

# JOINT TUFTS/MIT COSMOLOGY SEMINAR

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## *A universe of many fields: theory and observations*

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I will revisit the evidence for CMB birefringence in the context of a rich Axiverse. Using probability density functions (PDFs) for various axion parameters, such as the mass and axion decay constant, I will construct the PDF for the cosmic birefringence angle and investigate its properties. By relating the observed value of the birefringence angle to the mean or standard deviation of the constructed PDF, one can constrain the shape of the input PDFs, providing insights into the statistical distribution of the Axiverse. The focus will be on three different types of axion potentials: cosine, quadratic, and asymptotically linear axion monodromy. I will describe the potential of cosmic birefringence in constraining the distribution of axion parameters and uncovering possible correlations among them. I will additionally derive predictions for "birefringence tomography," anticipating future measurements of birefringence from lower multipoles, and show how it can be used to rule out simpler versions of the Axiverse.

If time allows, I will discuss a family of inflationary models, which remain predictive in the many-field limit, unless a softly broken symmetry between the fields is present. This can be used to reconcile the apparent agreement of CMB data with single field inflation with the expected existence of many fields at high energies.

Tuesday, December 5, 2023, 2:30 pm  
Cosman Seminar Room  
Center for Theoretical Physics  
Building 6C, Room 6C-442  
Massachusetts Institute of Technology