

Probing Inflation, Reionization and Cosmic Acceleration with cosmological data

Dr. Vivian Miranda (UPENN)

The standard paradigm of cosmology is built upon on a series of premises on how the early, intermediate and late-time universe behaves, and the current data is already powerful enough to exam some of the hypotheses behind the standard model. In this talk, I propose a program to investigate how we can falsify these hypotheses with space missions in the 2020s in combination with ground-based observatories. One unique aspect of this proposal is that I will properly account for systematic effects as well as theoretical uncertainties (e.g., modeling inflation and reionization through CMB data). This program will be crucial to set the strategy for the WFIRST Type Ia supernova and weak lensing surveys. The WFIRST satellite is scheduled to launch in 2024-25; the complete observational plan needs to be ready soon to set the requirements for instrumentation. I will lead the analysis on how Type IA supernova and weak lensing can be combined to test paradigms of cosmic acceleration, and how different strategies can affect this goal. In addition to research on the WFIRST mission, my short-term investigations on how inflation and reionization affect CMB inferences on dark energy will provide long-term guidance to NASA on how future CMB satellite missions can be used to test some of the core hypotheses of the standard model.