Probing the Epoch of Reionization with the Hubble Frontier Fields Clusters

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Abstract

The identification of the first generation of galaxies and the possible sources of cosmic reionzation is one of the foremost challenges in modern astrophysics. Great progress has been made in characterizing galaxy populations at redshift z=6-7 through photometric observations in blank fields. A complementary approach is to exploit the power of gravitational lensing offered by massive galaxy clusters, which gives access to the faintest sources at high redshift. I will discuss the first results of the Hubble Frontier Fields program that aims at peering deeper into the distant Universe. Using the first HFF clusters A2744 and MACS0416, I will show how combining HST capabilities with gravitational telescopes can be an efficient way to study the faintest galaxy populations ever observed at those redshifts. We can now put constraints on the faint-end slope of the UV luminosity function at $z \sim 7$ down to an absolute magnitude of $M_{UV} = -15.5$, which is about $0.01L^{\star}$, and two magnitudes deeper than the deep blank fields. I will also discuss the implications of the new constraints on the galaxy UV luminosity density on the cosmic reionization.