

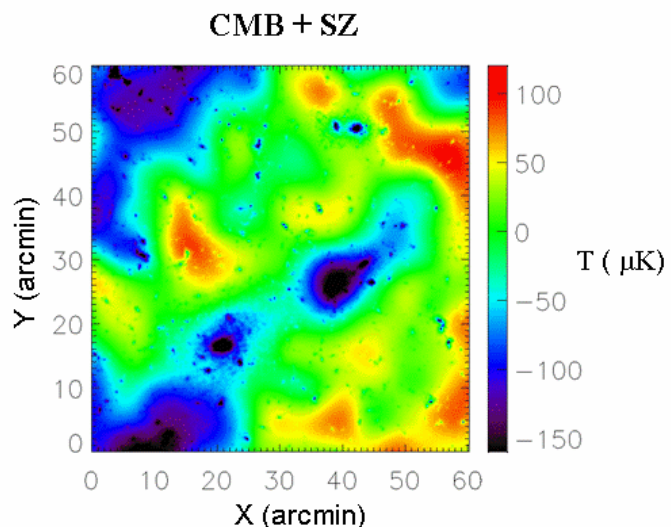
ASTROPHYSICS SEMINAR

Wednesday, 21 January 2004
4:00 – 5:00 PM
Broida Conference Room 3302

DR. NILS HALVERSON
University of California, Berkeley

EXPLORING THE EARLY UNIVERSE WITH THE COSMIC MICROWAVE BACKGROUND

Since its discovery in 1964, the Cosmic Microwave Background (CMB) has proven to be an invaluable source of information about the early universe. Recent detections of harmonic peaks and polarization in the CMB angular power spectrum provide strong evidence that sub-degree scale anisotropy in the CMB evolved from density fluctuations consistent with adiabatic inflationary models. Robust evidence from the CMB and other cosmological probes also indicates that the universe is dominated by non-baryonic dark matter and dark energy, both of which are poorly understood. In my talk, I will discuss the present status of CMB measurements, with emphasis on contributions from the Degree Angular Scale Interferometer (DASI). I will also discuss the promise of future CMB measurements to unravel the nature of the mysterious dark components, observe the evolution of large-scale structure, and directly probe the inflationary epoch through polarization induced by primordial gravity waves. In particular, I will describe two experiments under development, the APEX-SZ survey and the South Pole Telescope (SPT), that will use the CMB as background light to search for clusters of galaxies via the Sunyaev-Zel'dovich (SZ) effect. These surveys will enable us to test theories of large-scale structure formation and precisely constrain the dark energy equation of state.



(Left panel) The 12-m diameter APEX telescope, currently under construction on the Atacama plateau in Chile. (Right panel) Simulated sky map of the Cosmic Microwave Background and Sunyaev-Zel'dovich effect at 150 GHz, courtesy of Alexandre Amblard.