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Galaxy formation and mass assembly with the VIMOS Ultra Deep Survey (VUDS)

Galaxy evolution and formation has been extensively studied in the past decades. In numerous studies two main parameters are widely used, namely the star formation rate (SFR) and stellar mass (M^*). They allowed the estimation of the evolution of the luminosity function, SFR density and Mass functions at different epochs which brought important constraints on the physical processes driving the evolution of galaxies.

In this work we choose to study another crucial parameter, the age of galaxies; a parameter that is in general left apart due to the degeneracies with other parameters like dust and metallicity. Nevertheless, I will show, with large simulations, that the estimation of galaxy ages is possible when we use high redshift galaxies ($z > 2$) and the coupling of UV-rf spectroscopy and multi-wavelength photometry. Using this method applied to the galaxies of the VIMOS Ultra deep survey I will discuss the implications of the estimation of high redshift galaxy ages. First, I will present the estimation of the formation redshift of galaxies, e.g. the redshift (or epoch) at which the star formation in the galaxy was ignited. These measurements are then used to estimate the formation redshift function (FzF), a new way to trace galaxy formation across cosmic time. It describes the number of created galaxies at any particular epoch in the history of the Universe. This allows us to follow the formation of galaxies up to very early time at $z \sim 10-15$. Then, using these formation redshifts and stellar mass I will present the last results on the mass assembly of galaxies. I will show that there is a strong correlation between these two parameters at low redshift while this correlation is continuously reduced with redshift to almost a non-correlation at the highest redshift.

To conclude I will present the next steps that will be developed in the future to extend this work at other cosmic epochs using the SPARTAN project, a new fitting tool under active development.

Serdecznie zapraszam,
Agnieszka Majczyna