSU)
- Modeling the power spectrum of polarized galactic filaments.
  Collaborators: K. Huffenberger (FSU) and David Collins (FSU)

List of publications

Submitted

1. Real-space computation of E/B-mode maps I: Formalism, Compact Kernels, and Polarized Filaments
   Aditya Rotti & Kevin Huffenberger
   Submitted to JCAP [arXiv:1807.11940]
2. Can we neglect relativistic temperature corrections in the Planck thermal SZ analysis?
   Mathieu Remazeilles, Boris Bolliet, Aditya Rotti & Jens Chluba
   Submitted to PRL
3. Measuring our velocity from fluctuations in number counts
   Nidhi Pant, Aditya Rotti, Carlos A.P. Bengaly & Roy Maartens
   Submitted to JCAP [arXiv:1808.09743]

Refereed

1. Constraining stochastic gravitational wave background from weak lensing of CMB B-modes
   Shabbir Shaikh, Suvodip Mukherjee, Aditya Rotti & Tarun Souradeep
   JCAP, 09, 029 (September 2016) [arXiv:1606.08862]
2. Isotropy-Violation Diagnostics for B-mode Polarization Foregrounds to the Cosmic Microwave Background
   Aditya Rotti & Kevin Huffenberger
   JCAP, 09, 034 (September 2016) [arXiv:1604.08946]
3. Estimating SI violation in CMB due to non-circular beam and complex scan in minutes
   Nidhi Joshi, Santanu Das, Aditya Rotti, Sanjit Mitra & Tarun Souradeep
   JCAP, 03, 035 (March 2016) [arXiv:1511.03672]
4. A novel approach to reconstructing signals of isotropy violation from a masked CMB sky
   Pavan K. Aluri, Nidhi Pant, Aditya Rotti & Tarun Souradeep
   Phys. Rev. D 92, 083015 (2015) [arXiv:1506.00550]
5. Orthogonal BipoSH measures : Scrutinizing sources of isotropy violation
   Saurabh Kumar, Aditya Rotti, Moumita Aich, Nidhi Pant, Sanjit Mitra & Tarun Souradeep
   Phys. Rev. D 91, 043501, (2015) [arXiv:1409.4886]

6. Statistical isotropy violation in WMAP CMB maps due to non-circular beams
   Santanu Das, Sanjit Mitra, Aditya Rotti, Nidhi Pant, Tarun Souradeep
   A & A 591, A97 (July 2016) [arXiv:1401.7757]

7. A comparison of CMB lensing efficiency of gravitational waves and large scale structure
   Hamsa Padmanabhan, Aditya Rotti & Tarun Souradeep
   Phys. Rev. D 88, 063507 (2013) [arXiv:1307.2355]

8. Removing the ISW-lensing bias from the local-form primordial non-Gaussianity estimation
   Jaiseung Kim, Aditya Rotti & Eiichiro Komatsu.
   JCAP, 04, 021 (2013 April 9) [arXiv:1302.5799]

9. Statistics of bipolar representation of CMB maps
   Nidhi Joshi, Aditya Rotti & Tarun Souradeep.
   Phys. Rev. D 85,043004 (2012) [arXiv:1112.1689]

10. A New Window into Stochastic Gravitational Wave Background
    Aditya Rotti & Tarun Souradeep.
    Phys. Rev. Lett. 109, 221301 (2012) [arXiv:1112.1689]

Big collaboration papers

(The papers marked with an asterix are ones where I made significant contributions.)

1. CMB-S4 Science Book, First Edition
   CMB-S4 Collaboration: K. N. Abazajian, et. al.
   [arXiv:1610.02743v1], 2016

2. Planck 2015 results. I. Overview of products and scientific results
   Planck Collaboration: R. Adam et. al.
   A & A 594, A1 (2016)[arXiv:1502.01582], 2015

3.* Planck 2015 results. XVI. Isotropy and statistics of the CMB
   Planck Collaboration: P. A. R. Ade et. al.
   A & A 594, A16 (2016) [arXiv:1506.07135v2]

4.* Planck 2013 results. XXIII. Isotropy and statistics of the CMB
   Planck Collaboration: P. A. R. Ade et. al.
   A & A, A23, Volume 571, November 2014 Planck 2013 results [arXiv:1303.5083]

Conference proceedings

1. Recovering hidden signals of statistical anisotropy from a masked or partial CMB sky
   Pavan K. Aluri, Nidhi Pant, Aditya Rotti & Tarun Souradeep
   [arXiv:1510.02454], 2016
   11th Rencontres du Vietnam on Cosmology - 50 years after CMB discovery, Quy Nhon, Vietnam

2. Statistics of statistical anisotropy measures
   Nidhi Pant, Aditya Rotti & Tarun Souradeep
   Journal of Physics: Conference Series, 484, 1, 012046 (2014)
   Vishwa Mimansa: An Interpretative Exposition of the Universe. Proceedings of the 7th International Conference on Gravitation and Cosmology

Non - refereed

1. Weak lensing in non-statistically isotropic universes
   Moumita Aich, Aditya Rotti & Tarun Souradeep
   [arXiv:1506.08806], 2015

2. Revealing Non-circular beam effect in WMAP-7 CMB maps with BipoSH measures of Statistical Isotropy
   Nidhi Joshi, Santanu Das, Aditya Rotti, Sanjit Mitra & Tarun Souradeep
   [arXiv:1210.7318], 2012

3. WMAP anomaly : Weak lensing in disguise
   Aditya Rotti, Moumita Aich & Tarun Souradeep.
   [arXiv:1111.3357], 2011

Selected presentations

- *Talk* (upcoming) : **High Precision Modelling of Foreground Using Moments**, CMB foreground for B-mode studies, Tenerife, Spain, 18^{th} October, 2018
- *Talk* : **Real-space Computation of E/B-mode Maps I: Formalism and Compact Kernels**,The 15^{th} Marcel Grossmann Meeting, Rome, Italy, 3^{rd} July 2018.
- *Talk* : **High Precision Foreground Modeling Using Current And Future Multi-frequency Microwave Maps**,The 15^{th} Marcel Grossmann Meeting, Rome, Italy, 3^{rd} July 2018.
- *Talk*: **Probing B-mode foregrounds using estimators of isotropy violation**, Indian Institute of Science Education and Research (IISER), Mohali, India, 14^{th} December 2015.
- *Talk*: **Probing B-mode foregrounds using estimators of isotropy violation**, University of Michigan, 23^{rd} September 2015.
- *Talk*: **Reconstructing isotropy violating sources : A Novel approach**, Berkeley Centre for Cosmological Physics, 12^{th} January 2015
- *Talk*: **Beyond the isotropic universe**
  Florida State University, 21^{st} October 2014.
- *Talk*: **Is the (PLANCK sky) universe isotropic ?**
  - Astrophysics and Exoplanet Science Colloquia and Seminars, Jet Propulsion Laboratory, CA, USA (28^{th} October 2013.)
  - Astrophysics Journal Club, University of California - Los Angeles, CA, USA (22^{nd} October 2013.)
  - Astro lunch talk, University of California - Santa Barbara, CA, USA (1^{st} November 2013.)
  - Cosmology seminar, KIPAC, Stanford, CA, USA (4^{th} November 2013.)
- *Talk*: **A New Window into the Stochastic Gravitational Wave Background**
  Jet Propulsion Laboratory, CA, USA (9^{th} October 2013.)
- *Talk*: **Is the universe isotropic ?**
  Institute for Theory and Computation, Harvard-Smithsonian Centre for Astrophysics, Boston, MA, USA (10^{th} September 2013.)

- *Talk*: **Beyond standard cosmology**
  Centre for Theoretical and Observational Cosmology, Penn State University, State College, PA, USA (13^{th} September 2013.)

- *Invited talk*: **Beyond the isotropic universe**
  "Symposium on Our Universe: Revelations from Planck" at the Indian Institute of Astrophysics, Bangalore. (17^{th} April 2013.)

- *Invited talk*: **Beyond the isotropic universe**
  Workshop : "Planck Day" at the International Centre for Theoretical Sciences, Bangalore. (16^{th} April 2013.)

- *Talk*: **A New Window into the Stochastic Gravitational Wave Background**
  Max Planck Institute for Astrophysics, Garching, Germany (23^{rd} September 2012.)

- *Talk*: **Probing the Universe with CMB weak lensing**
  Raman Research Institute, Bangalore, India (30^{th} November 2011.)

- *Poster*: **A New Window into the Stochastic Gravitational Wave Background**
  Presented at the International Conference on Gravitation and Cosmology, Goa, India, ($14-19^{\text{th}}$ December 2011).
  This was awarded the best poster prize.

Conferences and workshops

- (upcoming) Workshop on anamolous microwave emission, Tenerife, Spain, 19^{th} October, 2018

- (upcoming) CMB foreground for B-mode studies, Tenerife, Spain, $15^{\text{th}} - 18^{\text{th}}$ October, 2018.

- (upcoming) Towards the European Coordination of the CMB program, Florence, Italy, $20^{\text{th}} - 21^{\text{st}}$ September.

- The 15^{th} Marcel Grossmann Meeting, Rome, Italy, $1^{\text{st}} - 7^{\text{th}}$ July 2018.

- Future Cosmic Surveys, KICP, University of Chicago, Chicago, U.S.A, 21^{st} - 23^{rd} September 2016.

- CMB - S4 Collaboration workshop, KICP, University of Chicago, Chicago, U.S.A, 19^{th} - 21^{st} September 2016.

- International Conference on Gravitation and Cosmology, Indian Institute of Science Education and Research (IISER), Mohali, India, 14^{th} - 18^{th} December 2015.

- Workshop of Cosmology with CMB - S4, University of Michigan, Ann Arbor, U.S.A, 21^{st} - 22^{nd} September 2015.

- Computing the Universe (CtU2015) Symposium & Cosmo Hack Week, Berkeley Center For Cosmological Physics, 11^{th} - 17^{th} January 2015.

- Aspects of Cosmology, Indian Institute of Astrophysics, Bangalore, 9^{th} - 11^{th} April 2014.

- Symposium on Our Universe: Revelations from Planck, Indian Institute of Astrophysics, Bangalore, 17^{th} April 2013.

- Planck day, International Centre for Theoretical Sciences, Bangalore, India, 16^{th} April 2013.

- Raman Memorial Conference, Department of Physics, University of Pune, Pune, India, $2^{\rm nd}$ - $3^{\rm rd}$ March 2012
- International Conference on Gravitation and Cosmology, Goa, India, $14^{\rm th}$ - $19^{\rm th}$ December, 2011
- School on Cosmology and Gravity Waves, IUCAA, Pune, India, $1^{\rm st}$ - $11^{\rm th}$ December, 2011
- EGO-IndIGO Meet on Gravitational Waves, IUCAA, Pune, India, $1^{\rm st}$ - $2^{\rm nd}$ November, 2011.
- Confronting particle-cosmology with Planck and LHC, IUCAA, Pune, India, $10^{\rm th}$ - $12^{\rm th}$ August, 2011
- Primordial Features and Non-Gaussianities, Harish Chandra Research Institute(HRI), Allahabad, India, $14^{\rm th}$ - $18^{\rm th}$ December, 2010.
- Science and Engineering Research Council (SERC) preparatory school on Theoretical High Energy Physics at Birla Institute of Technology and Science, Goa, India from $20^{\rm th}$ October - $15^{\rm th}$ November 2010.
- Cosmology Rapid Response Meeting at Tata Institute of Fundamental Research (TIFR), Mumbai, India, $6^{\rm th}$ - $8^{\rm th}$ April 2010.
- Cosmological Reionization, Harish Chandra Research Institute(HRI), Allahabad, India, $16^{\rm th}$ - $20^{\rm th}$ February 2010.