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The prevalence and physical properties of extremely low-luminosity galaxies in the early universe

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Abstract. Gravitational lensing from galaxy clusters has great potential for deriving the prevalence and physical properties of ultra-faint galaxies at early times, with recent very impressive results from the Hubble Frontier Fields program. Important issues in deriving the most accurate results are accurate constraints on source sizes and a robust treatment of uncertainties in the magnification models. Using >3300 $z = 2 - 10$ galaxies behind the 6 Hubble Frontier Fields clusters and a forwards modeling approach, I describe the efforts of my collaborators and me to map out the galaxy luminosity functions at ~ -13 mag from $z \sim 9$ to $z \sim 2$, i.e, a factor of 1000 below L^* and to the typical luminosity of galaxies suspected to drive cosmic reionization. Additionally, I discuss the constraints we can obtain on the properties of faint sources, in particular their stellar masses, mass-to-light ratios, colors, and stellar population ages. I conclude with a prospective on using cluster lenses to study the distant universe with the James Webb Space Telescope.
