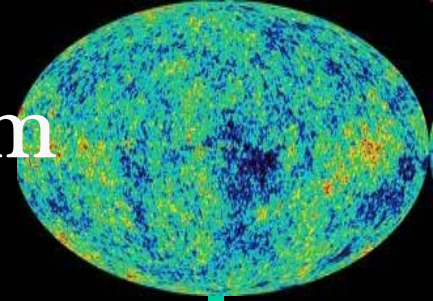


# CU Physics Department Colloquium

Monday, February 14, 2011 4:10 PM 428 Pupin Hall



## "Revealing the History of the Universe with the CMB"

The CMB is an image of the universe, as it was 380,000 years after the Big Bang, that spans the entire sky. Details of the physical processes that operated in the early universe are captured in the angular intensity and polarization anisotropies. The "primordial anisotropies" encode information about the universe when the CMB formed. In particular, the primordial "B-mode" polarization anisotropy could contain a detectable gravity wave signal produced during the first second after the Big Bang. Experimental research now focuses on searching for and characterizing the forecasted B-mode signal. The "secondary anisotropies" are distortions in the primordial CMB signal that are produced by matter in the universe, so they contain information about the state of the universe between the observer today and the surface where the CMB photons last scattered. CMB photons traveling through the hot plasma in galaxy clusters are inverse Compton scattered, which produces a detectable signal called the thermal Sunyaev Zel'dovich (SZ) effect. The SZ signal can be used to study galaxy clusters and constrain the values of a collection of cosmological parameters. My talk will focus on three experiments. PIPER and EBEX are two balloon-borne experiments under construction that are designed to search for the B-mode polarization of the CMB, and APEX-SZ is a ground-based experiment that has detected approximately 40 galaxy clusters via the SZ signal.

**Hosted by Brian Cole**

**Dr. Bradley  
Johnson  
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