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New far-UV imaging (WFC3/F225W) on Hubble Frontier Fields: new catalogs and photometric redshifts

Anahita Alavi[1] Vihang Mehta[2] Harry Teplitz[1] Brian Siana[3] Daniel Magee[4] Rychard Bouwens[5] Bruno Rebeiro[5] Pascal Oesch[6] Garth Illingworth[7] Ana Paulino-afonso[8] Renske Smit[9] Eros Vanzella[10]

[1]IPAC/Caltech, [2]Caltech/IPAC, [3]UC Riverside, [4]UCSC, [5]Leiden, [6]Geneva, [7]University of California, Santa Cruz, [8]Centra, [9]Liverpool JMU, [10]INAF

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The Hubble Frontier Fields (HFF) program observes 6 massive lensing galaxy clusters in optical and near-IR using the ACS and WFC3 cameras on the Hubble Space Telescope (HST). Our program extends the HFF observations to far-ultraviolet by imaging in the F225W band using the WFC3/UVIS channel on HST. Covering far-UV wavelengths opens up an immense range of science for both the lensed background galaxies and cluster members. In particular, it enables us to set significantly stronger constraints on the photometric redshift of star-forming galaxies down to z~1 through the identification of the Lyman-break. Accurate photometric redshifts are essential for constraining strong gravitational lensing models, and thus accurate estimates of the luminosity, deriving average properties for galaxies vs. cosmic time and constraining the UV luminosity function (LF).

In this work, we present new photometric catalogs and photometric redshifts for HFFs including these new UV observations. Since UV sources are usually more compact and have a lower signal to noise, a routine aperture-matched PSF-matched photometry would further degrade the UV signal to noise ratio. Therefore we measure UV photometry in the original high-resolution UV data. Specifically, we perform source detection on the F435W mosaics to obtain isophotes that better match the galaxy morphology in the bluer/UV wavelengths. We utilize photometry over all available HST filters along with K-band and IRAC ch.1,2 for the photometric redshift estimation. We use a collection of spectroscopic redshifts available from a multitude of literature studies over the HFF fields to calibrate for photometric zeropoint offsets and to validate the performance of the measured photometric redshifts.