ICTS Seminar

Title : Cosmology in the low redshift universe

Speaker: Vimal Simha, Centre for Extragalactic Theory, University of Western Cape, South Africa

Date : Wednesday, August 2, 2017

Time : 3:00 PM

Venue : Emmy Noether Seminar Room, ICTS Campus, Bangalore

Abstract : While the distribution of the gravitationally dominant dark matter can be reliably computed from first principles using cosmological N-body simulations, the distribution of observed light cannot be robustly predicted from first principles because of uncertainties in the detailed baryonic physics such as gas cooling, star formation, feedback etc. Hence, the principal difficulty in inferring cosmological information from observations is bias - the difference between the distribution of mass and light. To bridge the gap between N-body simulations and observed galaxies, we employ a novel technique, Subhalo Abundance Matching (SHAM) which is based on assuming a strictly monotonic relationship between galaxy luminosity and halo mass at the epoch of accretion. This implicit model for bias allows us to predict several observables such as the clustering of galaxies, cluster number counts etc. as a function of cosmology, and thereby use these observables to place constraints on the cosmology. We carry out tests of the SHAM technique against hydrodynamic cosmological simulations, finding that SHAM successfully matches the stellar masses and luminosities of galaxies at a wide range of epochs, albeit with small amounts of scatter. I will then go on to discuss the cosmological constraints obtained from this novel technique, demonstrating that this powerful technique can provide strong cosmological constraints using only low redshift data from the nearby Universe.