

# A candidate redshift $z \approx 7$ galaxy and rapid changes in that population at an age of 500 Myr

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Searches for very-high-redshift galaxies over the past decade have yielded a large sample of more than 6,000 galaxies existing just 900–2,000 million years (Myr) after the Big Bang (redshifts  $z > 3$ ). The Hubble Ultra Deep Field data have yielded the first reliable detections of  $z \approx 8$  galaxies that, together with reports of a  $\gamma$ -ray burst at  $z \approx 10$ , are the earliest objects reliably reported to date.

Observations of  $z \approx 7$  galaxies suggest substantial star formation at  $z > 9$ . Here we use the full two-color data to conduct an ultra-deep search for  $z \approx 10$  galaxies in the heart of the reionization epoch, only 500 Myr after the Big Bang. We only do we find one possible  $z \approx 10$  galaxy candidate, but we show that, regardless of source detections, the star formation rate density is much smaller ( $\sim 10\%$ ) at this time than it is just  $\sim 200$  Myr later at  $z \approx 8$ . This demonstrates how rapid star formation build-up was at  $z \approx 10$ , as galaxies increased in both luminosity density and volume density from  $z \approx 10$  to  $z \approx 8$ .  $z \approx 10$  is clearly a crucial phase in the assembly of the earliest galaxies.

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