

X45a Stellar velocity dispersion of a massive galaxy with suppressed star formation at $z = 4.01$

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We report on the measurement of stellar velocity dispersion of the most distant, massive quiescent galaxy spectroscopically confirmed to date. Using deep multiwavelength data in UDS, we have constructed a photometric sample of massive ($\gtrsim 10^{11}M_{\odot}$) galaxies with suppressed star formation rates at $z \sim 4$. We made a spectroscopic follow-up observation of the brightest galaxy in the sample with Keck/MOSFIRE. The 7 hour MOSFIRE spectrum reveals 4 prominent Balmer lines and we confirmed the galaxy at $z = 4.01$. This is the most distant galaxy with suppressed star formation rate confirmed to date. Thanks to the high S/N of the spectrum, we successfully measured its stellar velocity dispersion, $\sigma_* = 288 \pm 61 \text{ km s}^{-1}$. This is consistent with the velocity dispersion of nearby massive galaxies, which indicates that the stellar velocity dispersion does not evolve significantly since $z = 4$. Using the physical size of this galaxy measured from the deep HSC data, which is consistent with the typical size of massive quiescent galaxies at $z \sim 4$ in the rest-frame optical from Kubo et al. 2018, we find that the stellar mass inferred from photometry is consistent with the dynamical mass, which excludes exotic IMF models.