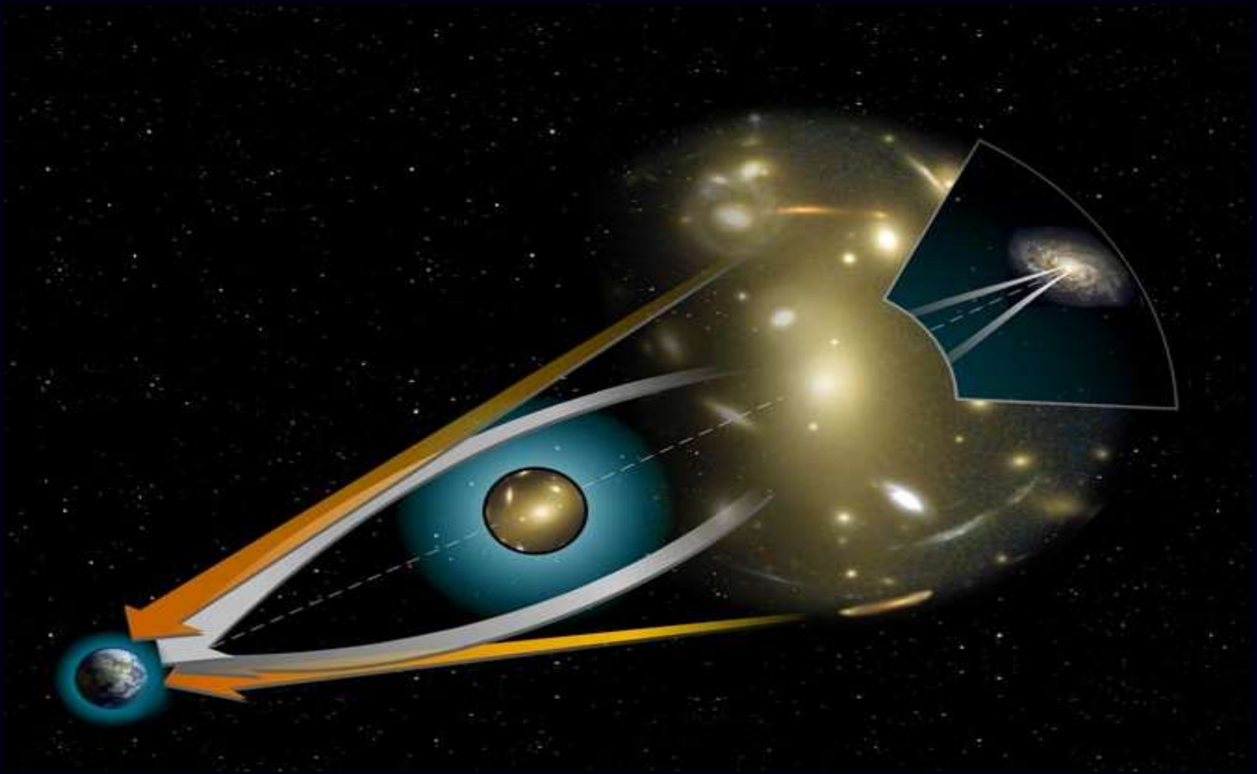
STRONG LENSING IN THE INNER HALO OF GALAXY CLUSTERS



Cristian Saez (UMD)
Luis Campusano (UCH)
*Eduardo Cypriano (*IAG*)*
*Laerte Sodre (*IAG*)*
Jean-Paul Kneib (EPFL)

Saez et al. 2016, MNRAS 460, 4453 (P12)

Research Question?

- What constrains on the dark matter haloes can we find by studying the lens statistics of low redshift galaxy clusters?

We accomplish this by obtaining the cumulative distribution of cluster with ars as a function of their redshifts (z_L) and comparing them with predictions of a simple formulation.

Number of Strong lensing Arcs

$$N_{\rm arcs}(M, z_l) = \int_{z_l}^{z_{max}} n_o(\bar{\mu}, z_s)\hat{\sigma}(M, z_l, z_s)\frac{cdt}{dz_s}(1+z_s)^3 dz_s.$$

n_o : Commoving density of detectable galaxies at an specific redshift (related to the luminosity function of galaxies and telescope sensitivity).

σ : strong lensing cross section in the source plane. Depends on the dark matter profile if the source and its parameters (we include elliptical profiles).

cdt/dz_s: differential proper length (depend on cosmological model).

Haloes

DARK MATTER MODELS

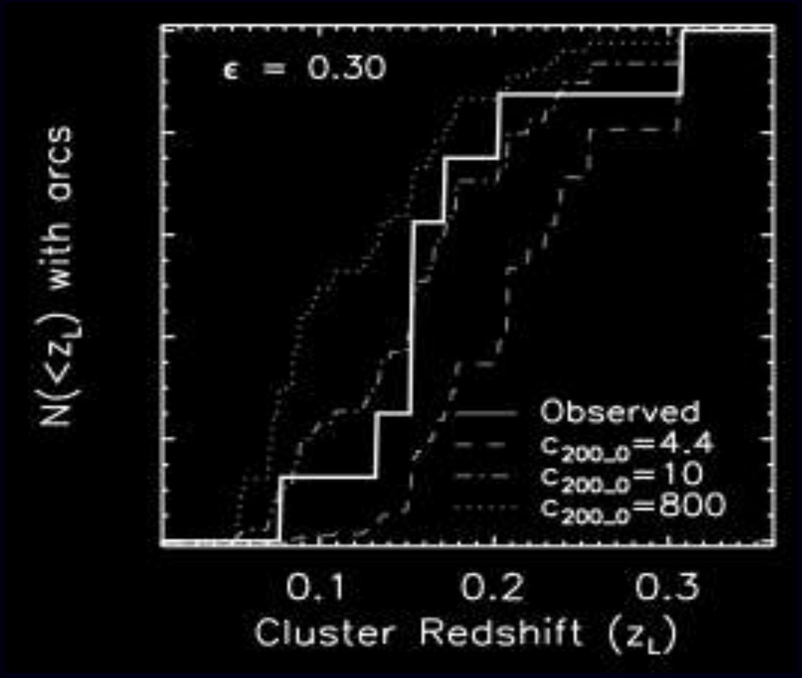
NSIS Profile

$$\rho(r) = \frac{\sigma_v^2}{2\pi G(r^2 + r_c^2)}$$

NFW Profile $r_s=r_\Delta/c_\Delta$

$$\rho(r) = \frac{\rho_s}{(r/r_s)(1 + r/r_s)^2}$$

In particular our methodology was effective to constrain parameters that affect z_{cut} (the minimum cluster redshift where we can detect arcs). These parameters were c_Δ for NFW profiles and r_c for the NSIS profiles.



Cluster images used in our analysis

- We select 48 bright X-ray (L_X>1.2 $10^{44}h^{-2}$ erg s^{-1}) clusters from Abell that were observed with VLT (FORS1). In 8 of these clusters we had detection of Arcs.