Anto Idicherian Lonappan

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Affiliations

- ◇ **SISSA** - Scuola Internazionale Superiore di Studi Avanzati
- ◇ **IFPU** - Institute for Fundamental Physics of the Universe
- ◇ **INFN** - Istituto Nazionale di Fisica Nucleare

Research Interests

- ◇ **Gravitational lensing of the Cosmic Microwave Background**
- ◇ **CMB low-level data analysis**
- ◇ **Observational Cosmology**
- ◇ **Data Science**

Education

2018 – 2022　◇ **Ph.D in Astrophysics and Cosmology, *Cum Laude*.**
`Scuola Internazionale Superiore di Studi Avanzati-SISSA`
Thesis title: *Cosmic Microwave Background: Analysis and Interpretation of B Modes for the detection of Inflationary Gravitational Waves and Gravitational Lensing.*

2014 – 2016　◇ **M.Sc. Physics**
`St. Berchmans College, Mahatma Gandhi University`
Thesis title: *Markov Chain Monte Carlo Methods: Cosmological Parameter Estimation*

2010 – 2013　◇ **B.Sc. Physics**
`St. Berchmans College, Mahatma Gandhi University`

Research Experience

2022　◇ **Visiting Research Fellow,** Kavli-IPMU University of Tokyo, Japan.
2017 – 2018　◇ **Junior Research Fellow,** Presidency University, India.
2016 – 2017　◇ **Research student,** Centre for Theoretical Physics, JMI, India.

Collaborations

- ◇ **POLARBEAR**
- ◇ **Simons Array**
- ◇ **LiteBIRD**

Publications

Journal Articles

1   Adachi, S., Adkins, T., Faú ndez, M. A. O. A., Arnold, K. S., Baccigalupi, C., Barron, D., … Zhou, Y. (2022). Improved upper limit on degree-scale CMB b-mode polarization power from the 670 square-degree POLARBEAR survey. *The Astrophysical Journal*, *931*(2), 101.   🔗 doi:10.3847/1538-4357/ac6809

2   Kar Chowdhury, R., Chatterjee, S., Lonappan, A. I., Khandai, N., & Di Matteo, T. (2020). Cosmological simulation of galaxy groups and clusters. i. global effect of feedback from active galactic nuclei. *The Astrophysical Journal*, *889*(1), 60.   🔗 doi:10.3847/1538-4357/ab5b96

3   Lonappan, A. I., Kumar, S., Ruchika, Dinda, B. R., & Sen, A. A. (2018). Bayesian evidences for dark energy models in light of current observational data. *Physical Review D*, *97*(4).   🔗 doi:10.1103/physrevd.97.043524

In Preparation

1   Namikawa, T., Lonappan, A. I., & *et.al.* (2022). *Litebird: Delensing b-modes for improving constraints on inflationary gravitational waves.*

2   Lonappan, A. I., & *et.al.* (2022). *Litebird: A full sky measurement of gravitational lensing of cmb.*

Projects

Ongoing   ◇ **Delensing LiteBIRD**
The purpose of this study is to improve the deflection field (mass tracer) reconstruction utilizing LiteBIRD polarization data. Additionally, by combining this deflection field with other mass tracers, we can delens LiteBIRD more efficiently and therefore increase the sensitivity of primordial gravitational waves. I'm developing a pipeline for this project that operates on a curved cut sky. This pipeline generates realistic simulations that quadratic estimators employ to reconstruct the mass field used to delens LiteBIRD. *Publication in prepartion[1,2]*

    🔗 https://github.com/antolonappan/s4bird
    🔗 https://github.com/antolonappan/dell
    🔗 https://github.com/litebird/LiteBIRD-lensing

    ◇ **Data Quality analysis of Simon Array**
Data Quality analysis is a statistical technique that we employ to identify high-quality science data from the Time Ordered Data of CMB. This analysis is appropriate right prior to the Map making operation. This analysis is being led by me in the Simons Array pipeline development group. The pipeline is not yet open to the public.

Projects (continued)

Completed   ◇   **Constrain on r using Polarbear Data**
Polarbear Collaboration's recent glitch cleanup method enabled it to recover a sizable quantity of data volume. This prompted the collaboration to do a reanalysis of the data in order to put a new upper limit on r. I was involved in the parameter estimate studies for this project, which used a power spectrum-based likelihood approach. *Publication in preparation[3]*

     https://github.com/PolarbearEU/LargePatch_reanalysis

◇   **Global effect of AGN Feedback**
We investigated the global effects of AGN feedback on their host dark matter halos and galaxies at cluster scales in this work. I constructed the analysis pipeline for this work which uses the Massive Blackhole-II fully cosmological-hydrodynamic simulation. *Publications[1]*

     https://github.com/antolonappan/ABE-I

◇   **Bayesian Evidence for Dark Energy models**
This work analyzes a vast number of distinct cosmological models, including various Dark Energy parameterizations and scalar fields such as minimally coupled quintessence, tachyon, and galileon fields. Additionally, the pipeline contains likelihoods for the BAO, Pantheon, CMB prior, Time Delay strong lensing, Hubble parameter, Masers, and Growth Data.*Publications[2]*

     https://github.com/antolonappan/cosmopass

Skills

Languages	◇	Reading, writing and speaking competencies for English and Malayalam.
Coding	◇	python, C, C++, R, MPI, Bash, Zsh, LaTeX
Databases	◇	Mysql, sqlite.
Web Dev	◇	Html, css, JavaScript, Apache, Ngnix.