[구CD-05] Applying Alcock-Paczynski Test to the Large Scale Structure

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The main idea of the Alcock-Paczynski (AP) test is that, if we use a wrong distance-redshift relation to infer the shape of a spherical object in the Universe, this object may look non-spherical. To probe the cosmic expansion history through the AP test, the key point is to find something which is known as spherical in the Universe. We propose two possible ways applying the AP test to the large scale structure (LSS): 1) Based on the observed galaxies or quasars, one built up the beta-skeleton tracing the LSS, and investigating the inhomogeneity of the connections; 2) One reconstructs the smoothed density-contrast gradient field based on LSS observations, and investigating the inhomogeneity of the gradient vectors. Compared with some existed methods probing AP effect through 2-point correlation function, galaxy pairs, or voids, our methods have various advantages: 1) The information of both the high and low dense regions of the LSS are taken into account. 2) The redshift space distortion as the main contamination to the AP effect can be easily removed.

[구CD-06] The Alcock-Paczynski effect via clustering shells

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Both peculiar velocities and errors in the assumed redshift-distance relation ("Alcock-Paczynski effect") generate correlations between clustering amplitude and orientation with respect to the line-of-sight. In this talk we propose a novel technique to extract the Alcock-Paczynski, geometric, distortion information from the anisotropic clustering of galaxies in 3-dimensional redshift space while minimizing non-linear clustering and peculiar velocity effects.

We capitalize on the recent, large dataset from the Sloan Digital Sky Survey III (SDSS-III), which provides a large comoving sample of the universe out to high redshift. We focus our analysis on the Baryon Oscillation Spectroscopic Survey (BOSS) constant mass (CMASS) sample of 549,005 bright galaxies in the redshift range $0.43<z<0.7$. Careful modeling of clustering and peculiar velocities in the mildly non-linear regime together with statistical covariance from 600 realistic mock catalogues, allow us to interpret the Alcock-Paczynski effect in a cosmologically informative manner. We measure galaxy clustering in shells of comoving redshift space which provides a very clean estimate of the geometrical distortion and provides direct constraints on the combination of the diameter distance, DA, and the Hubble constant, H.