

# Dr. Pranati Kumari Rath

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## Area of research

Cosmology - Cosmic Microwave Background (CMB) radiation - Theory and Data Analysis, Statistical Isotropy

## Education

1. 2015 Ph.D. in Physics/Cosmology from IIT Kanpur (India)
2. 2008 M.Sc. in Physics from Utkal University (India)
3. 2006 B.Sc. in Physics, Mathematics, Statistics from R.D. Women's Autonomous College, Utkal University (India)

## Post-Doctoral Experience

Sept. 2016 - Jan. 2018 Postdoc in Cosmology at Institute of High Energy Physics, Beijing  
May 2015 - Aug. 2016 Postdoc in Cosmology at Institute of Physics, Bhubaneswar, India

## Short-term research experience

2007 Summer project during M.Sc. on "Massive scalar field in Anti de Sitter space: a Super potential approach", under the supervision of Prof. Sudipta Mukherji at Institute Of Physics, Bhubaneswar, India.

## Publications

1. "Parity in Planck full-mission CMB temperature maps", Srikanta Panda, Pavan K. Aluri, Pramoda Kumar Samal, Pranati Kumari Rath, Astroparticle Physics, Vol. 125, 102493, 2021.
2. Finsler space-time can explain both parity asymmetry and power deficit seen in CMB temperature anisotropies, Zhe Chang, Pranati K. Rath, Yu Sang, Dong Zhao, Yong Zhou, Monthly Notices of Royal Astronomical Society, 2018, 479, 1, 1327-1331 [arXiv:1806.11425]
3. Anisotropic power spectrum and the observed low-l power in PLANCK CMB data Zhe Chang, Pranati K. Rath, Yu Sang, Dong Zhao, Research in Astronomy and Astrophysics, 2018 [arXiv:1801.02773]
4. Testing statistical Isotropy in Cosmic Microwave Background Polarization maps Pranati K. Rath, Pramoda Kr. Samal, Srikanta Panda, Debesh D. Mishra, Pavan K. Aluri Monthly Notices of Royal Astronomical Society, 2018, 475, 4, 4357-4366
5. Cosmological Power spectrum in non-commutative space time Rahul Kothari, Pranati K. Rath, Pankaj Jain, Phys. Rev. D, 2016, 94, 063531
6. Imprint of Inhomogeneous and Anisotropic Primordial Power Spectrum on CMB Polarization, Rahul Kothari, Shamik Ghosh, Pranati K. Rath, Gopal Kashyap, Pankaj Jain Monthly Notices of Royal Astronomical Society, 2016, 460, 1577 [arXiv:1503.08997]
7. Cross-correlation analysis of CMB with foregrounds for residuals Pavan K. Aluri, Pranati K. Rath, Monthly Notices of Royal Astronomical Society, 2016, 458, 4269 [arXiv:1202.2678]
8. Dipole Modulation of Cosmic Microwave Background Temperature and Polarization

- Shamik Ghosh, Rahul Kothari, Pankaj Jain, Pranati K. Rath, JCAP, 2016, 01, 046 [arXiv:1507.04078]
9. Testing Isotropy of Cosmos with WMAP and PLANCK data, Pranati K. Rath, Pramoda Kumar Samal, Mod. Phys. Lett. A, 2015, 30, 1550131 [arXiv:1710.09641]
  10. Noncommutative Geometry and the Primordial Dipolar Imaginary Power Spectrum Pankaj Jain, Pranati K. Rath, Eur. Phys. Jou. C, 2015, 75, 113 [arXiv:1407.1714]
  11. Relating the inhomogeneous power spectrum to the CMB hemispherical anisotropy Pranati K. Rath, Pavan K. Aluri, Pankaj Jain Phys. Rev. D, 2015, 91, 023515 [arXiv:1403.2567]
  12. Testing the Dipole Modulation Model in CMBR Pranati K. Rath, Pankaj Jain Journal of Cosmology and Astro particle Physics, 2013, 12, 014 [arXiv:1308.0924]
  13. Direction dependence of the power spectrum and its effect on the Cosmic Microwave Background Radiation, Pranati K. Rath, Tanmay Mudholkar, Pankaj Jain, Pavan K. Aluri, Sukanta Panda Journal of Cosmology and Astro particle Physics, 2013, 04, 007 [arXiv:1302.2706]
  14. Massive Scalar Field in Anti-deSitter Space: a Super potential Approach. Pranati Kumari Rath Prayas (Student's Journal of Physics), Vol. 3, No. 1, Jan.-Feb. 2008, p24-32

### Computational Skills

Programming in Fortran and Matlab, and familiarity with C, C++, and Mathematica. Experience in using CMB analysis packages such as HEALPix, CAMB, and COSMOMC.

### Talks/Presentations

1. Dec 12, 2017 “Study of CMB low- $l$  Anomalies” - talk given at Korea Institute For Advanced Study, South Korea.
2. May 15, 2016 “Large Scale Anisotropy in Cosmic Microwave Background Radiation and its Dependence on the Primordial Power Spectrum” - talk given at Theoretical Physics Center for Science Facilities, Institute of High Energy Physics, Chinese Academy of Sciences, Beijing, China.
3. April 29, 2016 “Cross-correlation analysis of CMB with foregrounds for residuals” - talk given at Institute of Physics, Bhubaneswar, India
4. Jan. 21, 2015 “Large scale anisotropy in CMB” - talk given at Institute of Physics, Bhubaneswar, India
5. Feb. 2015 “Noncommutative Geometry and the Primordial Dipolar Imaginary Power Spectrum” HEP seminar given at Dept. of Physics, IIT Kanpur, India
6. Feb. 2014 “Relating the inhomogeneous power spectrum to the CMB hemispherical anisotropy” - HEP seminar given at Dept. of Physics, IIT Kanpur, India
7. Feb. 20-22, 2013 “Direction Dependent Power Spectrum and Its Effect on CMBR”, poster presented at 31st meeting of the Astronomical Society of India (ASI) organized by IISER-TVM, India and IIST, Thiruvananthapuram, India
8. Dec. 19-21, 2012 “Direction Dependent Power Spectrum and Its Effect on CMBR” - talk given at Young Astrophysicists’ Symposium held at TIFR, Mumbai, India

### Profession/related activities

1. May. 2-6, 2016 Attended the “Workshop on Perspectives on the Extragalactic Frontier: from Astrophysics to Fundamental Physics” held at Abdus Salam International Centre for Theoretical Physics (ICTP) in Trieste, Italy.
2. Dec. 4-13, 2015, participated in “Workshop on High Energy Physics Phenomenology 2015”, held at Indian Institute of Technology (IIT) Kanpur, India

Oct. 30 - Nov. 5, 2015, Member of local organizing committee of  
“COSMOASTRO15 - Discussion,

3. Meeting On Cosmology and Astro particle Physics” held at Institute Of Physics, Bhubaneswar, India
4. Feb. 15-17, 2013, Took part in “Particle Physics at the Crossroads: Edinburgh - India Symposium” held at India International Centre, New Delhi, India
5. Dec. 10-17, 2012, Participated in “Winter School on Astronomical and Cosmological Surveys”, held at Tata Institute of Fundamental Research (TIFR), Mumbai, India
6. Jan. 31 - Feb. 20, 2011, Participated in XXVI Main School in Theoretical High Energy Physics, held at Centre for Theoretical Physics, Jamia Millia Islamia, New Delhi, India
7. Oct. 20 - Nov. 15, 2010, Participated in SERC Preparatory School in Theoretical High Energy Physics held at Birla Institute of Science and Technology, Goa Campus, Goa, India
8. June 14 - July 10, 2010, participated in SERC School on Astrophysics and Astronomy, held at National Centre for Radio Astrophysics, TIFR, Pune, India

#### Refreshers/Orientation Course attended

- February 11 - March 13, 2021, “Faculty in Universities/Colleges/Institutes of Higher Education” held at Teaching Learning Centre, Ramanujan College University of Delhi.
- 01 - 15 May 2021, “Applications of Statistical Techniques in Real World”, Teaching Learning Centre, Ramanujan College University of Delhi.
- 27 October – 10 November 2021, ONLINE TWO - WEEK REFRESHER COURSE IN “PHYSICS” Teaching Learning Centre, Ramanujan College University of Delhi.

#### Teaching/Department Services

(Experience gained while pursuing Ph.D.)

- Physics of the Universe (PHY305) (TA)
- Electromagnetic Theory (PHY103) (TA)
- Classical Mechanics (PHY102) (TA)
- Quantum Mechanics (PHY520) (TA)
- Molecular Physics (PHY525) (TA)
- Physics core lab (PHY101) (Experiment instructor)
- Thermal Physics (PHY210) (TA)

#### Grants and Awards

- Awarded Junior Research Fellowship (UGC-JRF), through National Eligibility Test (NET) conducted jointly by Council of Scientific and Industrial research (CSIR), India and University Grants Commission (UGC), India in Dec. 2009
- Cleared Graduate Aptitude Test in Engineering (GATE) in Physics discipline in 2009
- Received a cash award of Rs. 20,000/- from IIT Kanpur (India) during Ph.D. for 2 SCI listed journal publications.