



10589 - The highest redshift Einstein ring: probing a dark matter halo at $z=1$ and galaxy morphology at $z=3.8$

Cycle: 14, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

<i>Visit</i>	<i>Targets</i>	<i>Configurations</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
01	(1) FOR-J0332-3557-F814W	ACS/HRC	?	?	yes

ABSTRACT

The occurrence of nearly complete Einstein rings is very low, but their importance cannot be overstated: in comparison with configurations which have a few images, Einstein rings provide a full characterisation of the dark matter halo when combined with measures of the velocity dispersion gradient in the lens. The projected gravitational potential is vastly constrained by the polar information given by the shape of the ring at different position angles. Our discovery of the highest redshift Einstein ring so far, a configuration where the lens is an elliptical galaxy at $z=0.986$ and the source a post-starburst Lyman break galaxy at $z=3.77$, yields several intriguing results. The modelling of the ring, which stretches some 260 degrees around the lens, points to a very slow evolution in the mass-to-light ratio, as indicated by its position with respect to the fundamental plane of nearby ellipticals. This is at odds with the results obtained by the few lenses existing at this redshift. The M/L ratio within the effective radius is consistent

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with the one produced by stellar populations, indicating that the dark matter is not dominant at this radius. To fully characterise the dark matter halo of this unique elliptical at a look-back time of 50% of the current age of the universe, we require both a measure of the gradient in velocity dispersion and a high-resolution image of the ring. The former will be measured by our forthcoming VLT medium-resolution spectroscopy, while the later can only be provided by the ACS onboard HST. The presence of a counter-image which is radially elongated, combined with the shape of the main ring will lead to the first reconstructed projected potential of an isolated dark halo at $z=1$, with unprecedented accuracy. In addition, the exquisite image quality provided by the ACS will allow us to reconstruct the imaged source, providing the first ever high-resolution morphology of a Lyman-break galaxy at $z=3.77$.

OBSERVING DESCRIPTION

This is a very simple one orbit visit with ACS WFC in F814W of a gravitational lensing system. Default dithering with ACS-WFC-DITHER-BOX template.

Proposal 10589 - Visit 01 - The highest redshift Einstein ring: probing a dark matter halo at z=1 and galaxy morphology at z=3.8

Mon Jun 20 15:20:38 GMT 2005

Visit	Proposal 10589, Visit 01 Diagnostic Status: Error Scientific Instruments: ACS/HRC Special Requirements: PCS MODE FINE; SCHED 30%																								
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