[초GC-13] Testing Weak-Lensing Maps of Galaxy Clusters with Dense Redshift Surveys Testing Weak-Lensing Maps of Galaxy Clusters with Dense Redshift Surveys

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We use dense redshift surveys of nine galaxy clusters at z ~ 0.2 to compare the galaxy distribution in each system with the projected matter distribution from weak lensing. By combining 2087 new MMT/Hectospec redshifts and the data in the literature, we construct spectroscopic samples within the region of weak-lensing maps of high (70-89%) and uniform completeness. With these dense redshift surveys, we construct galaxy number density maps using several galaxy subsamples. The shape of the main cluster concentration in the weak-lensing maps is similar to the global morphology of the number density maps based on cluster members alone, mainly dominated by red members. We cross correlate the galaxy number density maps with the weak-lensing maps. The cross correlation signal when we include foreground and background galaxies at 0.5zcl < z < 2 zcl is 10 - 23% larger than for cluster members alone at the cluster virial radius. The excess can be as high as 30% depending on the cluster. Cross correlating the galaxy number density and weak-lensing maps suggests that superimposed structures close to the cluster in redshift space contribute more significantly to the excess cross correlation signal than unrelated large-scale structure along the line of sight. Interestingly, the weak-lensing mass profiles are not well constrained for the clusters with the largest cross correlation signal excesses (>20% for A383, A689 and A750). The fractional excess in the cross correlation signal including foreground and background structures could be a useful proxy for assessing the reliability of weak-lensing cluster mass estimates.