Redshift $z \sim 9$ galaxies in the Hubble Frontier Fields and implications for the high-redshift evolution of the UV luminosity density

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Abstract

The Hubble Frontier Fields (HFF) survey has recently begun to deliver ultra-deep HST imaging of massive low-redshift galaxy clusters. The key science goal of the HFF project is to use the gravitational lensing of the foreground clusters to identify and study faint background galaxies at redshifts $z > 7$. Here we present the results of a recently submitted paper, which uses a photometric redshift analysis to identify a robust sample of $z \sim 9$ galaxies from the first two clusters targeted by the HFF survey. This sample significantly improves on previous determinations of galaxy number densities at $z \sim 9$ and allows us to provide tighter constraints on the decline in star-formation density within the epoch of reionization. We conclude that the new data strengthen the evidence for a smooth decline in the UV luminosity density from $z = 8$ to $z = 9$, contrary to recent reports of a dramatic drop-off at these redshifts. This provides support for the scenario in which early galaxy evolution is sufficiently extended to explain cosmic reionization.