

Title: A HERO (Hyper Extremely Red Object) in the Field near 53W002.

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HEROs (Hyper Extremely Red Objects) are objects which are very red in NIR colors ($J-K \gtrsim 3$). They are speculated to be intrinsically red galaxies at $z \gtrsim 2$ or Lyman-break galaxies at $z > 10$. We report the discovery of a HERO in the field which includes a known radio galaxy, 53W002, and a possible cluster of galaxies both at $z=2.39$.

The HERO, which we name as HERO J171411.91+501541.8, or 53W002-HERO1 for brevity, is visible in the HST NICMOS H -band data and deep K' -band data from Subaru telescope ($K' \lesimeq 21.5$ mag), but not visible in B , V , I , and J band images ($J-K > 4.45$, $2-\sigma$).

Its spectral energy distribution is consistent with that of a dusty starforming or an old galaxy at $z \lesimeq 2.4$, which may suggest that 53W002-HERO1 is a member of group of galaxies associated with 53W002.

Alternatively, the HERO could be at $z \lesimeq 12.5$, if its red color is due to the redshifted Lyman break. If 53W002-HERO1 is an old galaxy at $z \sim 2.4$, the implied stellar age is a few Gyrs, meaning that stars in the HERO formed at the reionization epoch of $z \gtrsim 10$.

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