

Modeling color-dependent galaxy clustering: an extension of the abundance matching method

X34a

正木彰伍 (名古屋大学), Yen-Ting Lin(ASIAA), 吉田直紀 (東京大学)

Recent large galaxy redshift surveys have provided us with large size samples and various observational results relevant to galaxy evolution, e.g., luminosity-/color-dependent clustering, type-dependent mass profile, etc. Modeling the relation between galaxies and dark matter halos are very important to interpret and understand such results. So far, several powerful phenomenological approaches have been developed. We focus on the so-called subhalo abundance matching (SHAM) method in this work. SHAM connects galaxies and subhalos under the assumption of the monotonic relation between magnitude and circular velocity. SHAM works very well to reproduce the luminosity-dependent clustering without any fitting parameters. However SHAM only assigns galaxies' magnitudes to subhalos. It is important to generalize/extend the capability of SHAM to associate more physical properties of galaxies with subhalos.

In this work, we extend SHAM method by including the subhalo formation epoch which can be expected to be relevant to galaxy color. We show that our model reproduces well the latest results of color-dependent clustering obtained from the Sloan Digital Sky Survey and compare the obtained halo occupation distributions with them from other models. We will also discuss the potential of our model to assign the multiple properties by comparing the model prediction for the morphology-density relation and the galaxy type-dependent mass profile with observational results.