

Using spectroscopic data of galaxies within and around galaxy clusters to test structure formation

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June 30th, 2014

Abstract

Galaxy clusters are extremely useful tracers of structure formation. I show the use of clusters to test the cosmological model in two different tests using a unique spectroscopic data set with more than about 300 bound galaxies per cluster for about 8 (at the $0.2 \lesssim z \lesssim 0.5$ redshift range) of the 20 X-ray selected CLASH clusters. First, I provide a new observational test for a key prediction of the Λ CDM cosmological model: the contributions of mergers with different halo-to-main-cluster mass ratios to cluster-sized halo growth. For mass ratios between ~ 0.2 and ~ 0.7 , we find a $\sim 1\sigma$ agreement with Λ CDM expectations based on the Millennium simulations I and II. Second, I estimate the clusters concentration-mass relation, which is another key test for the cosmological model, using galaxy dynamics. Finally, I compare our preliminary results for the relation to those derived by lensing and to the theoretical expected ones.