The reversal of the star formation - density relation in a high redshift galaxy cluster

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Abstract

In the local universe the cores of massive galaxy clusters are typically dominated by red passive galaxies with old stellar populations, and low-level star-forming galaxies are usually located at the cluster outskirts. A 'red sequence' of galaxies is already in place for these clusters up to $z \sim 1.5$, so the peak epoch of mass assembly in high density environments must reside at higher redshifts. We report on Herschel observations of the massive cluster XDCP0044-2033 ($z = 1.58$) that shows a strikingly high amount of star formation in the cluster core (< 250 kpc), of more than 1000 solar masses / year, unprecedented in a galaxy cluster. This brings evidence that we start to see the long sought reversal of the star formation density relation at high redshift in high density environments. I shall discuss the on-going search to detect high-redshift star-forming clusters with Planck/Herschel observations and the longer term prospect of future survey missions, like Euclid.