

# SHAMIK GHOSH

## *Postdoctoral Fellow*

CAS Key Laboratory for Research in Galaxies and Cosmology  
Department of Astronomy  
University of Science and Technology of China  
Hefei, Anhui 230022  
China

Phone: +86 19840178794  
Skype: shamik-ghosh  
email: [shamik@ustc.edu.cn](mailto:shamik@ustc.edu.cn),  
[shamik-ghosh@outlook.com](mailto:shamik-ghosh@outlook.com)  
URL: [1cosmologist.github.io/](https://1cosmologist.github.io/)

Born: January 11, 1989 – Kolkata, India  
Nationality: Indian

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## Current position

### *Postdoctoral Fellow*

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Department of Astronomy, University of Science and Technology of China  
96 Jinzhai Road, Baohe,  
Hefei, China

## Education

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| 2012-2018 | <b>PhD in Physics</b><br>Indian Institute of Technology, Kanpur<br>Thesis Supervisor: Prof. Pankaj Jain<br>Thesis Title: <i>Cosmology beyond the Cosmological Principle</i><br>Coursework CPI: 9.7 |
| 2010-2012 | <b>M.Sc. in Physics</b><br>Indian Institute of Technology, Kanpur<br>CPI: 8.9  |
| 2007-2010 | <b>B.Sc. (Hons.) in Physics</b><br>University of Calcutta<br>Percentage: 78.0%   |

## Research Interest

During my doctoral research I have worked extensively on testing the Cosmological Principle. This body of work includes searching for statistical isotropy violation in various cosmological data. In particular I have developed several estimators to test the presence of hemispherical power asymmetry in Planck polarization data. However, due the presence of large residual systematics we fail to get significant detection. I have also worked on several theoretical models that explain the hemispherical power asymmetry in CMB temperature field. I extended these models to the case of CMB polarization and demonstrated the expected signatures in CMB polarization that can be tested in future CMB observations. I have also looked at possible variations in the spectral index of the differential number count of galaxies that is an important variable in estimation of the kinematic dipole from radio continuum surveys. With an new likelihood based method I showed that there was not significant departure from expectations of isotropy. I have looked at effects on systematics of flux density calibration of radio surveys and their impact on the 2D galaxy power spectrum and found that the effects are significant. Overall showing that there is important effects of systematics in radio continuum surveys that we need to take into consideration while doing cosmology.

I have been involved in developing the power spectrum estimation pipeline and optimizing it to reduce  $E$ -to- $B$  leakage. I have proposed a novel method to use additional full sky  $E$ -mode data from a survey like Planck to complete the  $E$ -mode information and thereby reduce the  $E$ -to- $B$  leakage. This method shows better performance than the conventional pure- $B$  method. I am currently working on developing a constrained Internal Linear Combination pipeline for foreground cleaning the AliCPT data.

## Publications

### RESEARCH PUBLICATIONS

- 2020b M. Salatino, J. Austermann, K. L. Thompson, P. A. R. Ade, X. Bai, J. A. Beall, D. T. Becker, Y. Cai, Z. Chang, D. Chen, J. Connors, P. Chen, B. Dober, J. Delabrouille, S. M. Duff, G. Gao, R. C. Givhan, S. Ghosh, G. Hilton, B. Hu, J. Hubmayr, E. Karpel, C.-L. Kuo, H. Li, M. Li, S.-Y. Li, X. Li, M. Link, Y. Li, H. Liu, L. Liu, Y. Liu, F. Lu, T. Lukas, X. Lu, J. A. B. Mates, J. Mathewson, P. Mauskopf, J. Meinke, J. Montana-Lopez, J. Moore, J. Shi, A. K. Sinclair, R. Stephenson, W. Sun, Y.-H. Tseng, C. Tucker, J. Ullom, L. Vale, J. van Lanen, M. Vissers, S. Walker, B. Wang, G. Wang, J. Wang, E. Weeks, Di Wu, Y.-H. Wu, J. Xia, H. Xu, J. Yao, Y. Yao, K. W. Yoon, B. Yue, H. Zhai, A. Zhang, Laiyu Zhang, Le Zhang, P. Zhang, T. Zhang, Xinmin Zhang, Yifei Zhang, Yongjie Zhang, G.-B. Zhao, W. Zhao, “The design of the Ali CMB Polarization Telescope receiver”, *SPIE Proceedings vol 11453: Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumentation for Astronomy X*, 2020
- 2020a Shamik Ghosh, Jacques Delabrouille, Wen Zhao and Larissa Santos “Towards ending the partial sky E-B ambiguity in CMB observations”, *Journal of Cosmology and Astroparticle Physics* 2021:02 036
- 2019c Jiaxin Wang, Tess R. Jaffe, Torsten A. Enßlin, Piero Ullio, Shamik Ghosh, Larissa Santos “hammurabi X: Simulating Galactic Synchrotron Emission with Random Magnetic Fields”, *Astrophysical Journal Supplement* 247:18
- 2019b Larissa Santos, Jian Yao, Le Zhang, Pengjie Zhang, Wen Zhao, Shamik Ghosh, Jiming Chen Thyrso Villega, “Reconstructing simulated CMB polarization power spectra with the Analytical Blind Separation method.” *arXiv:1908.07862*
- 2019a Prabhakar Tiwari, Shamik Ghosh & Pankaj Jain, “The galaxy power spectrum from TGSS ADR1 and the effect of flux calibration systematics”, *The Astrophysical Journal* 887:2
- 2018 Shamik Ghosh & Pankaj Jain, “A Pixel Space Method for Testing Dipole Modulation in the CMB Polarization.” *Monthly Notices of the Royal Astronomical Society* 492:3
- 2017 Shamik Ghosh & Pankaj Jain, “Testing the Isotropy of the Log N – log S Slope for the NVSS Radio Catalog”, *The Astrophysical Journal* 843:1
- 2016b Rahul Kothari, Shamik Ghosh, Pranati Rath, Gopal Kashyap & Pankaj Jain, “Imprint of Inhomogeneous and Anisotropic Primordial Power Spectrum on CMB Polarization”, *Monthly Notices of the Royal Astronomical Society* 460:2
- 2016a Shamik Ghosh, Rahul Kothari, Pankaj Jain & Pranati Rath, “Dipole Modulation of Cosmic Microwave Background Temperature and Polarization”, *Journal of Cosmology and Astroparticle Physics* 2016:01
- 2014 Shamik Ghosh, “Generating Intrinsic Dipole Anisotropy in the Large Scale Structures”, *Physical Review D* 89, 063518

### REVIEW PUBLICATIONS

- 2016 Shamik Ghosh, Pankaj Jain, Gopal Kashyap, Rahul Kothari, Sharvari Nadkarni-Ghosh & Prabhakar Tiwari, “Probing Statistical Isotropy of Cosmological Radio Sources using Square Kilometre Array”, *Journal of Astrophysics and Astronomy* 37, 25

## Conferences & Workshops

- Dec. 2020 Presented a talk titled: “Towards ending partial sky E-B ambiguity in CMB observations.” at CMB Systematics and Calibration Focus Workshop (online), organized by Kavli IPMU, Tokyo, Japan

Sep. 2019	Presented a talk titled: “The hemispherical power asymmetry after Planck.” 2nd Symposium on Cosmology and AliCPT, BNU, Beijing, China
Apr. 2019	Presented a talk titled: “The hemispherical power asymmetry after Planck.” 2019 CCNU-USTC Junior Cosmology Symposium, CCNU, Wuhan, China
Oct. 2017	Presented a talk titled: “The hemispherical power asymmetry after Planck.” PPC 2017: Post-Planck Cosmology 2017, IUCAA, Pune, India
Nov. 2016	Presented a talk titled: “Cosmic Birefringence and Anisotropies in CMB Polarization.” SKA 2016: Science for the SKA Generation, Goa, India
Feb. 2016	Presented a poster titled: “Testing the statistical isotropy of the cosmological radio sources with the SKA continuum survey.”
Dec. 2015	Attended GIAN School on Cosmological Weak Lensing, JMI, New Delhi, India International Conference on Gravitation and Cosmology, Mohali, India
Jul. 2014	Presented a poster titled: “The Search for Dipole Modulation in CMB Polarization.” Attended Workshop on Galaxies and Cosmology, NCRA-TIFR, Pune, India
Jul. 2013	Attended School and Workshop New Light in Cosmology from the CMB, ICTP, Trieste, Italy

## Grants and Fellowship

2020-2022	CNY250,000 funding for research project titled “Optimal estimator of polarization power spectrum in cosmic microwave background radiation” from the National Natural Science Foundation of China.
2007-2010	Inspire Fellowship awarded by Department of Science and Technology, Government of India

## Achievements & Awards

2012	Qualified the CSIR-UGC NET examination
2011	Academic Excellence Award from IIT Kanpur for academic performance
2010	Qualified IIT JAM 2010 examination
2010	Qualified JEST 2010 examination

## Teaching Experience

2017	Teaching Assistant for Quantum Mechanics course (PHY431)
2013-2017	Instructor for set of six experiments in M.Sc. Laboratory (PHY461)
2013	Tutor for course on Classical Mechanics (PHY102)
2012	Teaching Assistant for Analytical Mechanics course (PHY401)