



# CLASH: New Multiple-Images Constraining the Inner Mass Profile of MACS J1206.2-0847

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We present a strong-lensing analysis of the galaxy cluster MACS J1206.2-0847 ( $z=0.44$ ) using UV, Optical, and IR, HST/ACS/WFC3 data taken as part of the CLASH multi-cycle treasury program, with VLT/VIMOS spectroscopy for some of the multiply-lensed arcs. The CLASH observations, combined with our mass-model, allow us to identify 47 new multiply-lensed images of 12 distant sources. These images, along with the previously known arc, span the redshift range  $1 \leq z \leq 5.5$ , and thus enable us to derive a detailed mass distribution and to accurately constrain, for the first time, the inner mass-profile of this cluster. We find an inner profile slope of  $d \log \Sigma / d \log \theta \simeq -0.55 \pm 0.1$  (in the range  $[1 \text{ arcsec}, 53 \text{ arcsec}]$ , or  $5 \leq r \leq 300$  kpc), as commonly found for relaxed and well-concentrated clusters. Using the many systems uncovered here we derive credible critical curves and Einstein radii for different source redshifts. For a source at  $z_s \simeq 2.5$ , the critical curve encloses a large area with an effective Einstein radius of  $\theta_E = 28 \pm 3 \text{ arcsec}$ , and a projected mass of  $1.34 \pm 0.15 \times 10^{14} M_\odot$ . From the current understanding of structure formation in concordance cosmology, these values are relatively high for clusters at  $z \sim 0.5$ , so that detailed studies of the inner mass distribution of clusters such as MACS J1206.2-0847 can provide stringent tests of the  $\Lambda$ CDM paradigm.

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