[SS2-2] Power Spectrum of Cosmic Momentum Field Measured from the SFI Galaxy Sample

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The peculiar velocity observation is important in the study of large-scale structure because it directly probes the large-scale matter density field and contains information on larger scales compared with the density field in a given survey volume. As a natural measure of the large-scale peculiar velocity and matter fluctuation fields, we use the cosmic momentum field that is defined as the peculiar velocity field weighted by local number of galaxies. The SFI catalog is a field spiral galaxy sample which contains radial peculiar velocities derived from the I-band Tully-Fisher relations. From this sample we have measured the power spectra of momentum and density fields. By comparing the measured momentum and density power spectra we have estimated \beta = \Omega^{0.6} / b_o where \Omega is the matter density parameter and b_o is the bias factor for optical galaxies. Our analysis method can be directly applied to the Sloan Digital Sky Survey (SDSS) early-type galaxies and clusters whose peculiar motions are derived from the D_n-\sigma relation.

[SS2-3] Scale, Luminosity and Morphology Dependence of Topology in the UZC+SSRS2 Catalog of Galaxies

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We have analyzed the combined survey sample of the Updated Zwicky (UZC) and the Southern Sky Redshift Surveys 2 (SSRS2) to measure topology of the distribution of galaxies. This dense sample allows us to explore the dependence of the topology of volume-limited samples as a function of scale, absolute magnitude, and morphology of galaxies.

As for the scale dependence the negative shift of the genus curve, which is a topology measure, is clear on scales less than 5 h^{-1}Mpc for galaxies fainter than -19.5+ 5 log h. The observational sample consistently indicates that the number of voids is fewer than that of clusters at all scales explored.

We have also found there is luminosity dependence of topology. Namely, galaxies fainter than -19.5 show stronger negative shifts than those brighter than -19.5. Morphology of galaxies is also found to affect the genus. The late type galaxies with $T \geq 1$ (or 3) have more negative shifts than the earlier types with $T \leq 0$ (or 2). The fact that the topology depends sensitively on physical properties of galaxies, opens a possibility to understand the galaxy formation mechanism by studying topology of galaxy distribution when the full SDSS sample is prepared.