X39a Statistical study of recently quenched galaxies in preparation for PFS

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Quenching is the process where galaxies suppress their star formation activities. It is a critical stage in galaxy evolution, mainly affected by stellar mass and the environment of galaxies. In this work, we try to understand the environmental and mass effects of quenching.

Recently quenched galaxies (RQGs), as a transitional population between quiescent and star-forming galaxies, can efficiently deliver information on quenching processes. A statistical sample of RQGs is necessary for studying mass and environment dependence of quenching. However, the rarity of RQGs hampers statistical spectroscopic analysis. As a pilot work, we conduct a statistical photometric study of RQGs. Using the rest-frame UVJ diagram, we select about 250 RQGs from the centre to the outskirts of clusters at redshift 0.5-1.0 and divide them by the quenching timescale. This method is consistent with current DEIMOS and LEGA-C galaxy spectra. We found the quenching efficiency is enhanced by both higher stellar mass and denser environment. Massive galaxies and galaxies in dense environments tend to start quenching earlier. The quenching timescale shows dependence on redshift and stellar mass. However, the time a galaxy stays in the RQG regime on the UVJ diagram may degenerate with other quenching properties. We need to obtain galaxy spectra to disentangle this degeneracy.

The upcoming PFS' large FOV can significantly improve the efficiency of the RQG spectroscopic survey. With statistical RQG spectroscopic data, we will interpret the quenching scenario better.