



UNIVERSITÀ
DEGLI STUDI
DI PADOVA

Developing Technology for the Future

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PhD retreat at the Gran Sasso Laboratories

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Introduction

Master's in Physics from University of Delhi, India.

Specialization courses: Advanced Nuclear Physics and General Theory of Relativity

Research Experience

Project Title: Probing early Universe with the gravitational wave background

Institution: Department of Physics and Astrophysics, University of Delhi, India

Supervisor: Dr. Debottam Nandi

PhD Project

Project Title: Development of photosensors and readout for the upgrade of the LHCb RICH detector for High Luminosity LHC

Institution: INFN- Sezione di Ferrara, Italy

Supervisor: Dr. Angelo Cotta Ramusino, Dr. Nicolo' Vladi Biesuz

Research Experience

Enhancing inflationary model predictions

- Probing the early Universe, we have numerous models that follow the CMB parameter constraints.
- By improving predictions of the inflationary model through an enhanced understanding of slow-roll dynamics, We observe that even minor adjustments can greatly influence perturbed observables, and these refined predictions can be compared with future observations to explore model parameters.

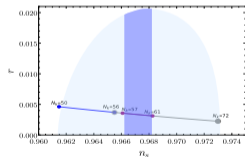


Figure: Variation in the inflationary observables, by implementing numerical approximations.

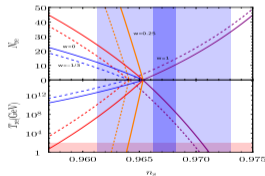


Figure: Variation in the reheating parameters, by implementing numerical approximations.

PGWs and PBHs, and the dark matter

- **New Observations:**
 1. Gravitational wave background,
 2. Black holes.
- This work focuses on modeling a system that satisfies the observational data of GWs and the finding of dark matter in today's universe, which might come from primordial black holes (PBHs).

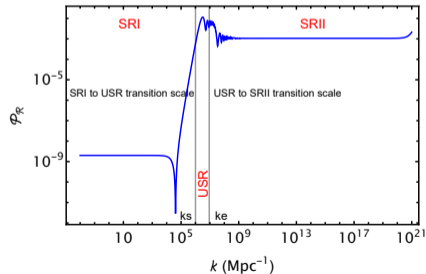


Figure: Behaviour of total power spectrum

PhD Project

The main aim of the research project is, Upgrade of the DAQ system of the LHCb Ring Imaging Cherenkov (RICH) detectors for operation at High-Luminosity LHC (HL-LHC) conditions.

- Development of new QC system for the “FASTRICH FEB”
- Characterization of SiPMs for LHCb Upgrade II