

Cosmology with Photometric SNIa in the LSST Era

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The Vera C. Rubin Observatory Legacy Survey of Space and Time (Rubin LSST) is expected to achieve its first system light by late 2025. An initial data preview, drawn from early commissioning phases, is set for 2025-26, exciting the scientific community as they prepare to explore the Rubin LSST data. In this context, we have been working on developing the DESC Time Domain (TD) pipeline with a focus on SNIa cosmology and dark energy estimation. In this work, I present a rigorous cosmology analysis with type Ia supernova performed with the DESC TD pipeline and study the improvement from using a photometrically classified SNIa sample, and with host galaxy photo-z availability over cosmology results from spectroscopically obtained redshift 'only' SNIa sample. We use two different SN datasets: the ELAsTiCC (Extended LSST Astronomical Time-series Classification Challenge) and the PLAsTiCC (Photometric LSST Astronomical Time-Series Classification Challenge) supernova sample [2210.07560]. For identifying non type Ia contaminations, we use a photometric classifier, SCONE (Supernova Classification with a Convolutional Neural Network). We show that with the use of photometric SNIa sample there is a significant improvement in dark energy estimation quantified via the Figure of Merit (FoM), over spectroscopic only SNIa sample. More details on the analysis and results shall be shared during the talk, as the analysis is not yet complete.

Track type

Cosmology

Author: MITRA, Ayan (NCSA, University of Illinois, USA)

Presenter: MITRA, Ayan (NCSA, University of Illinois, USA)

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