

TATA INSTITUTE OF FUNDAMENTAL RESEARCH
DEPARTMENT OF ASTRONOMY & ASTROPHYSICS

ASTRONOMY SEMINAR

April 13, 2010

Speaker : Satej Khedekar
TIFR-DAA

Title : More out of cluster surveys

Day, Date & Time : Tuesday, 20 April, 2010 at 16.00 hrs

Venue : Lecture Room (AG-66)

(J.S.Yadav)

Abstract

Ongoing Sunyaev-Zel'dovich (SZ) cluster surveys like the ACT, SPT and Planck have the potential of revealing the nature of dark energy using cluster number count observations. However, the cluster yields in these surveys have been a factor of 4 to 5 lower than what had been anticipated earlier (due to various reasons like point sources, large detector noise etc.). With such low cluster detections, the cosmological constraints would be washed out due to the infamous cosmology-cluster physics degeneracy. In this context, we shall discuss two new ideas to significantly improve the constraints on dark energy.

1. - A wedding cake strategy for SZ surveys, recovers the cosmological information that would be otherwise diluted in a single survey of the same duration. Combining the slightly different parameter degeneracy directions of the deep and wide surveys, makes it even with a few thousand clusters as effective as a single depth survey with a much larger cluster sample.

2. - We show that the clusters discovered jointly in SZ and X-Ray surveys may be used to probe the expansion history of the Universe at various redshifts through dA measurements. Such measurements would come at no extra observational cost, and when analyzed together with number count observations, the dark energy constraints can improve by factor of at least 2 to 3. We find that future constraints from dA using eROSITA+Planck clusters would be comparable to the constraints placed by the SCP 'Union' supernovae compilation.