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The formation and build-up of the red-sequence over the past 9 Gyr in VIPERS

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Abstract. We present the Luminosity Function (LF) and Colour-Magnitude Relation (CMR) using ~ 45000 galaxies drawn from the VIMOS Public Extragalactic Redshift Survey (VIPERS). Using different selection criteria, we define several samples of early-type galaxies and explore their impact on the evolution of the red-sequence (RS) and the effects of dust. Our results suggest a rapid build-up of the RS within a short time scale. We find a rise in the number density of early-type galaxies and a strong evolution in LF and CMR. Massive galaxies exist already 9 Gyr ago and experience an efficient quenching of their star formation at $z = 1$, followed by a passive evolution with only limited merging activity. In contrast, low-mass galaxies indicate a different mass assembly history and cause a slow build-up of the CMR over cosmic time.

Keywords. Galaxy Surveys - Galaxies: evolution - Galaxies: formation - Galaxies: statistics

1. The Evolution of Early-Type Galaxies Since $z = 1.3$

The VIMOS Public Extragalactic Redshift Survey (VIPERS) is mapping out the Universe at $0.5 < z < 1.2$ using spectroscopic redshifts of 100k galaxies with $I_{AB} < 22.5$ in two sky regions over 24 deg^2 . Based on complementary precise UV to IR photometry, this unique dataset provides unprecedented detail on the statistical properties of galaxies and evolution of structure at intermediate redshifts (Guzzo *et al.* 2014; Garilli *et al.* 2014).

We examine the evolution of the Colour-Magnitude Relation (CMR) and Luminosity Function (LF) in VIPERS using ~ 45000 galaxies between $0.4 \leq z \leq 1.3$ over 10.32 deg^2 (Fritz *et al.* 2014). Independent from the selection criteria to define early-type galaxies, we find a rise in the number density and a strong evolution in the LF and CMR since $z = 1.3$. Dusty red galaxies show a mild evolution up to $z = 1$ and the effects of dust obscuration become more prominent at $z > 1.3$. Stellar population properties and their modelling favour a rapid build-up of the red-sequence within ~ 1.5 Gyr. Massive galaxies are already assembled at $z = 1$ and experience a rapid star formation (SF) quenching without significant subsequent dry mergers. Low-massive galaxies indicate a more complex mass assembly with a combination of SF quenching and minor mergers that slowly build-up of the faint- and intermediate-luminosity end of the CMR.

References

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