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Searching for Inflation from the South Pole with CMB Polarimetry

Department of Physics Colloquium

Inflation predicts a cosmic gravitational-wave background (CGB), the amplitude of which measures the inflationary energy scale. The CGB in turn produces a faint but unique signature in the 'B-mode' polarization of the cosmic microwave background (CMB). BICEP1, the first experiment specifically designed to search for this signature, began observing from the South Pole in early 2006. It has produced the highest sensitivity measurements yet made of CMB polarization at the ~ 2 degree angular scales where the inflationary signal is expected to peak. Follow-on experiments BICEP2 and the Keck Array have now improved sensitivity dramatically and are currently testing models of inflation at the GUT scale. At smaller angular scales, measurements of B-modes from gravitational lensing promise a sensitive probe of the Dark Energy equation of state, the sum of neutrino masses, and improved constraints on inflation. This decade will see intensified efforts to probe a rich array of fundamental physics through CMB polarization.



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