[구CD-03] Neutrino mass from cosmological probes

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Neutrino science has received a boost of attention quite recently in cosmology, since the outstanding discovery in particle physics over the last decade that neutrinos are massive: pinpointing the neutrino masses is one of the greatest challenges in science today, at the cross-road between particle-physics, astrophysics, and cosmology. Cosmology offers a unique `laboratory' with the best sensitivity to the neutrino mass, as primordial massive neutrinos comprise a small portion of the dark matter and are known to significantly alter structure formation. I will first introduce a new suite of state-of-the-art hydrodynamical simulations with cold dark matter, baryons and massive neutrinos, specifically targeted for modeling the low-density regions of the intergalactic medium as probed by the Lyman-Alpha forest at high-redshift. I will then present and discuss how these simulations are used to constrain the parameters of the LCDM cosmological model in presence of massive neutrinos, in combination with BOSS data and other cosmological probes, leading to the strongest bound to date on the total neutrino mass.

[구CD-04] How does the star formation history of cluster galaxies look like?

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We investigate the history of formation of ~400 galaxies in four Abell clusters at $0.04<z<0.1$. We collect photometric (optical u, g, and r bands) and spectroscopic data from the CTIO telescope (Sheen et al. 2012) and combine them with GALEX (two ultraviolet bands) and 2MASS (near-infrared J, H, and K bands) photometric data. We fit the photometry of each galaxy using the approach developed by Pacifici et al. (2012): this consists in the bayesian analysis of the observed galaxy spectral energy distributions with a comprehensive library of synthetic spectra assembled using realistic, hierarchical star formation, and chemical enrichment histories from cosmological simulations. We constrain the star formation history of each galaxy and measure the lookback times at which the galaxies reach 50% (t_50) and 90% (t_90) of their total stellar mass. We define the "quenching" time as t_50 - t_90 and we explore correlations with stellar mass and colors for both currently star forming and quiescent galaxies. We will also explore the morphology and merger features of the observed galaxies, and will compare the findings with hydrodynamical simulations.