Z107a Splashback Radius of Non-spherical Dark Matter Halos from Cosmic Density and Velocity Fields

Teppei Okumura (ASIAA/Kavli IPMU), Takahiro Nishimichi (Kavli IPMU), Keiichi Umetsu (ASIAA), Ken Osato (Univ. of Tokyo)

We investigate the splashback features of dark-matter halos based on cosmic density and velocity fields. Besides the density correlation function binned by the halo orientation angle which was used in the literature, we introduce, for the first time, the corresponding velocity statistic, alignment momentum correlation function. Using large-volume and high-resolution N-body simulations, we measure the alignment cross-momentum correlation function of halos and subhalos. On halo scales, $x \sim 1$Mpc/h, we detect a sharp steepening in the momentum correlation associated with the physical halo boundary, or the splashback feature, which is found more prominent than in the density correlation. We also find that, if the density field traced by subhalos is used, the splashback radius is determined to be $\sim 5\%$ smaller than the true value due to the halo bias. On the other hand, the momentum field provides the unbiased estimator of the splashback features. Using the HSC survey to identify clusters of galaxies and the PFS survey to obtain galaxy redshifts, one will be able to determine the splashback features based on the cosmic velocity field.