제 3회 고등과학원 우주론과 구조형성 워크숍

2008. 10. 27 ~ 2008. 10. 28

글 _ Pravabati Chingangbam · 고등과학원 물리학부 연구원

This biennial workshop series aims to explore the frontiers of our understanding of Cosmology and Large Scale Structure formation both from observational and theoretical perspective within the framework of the standard ΛCDM model. The talks covered a wide spectrum of very important topics, spanning time scales from the recombination era to the present time and physical scales from the cosmic web down to stars. Consequently, the issues involved are diverse and it is ambitious to hope to cover them in two days. However, the high quality of the talks made the workshop a comprehensive and successful one.

The workshop kicked off with a review of the role of neutrinos is the cosmic evolution and summary of the latest limits on the total neutrino mass from cosmological observations by C. W. Kim. M. Takada discussed this effect of non-zero neutrino mass suppressing growth of mass clustering in the nonlinear regime. P. Ko reviewed possible dark matter candidates from extensions of the Standard Model in particle physics and the prospects of finding some of them indirectly from their decay products in the LHC at CERN.

The recombination era was followed by the cosmic dark ages. P. Zhang explained that there is hope of directly probing it from peculiar velocity measurements. The dark ages ended when the first primordial stars began to form. N. Yoshida presented theoretical simulation results on the formation of primordial stars. R. R. Chary spoke about the epoch of reionization and argued why photons from star forming galaxies are the most likely cause for reionizing the universe. T. Matsubara described a new powerful technique for nonlinear perturbation theory of gravitational instability which takes into account both biasing and redshift-space distortions.

Ten years on from the announcement of the supernovae observations giving evidence of present accelerated expansion of the universe there is a

The Third KIAS Workshop on Cosmology and Structure Formation

plethora of theoretical models that offer explanation. M. Colless spoke about the status of the ongoing WiggleZ Dark Energy Survey in Australia. It aims to precisely measure the dark energy equation of state around redshift z=0.5 to 1.0, providing a robust and accurate test of dark energy models. X. Chen gave forecasts for dark energy measurements by LAMOST, China's ambitious sky survey experiment.

On the largest observable scales the universe has a web like structure with visible matter distributed along filaments and large, nearly empty regions called `voids' between them. Rien van de Weygaert talked about how to study the morphology and dynamical evolution of this cosmic web using computational topology. M. Vogeley focussed attention on voids and elaborated on the properties of galaxies residing in voids.

With the availability of precise data from observations that can peer deep into space or make wide surveys of the structure of the universe it is now possible to study in detail the formation, properties and evolution of galaxies. We learnt about dynamical properties of forming galaxies at very high redshift z>5, growth of mass of supermassive black holes of quasars from observations by AKARI IR space telescope, environmental effects on galaxy properties from C. Park, star clusters as probes of dynamical history of galaxy interactions, the coevolution of black holes and galaxies and the importance of dark matter halo model to understand galaxy formation. We also learnt that the Hubble constant is under estimated from SZ effect and X-ray observations of galaxy clusters due to log-normal fluctuations in IGM. S. Yi reported that semi-analytic models of star formation quenching in satellite galaxies badly overproduce the fraction of red galaxies and do not agree with observed data. Lastly, Hsi-Yu Schive gave some reason to cheer by his claim of an order of magnitude improvement in the speed of large N-body simulations using clusters of GPU's compared to CPU's. KIAS