

Gravitational lensing of individual Population III stars in the early Universe

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Individual stars are typically not detectable beyond the local Universe, but gravitational lensing by foreground galaxy clusters can in rare cases raise the brightness of extremely distant stars to detectable levels. More than a dozen lensed stars at $z \sim 1-3$ have already been detected this way using HST and JWST, along with a smaller number of candidates at $z \sim 5-6$ (including the current record holder “Earendel” at $z=6.2$). Individual, lensed Population III stars at redshifts up to $z \sim 15$ may potentially also be detectable this way with JWST, which would allow for a unique opportunity to observationally constrain the SFRD(z) and stellar IMF of such stars. The methods used to interpret lensed-star observations are, however, still in their infancy and significant community efforts would be required to identify and characterize Population III candidates this way. In this talk, I will describe the current state of lensed-star observations, outline under what circumstances individual lensed Population III stars may be detectable with JWST, and describe what new challenges the Population III community would need to face with in order to take full advantage of this observational technique.

Presenter: ZACKRISSON, Erik (Uppsala University)

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