

Extremely Magnified Stars and Flashlights

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Observations with the Hubble Space Telescope (HST) have now definitively identified two blue supergiant stars, Icarus and Warhol, at cosmological distances which are extremely magnified by foreground Hubble Frontier Field (HFF) galaxy clusters. Moreover, several less well characterized stars have also been detected briefly when their magnification temporarily increased due to microlensing by an object in a foreground cluster. I will discuss the two-cycle Flashlights 192-orbit HST program, which is obtaining two epochs of ultra-deep, unfiltered imaging of all six HFF cluster fields. These observations, with a single-visit five-sigma limiting magnitude of 31 AB, can be expected to increase the current sample of microlensing events of extremely magnified stars substantially, and detect a sizable sample of pairs of stellar images. If only 2% of dark matter consists of primordial black holes across a broad ranges of masses, then the rate of detected microlensing peaks should be significantly increased. The pairs of stellar images should stringently test lens models, probe the abundance of low-mass dark-matter halos, and evaluate predictions for dark matter as ultra-light bosons.

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