

PHYSICS AND ASTRONOMY COLLOQUIUM

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The Birth of The Universe: Studying the Epoch of Inflation with the Cosmic Microwave Background

In the first fraction of a second after the birth of the Universe, space underwent a period of superluminal expansion which we call cosmic inflation. The theory of cosmic inflation was originally proposed in the 1980s to explain the observed geometry and smoothness of the universe. The residual quantum fluctuations from this epoch of inflation seeded the formation of structure in the Universe and left behind a relic background of gravitational waves. These gravitational waves imprint a unique pattern of polarization onto the cosmic microwave background (CMB) and a detection of this signal would lead to a revolution in our understanding of the beginning of the Universe. I will present an overview of the rich scientific questions currently being pursued by CMB experiments, which ties together the most disparate scales possible in science: quantum mechanics and cosmology; the beginning of the universe to the present day. I will discuss the signature of inflation, constraints on neutrino mass, gravitational lensing, experimental techniques, detector technology, plans for next-generation experiments, and the future direction of the field.



THURSDAY, APRIL 30, 2015 | 4:00 PM | HAWKING AUDITORIUM



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