우주론/암흑물질

[구 CD-01] Cosmic Dawn III: Simulating the Reionization of the Local Group

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Cosmic Dawn III (CoDa III) is the last of the series of simulations of the reionization of the Local Group, the galaxy cluster including the Milky Way and the M31. The simulation is based on the constrained initial condition, N-body and hydrodynamic simulation of structure formation, modelling of galaxy formation, calculation of radiation transfer, and calibration against the observed high-redshift galaxy luminosity function. We present various physical properties we observed and important lessons that could stimulate future observations.

[구 CD-02] The clustering of critical points in the evolving cosmic web

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Focusing on both small separations and baryonic acoustic oscillation scales, the cosmic evolution of the clustering properties of peak, void, wall, and filament-type critical points is measured using two-point correlation functions in ΛCDM dark matter simulations as a function of their relative rarity. A qualitative comparison to the corresponding theory for Gaussian random fields allows us to understand the following observed features: (i) the appearance of an exclusion zone at small separation, whose size depends both on rarity and signature (i.e. the number of negative eigenvalues) of the critical points involved; (ii) the amplification of the baryonic acoustic oscillation bump with rarity and its reversal for cross-correlations involving negatively biased critical points; (iii) the orientation-dependent small-separation divergence of the cross-correlations of peaks and filaments (respectively voids and walls) that reflects the relative loci of such points in the filament's (respectively wall's) eigenframe. The (cross-) correlations involving the most non-linear critical points (peaks, voids) display significant variation with redshift, while those involving less non-linear critical points seem mostly insensitive to redshift evolution, which should prove advantageous to model. The ratios of distances to the maxima of the peak-to-wall and peak-to-void over that of the peak-to-filament cross-correlation are ~2-√~2 and ~3-√~3, respectively, which could be interpreted as the cosmic crystal being on average close to a cubic lattice. The insensitivity to redshift evolution suggests that the absolute and relative clustering of critical points could become a topologically robust alternative to standard clustering techniques when analysing upcoming surveys such as Euclid or Large Synoptic Survey Telescope (LSST).

[구 CD-03] Testing LCDM with eBOSS / SDSS

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In this talk I will review recent progress that the SDSS-IV / eBOSS collaboration has made in constraining cosmology from the clustering of galaxies, quasars and the Lyman-alpha forest. The SDSS-IV / eBOSS collaboration has measured the baryon acoustic oscillation (BAO) and redshift space distortion (RSD) features in the correlation function in redshift bins from z~0.15 to z~2.33. These features constitute measurements of angular diameter distances, Hubble distances, and growth rate measurements. A number of consistency tests have been performed between the BAO and RSD datasets and additional cosmological datasets such as the Planck cosmic microwave background constraints, the Pantheon Type Ia supernova compilation, and the weak lensing results from the Dark Energy Survey. Taken together, these joint constraints all point to a broad consistency with the standard model of cosmology LCDM + GR, though they remain in tension with local measurements of the Hubble parameter.

[구 CD-04] Be it unresolved: Measuring time delays from unresolved light curves

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Gravitationally lensed Type Ia supernovae may be the next frontier in cosmic probes, able to