

**A direct measurement of the gas content of a massive elliptical galaxy
in the peak era of galaxy assembly**

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Abstract

Very little is known about the interstellar medium content and gas reservoirs of distant, passively evolving galaxies compared to the gas and dust in active galaxies which are now being characterised by infrared and sub-mm observatories on a routine basis. Gas fractions $f_{\text{gas}} = M_{\text{gas}}/(M_{\text{gas}} + M_{\star})$ in galaxies on the main sequence of star formation have been observed to rise by an order of magnitude out to $z \sim 2$. Does the gas content decrease with cosmic time in a synchronised fashion in both active and passive galaxies, i.e. following an average, ‘universal’ cosmic decline?

I will present the outcome of the first direct measurement of the molecular gas in passively evolving galaxies at high redshift, obtained through IRAM/PdBI follow-up of the CO(2→1) line toward an $6 \times 10^{11} M_{\odot}$ elliptical galaxy with $z = 1.43$ in the COSMOS field. This observation reveals a gas fraction which is about an order of magnitude lower than the dominant population of star-forming galaxies at this redshift. I will discuss the implication of this finding in the context of the AGN feedback paradigm and models of ISM replenishment through stellar evolution, as well as by comparison to simulations and observations of gravitational/morphological quenching.