Nilanjandev Bhaumik

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Current affiliation

Ph.D. student, Department of Physics, Indian Institute of Science, Bangalore

Thesis supervisor: Dr. Rajeev Kumar Jain

Expected date of completion : July, 2023

Education

2016 Master of Science (M.Sc) in Physics, *Indian Institute of Technology Guwahati*, India.

2014 Bachelor of Science (B.Sc) in Physics, *Presidency University*, Kolkata, India.

Research interests

Inflationary cosmology, Primordial black holes (PBH) from inflation, Second order stochastic gravitational wave (GW) background, Possible imprints of early matter domination through GW detection, Ultralight PBHs and their imprints in GW background, Black hole evaporation, Baryogenesis, Large scale CMB anomalies, Scalar-tensor theories, Cosmological data analysis

Publications

2018 1. Interior volume of (1+D) dimensional Schwarzschild black hole , **N. Bhaumik**, B. R. Majhi, Int. J. Mod. Phys. A 33, 1850011 (2018), [arXiv:1607.03704 [gr-qc]].

2020 2. Primordial black holes dark matter from inflection point models of inflation and the effects of reheating, **N. Bhaumik**, R. K. Jain, JCAP **01**, 037 (2020), [arXiv:1907.04125 [astro-ph.CO]].

2021 3. Small scale induced gravitational waves from primordial black holes, a stringent lower mass bound, and the imprints of an early matter to radiation transition , **N. Bhaumik**, R. K. Jain, Phys. Rev. D **104**, 023531 (2021), [arXiv:2009.10424 [astro-ph.CO]].

2022 4. Doubly peaked induced stochastic gravitational wave background: Testing baryogenesis from primordial black holes , **N. Bhaumik**, A Ghoshal and M. Lewicki, JHEP 07 (2022) **130**, [arXiv:2205.06260 [astro-ph.CO]].

2023 5. Understanding large scale CMB anomalies with the generalized non-minimal derivative coupling during inflation , Y. Tiwari, **N. Bhaumik**, R. K. Jain, Phys. Rev. D 107 (2023), no. 10 103513 . [arXiv:2206.13320 [astro-ph.CO]]

2023 6. Distinct signatures of spinning PBH domination and evaporation: doubly peaked gravitational waves, dark relics and CMB complementarity , **N. Bhaumik**, A. Ghoshal, R. K. Jain and M. Lewicki, JHEP 05 (2023) 169, [arXiv:2212.00775 [astro-ph.CO]].

Presentations/Talks/Posters

Dec 2019 (Offline) Oral presentation on "Primordial black holes dark matter from inflection point models of inflation and the effects of reheating" in the 9th International Conference on Gravitation and Cosmology (ICGC), IISER Mohali, India

Nov 2020 (Online) Oral presentation on "Lowest mass limit of Primordial black holes from USR models and effects of reheating" in Less Travelled Path Of Dark Matter: Axions And Primordial Black Holes, ICTS, Bangalore, India

Dec 2020 (Online) Oral presentation on "Lowest mass bound and reheating effects for primordial black holes from USR models of inflation" in 31st meeting of the Indian Association for General Relativity and Gravitation (IAGRG), IIT Gandhinagar, India.

May 2021 (Online) Invited talk on "Ultra slow roll models of inflation with different reheating histories, to form primordial black holes and induced stochastic gravitational wave background" in a cosmology group meeting at Indian Institute of Technology Madras, India

Aug 2021 (Online) Oral presentation on "PBHs and induced GWs from single field inflation and the small scale imprints of reheating " in The 24th International Conference on Particle Physics and Cosmology (COSMO'21), University of Illinois, USA

June 2022 (Online) Oral presentation on "Detectable stochastic background of gravitational waves in the presence of primordial black holes" in Gravity: Current challenges in black hole physics and cosmology, YITP, Kyoto, Japan

September 2022 (In person) Contributed talk on "Stochastic gravitational waves background to probe the reheating histories in the presence of primordial black holes" 31st Texas Symposium on Relativistic Astrophysics, Prague, Czech Republic

September, 2022 (In person) (Talk) A Cosmic Window to Fundamental Physics: Primordial Non-Gaussianity (PNG) and Beyond, IFT Madrid

December, 2022 (In person) (Talk) 32nd meeting of Indian Association for General Relativity and Gravitation (IAGRG32), IISER Kolkata

February, 2023 (In person) (Poster and flash talk) Frontiers in Cosmology, Raman Research Institute, Bangalore

March, 2023 (In person) (Talk) Less Travelled Path to the Dark Universe (LTPDU) , ICTS Bengaluru

Academic Visits

26 September 2022 Talk on "Formation of primordial black holes from inflation and their post inflationary imprints in gravitational wave background", Jagiellonian University, Kraków, Poland

27-28 September 2022 Talk on "Different aspects of primordial black holes : inflationary models and detectable gravitational wave background", Warsaw University, Warsaw, Poland

30 September 2022 Talk on "Stochastic gravitational wave background to probe primordial black hole scenarios and compatibility with inflationary models", Catholic University of Louvain, Louvain-la-Neuve, Belgium

Organizing experiences

2020-2021 Weekly journal-club meeting, cosmology group, Indian Institute of Science, Bangalore.

Teaching experience

2019-2020 Graduate course : Quantum Mechanis.

Course instructor : Dr. Manish Jain, Indian Institute of Science, Bangalore.

Technical skills

Operating Systems : Linux, Mac-Os

Programming Language: Fortran, C, Python

Symbolic computation : Mathematica

Computational Experience

High-Performance Computing :

- Param Pravega, ATOS Bull Sequana XH2000 series (I.I.Sc, India)
- SahasraT-Cray XC40 system (I.I.Sc, India)

Observational data : PLANCK-2018 data (Plik and Camspec12.5) and BICEP data (2020)

Schools/Workshops/Conferences attended (offline/online)

March 2021	(Online) Theoretical Aspects of Astroparticle Physics, Cosmology and Gravitation - 2021 GGI school, Florence, Italy
Aug 2021	(Online)(Parallel session speaker) 24th International Conference on Particle Physics and Cosmology (COSMO'21), University of Illinois,USA
June, 2022	(Online) Gravity: Current challenges in black hole physics and cosmology, YITP, Kyoto, Japan
July 2022	(In Person) Summer School on Cosmology 2022, ICTP, Trieste, Italy
September, 2022	(In person) 31st Texas Symposium on Relativistic Astrophysics, Prague, Czech Republic
September, 2022	(In person) A Cosmic Window to Fundamental Physics: Primordial Non-Gaussianity (PNG) and Beyond, IFT Madrid
December, 2022	(In person) 32nd meeting of Indian Association for General Relativity and Gravitation (IAGRG32), IISER Kolkata
February, 2023	(In person) Frontiers in Cosmology, Raman Research Institute, Bangalore
March, 2023	(In person) Less Travelled Path to the Dark Universe (LTPDU) , ICTS Bengaluru

Academic achievements and scholarships

2017	Secured All India Rank - 142 in JRF-NET 2016 (National Eligibility Test for PhD in India) in Physics.
2017	Secured All India Rank - 78 in JEST 2017 in Physics.
2011–2016	INSPIRE SHE Scholarship (B.Sc and M.Sc), Department of Science and Technology, India.

Previous research experience

2015-2016	M.Sc thesis : Interior volume of (1 + D) dimensional Schwarzschild black hole. Supervisor : Dr. Bibhas Ranjan Majhi , Indian Institute of Technology, Guwahati.
2018	Computational course project: Obtaining primordial scalar and tensor power spectra for single scalar field inflationary models. Course Instructor : Dr. Manish Jain, Indian Institute of Science, Bangalore.

Personal

DOB, Gender	26 April 1994, Male.
Citizenship	Indian.
Languages	English, Bengali, Hindi.