## 6<sup>th</sup> Annual Meet on ADVANCES IN PHYSICS, MATHEMATICS AND APPLIED SCIENCE

August 10, 11 2022 | Webinar

## **B-Mode Forecast of CMB-BHARAT**

## Aparajita Sen

India

Exploring Cosmic History and Origins (ECHO), popularly known as 'CMB-Bharat', is a space mission that has been proposed to the Indian Space Research Organisation (ISRO) for the scientific exploitation of the Cosmic Microwave Background (CMB) at the next level of precision and accuracy. The quest for the CMB polarization B-mode signals, generated by inflationary gravitational waves in the very early universe, is one of the key scientific goals of its experimental design. The discovery of B-mode will allow as to estimate the energy scale of the inflationary period that is quantified by the tensor-to-scalar ratio r. Its detection will open a new window for fundamental physics and cosmology. However, this is a challenging endeavour as the signal is very faint (in the order of 50 nano-Kelvin in temperature) and is deeply buried under astrophysical contaminants (also known as foregrounds) by a few orders of magnitude. In our work, we have studied the potential of the proposed ECHO instrumental configuration to detect the target tensor-to-scalar ratio r = 10-3 at  $3\sigma$  significance level, which covers the predictions of a large class of inflationary models. We investigate the performance of the existing methods for extracting the CMB (NILC and Commander) in the measuring r in presence of different physically motivated models of astrophysical foregrounds. We find that ECHO will have a sensitivity of 0.5x10-3 towards r and different form foreground complexities can bias the measurement of r in the upward direction

## **Biography**

Aparajita Sen is a (final year) PhD student at Indiann Institute of Science Education and Research Thiruvananthapuram (IISER-TVM). Her field of specialization is Cosmic Microwave Background, focusing on component separation methods and statistical properties of CMB maps. She is an activae member of the CMB-BHARAT data analysis group.