JOINT TUFTS/MIT COSMOLOGY SEMINAR

Characterizing Inflation from Antarctica: Improving Cosmology Constraints with the Cosmic Microwave Background and Line Intensity Mapping

Jessica Zebrowski

Chicago

Inflation, the theory describing a period of exponential expansion in the early universe, is a compelling model for the formation of the structure we see in our universe today, yet little is known about the energy scale and dynamics of the proposed inflationary field(s). In this talk, I will describe two ways to experimentally probe the physics of inflation: the cosmic microwave background, and line intensity mapping. First, I will describe how the imprint of inflation may exist in the oldest light in the universe, the cosmic microwave background. I will present the first inflationary constraints from SPT-3G, and propose ways to increase sensitivity to inflation by combining data from large and small aperture telescopes for future surveys such as the South Pole Observatory. Second, I will describe a new cosmology technique, line intensity mapping (LIM), which will be able to characterize the middle ages of the Universe's history by making a 3D map of structure over the last 11 billion years of cosmic time. The large number of modes in LIM data will provide a unique window into the dynamics of the inflationary field(s). I will describe the cameras and analysis techniques behind two of the first LIM experiments: the South Pole Telescope Shirokoff Line Intensity Mapper (SPT-SLIM), a millimeter-wave CO LIM experiment, and the Terahertz Intensity Mapper (TIM), a NASA balloon mapping [CII] in the far-infrared. I will describe the successful test flight of TIM and present the first results from SPT-SLIM, including on-sky measurements. I will conclude by describing some instrumentation directions for the next generation of LIM cameras, to realize LIM as a powerful cosmological probe for years to come.

Tuesday, April 21, 2026, 2:30 pm

Cosman Seminar Room

Center for Theoretical Physics

Building 6C, Room 6C-442

Massachusetts Institute of Technology