Multi-Object Spectroscopy in the Next Decade: Big Questions, Large Surveys and Wide Fields
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The dependence of the luminosity function on the magnitude gap

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Abstract

Fossil galaxy groups were discovered three decades ago by Ponman et al. (1994).They are thought to be very old and relaxed systems in which all M^* galaxies had merged in a single, massive, central galaxy. Their key parameter is the gap in magnitude between the two brightest member galaxies (Δm_{12}). Thus, their luminosity functions (LFs) are expected to present a deficit of bright galaxies (smaller M^* values). No differences are expected in the faint-end slope α with respect to regular clusters. However, the few studies of the LFs of individual fossil systems are not conclusive, mainly due to their large uncertainties. For this reason, we analyze a homogeneous dataset of 100 clusters and groups taken from the SDSS, including 17 spectroscopically confirmed fossil systems. With this dataset, we are now able to present the first homogeneous study of the evolution of the LF with Δm_{12}. We stacked all LFs in four bins of Δm_{12} using a hybrid method that allows us to use all the photometric and multi-object spectroscopic information of our survey. We find that both M^* and α evolve with the magnitude gap. In particular, the bigger the Δm_{12}, the lower the M^* and the flatter the α. Thus, the different dynamical state (age) associated with different magnitude gaps is reflecting also in the dwarf galaxy population. In this talk, we will discuss the impact of this result on the most-accepted formation scenarios for fossil systems, together with possible biases and alternative explanations.