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The JWST lensed quasar dark matter survey

Monday, 8 July 2024 14:40 (20 minutes)

Strong gravitational lensing provides a direct, purely gravitational method to infer the properties of dark matter halos and thereby constrain the mass, formation mechanism, and possible self-interactions of the dark matter. Many strong lenses appear as four lensed images of a background quasar alongside spatially-resolved light from the quasar host galaxy that we observe as spectacular, extended lensed arc(s). I will discuss how simultaneous reconstruction of the relative magnifications of quasar images and lensed arcs places stringent constraints on the deflection field of the lens system, isolating the subtle lensing signatures associated with low-mass (M < 10^8 solar mass) dark matter halos from properties of the lens on larger scales. I will discuss implications for models of warm and self-interacting dark matter, theories in which these low-mass halos exist in lower numbers as a result of free-streaming, or have extremely high central densities after experiencing "gravothermal catastrophe", or core collapse, as a consequence of dark self-interactions.

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