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Pointing the James Webb Space Telescope through lensing clusters - can the first stars and galaxies be detected?

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The James Webb Space Telescope (JWST), scheduled for launch in 2014, is expected to revolutionize our understanding of the high-redshift Universe. Even so, many of the first stars and galaxies are predicted to be intrinsically too faint for JWST. Here, we explore the prospects of searching for the first stars (both conventional pop III stars and dark stars) and galaxies at z > 10 by pointing JWST through foreground lensing clusters. Observations of this kind can reach significantly deeper than the currently planned JWST ultra deep field in just a fraction of the exposure time, but at the expense of probing a much smaller volume of the high-redshift Universe. We also present the first spectral synthesis model custom-designed for the first galaxies, and discuss the observational signatures of pop III stars and dark stars within these systems.

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