STRONG LENSING IN THE INNER HALO OF GALAXY CLUSTERS

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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

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

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

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

\( \frac{cdt}{dz_s} \): differential proper length (depend on cosmological model).
In particular our methodology was effective to constrain parameters that affect $z_{\text{cut}}$ (the minimum cluster redshift where we can detect arcs). These parameters were $c_\Delta$ for NFW profiles and $r_c$ for the NSIS profiles.
We select 48 bright X-ray ($L_X > 1.2 \times 10^{44} h^{-2} \text{ erg s}^{-1}$) clusters from Abell that were observed with VLT (FORS1). In 8 of these clusters we had detection of Arcs.