

Probing dark energy with galaxy clusters : the Euclid galaxy cluster catalog



Anaïs Widmer supervised by Jim Bartlett
Jean-Baptiste Melin (CEA), Calum Murray



Galaxy clusters

Largest and most massive gravitationally bound structures known in the Universe.
 $10^{14} - 10^{15} M_{\odot}$, 1 - 5 Mpc, 100 ~ 1000 galaxies.
Galaxies, ICM gas, dark matter.
Optical, X-rays, SZ effect.



Euclid

Launched 1 July 2023, heliocentric orbit (L2 point), optical and near IR. One of the largest clusters catalogs : 100,000 clusters across more than a third of the sky.

Dark Energy

Cluster formation is very sensitive to quantities of dark energy and dark matter. Detected clusters up to $z = 2$ > clusters counting as a function of redshift and mass > quantities of DE and DM.

Validation of Euclid with external data (CG - WP8)

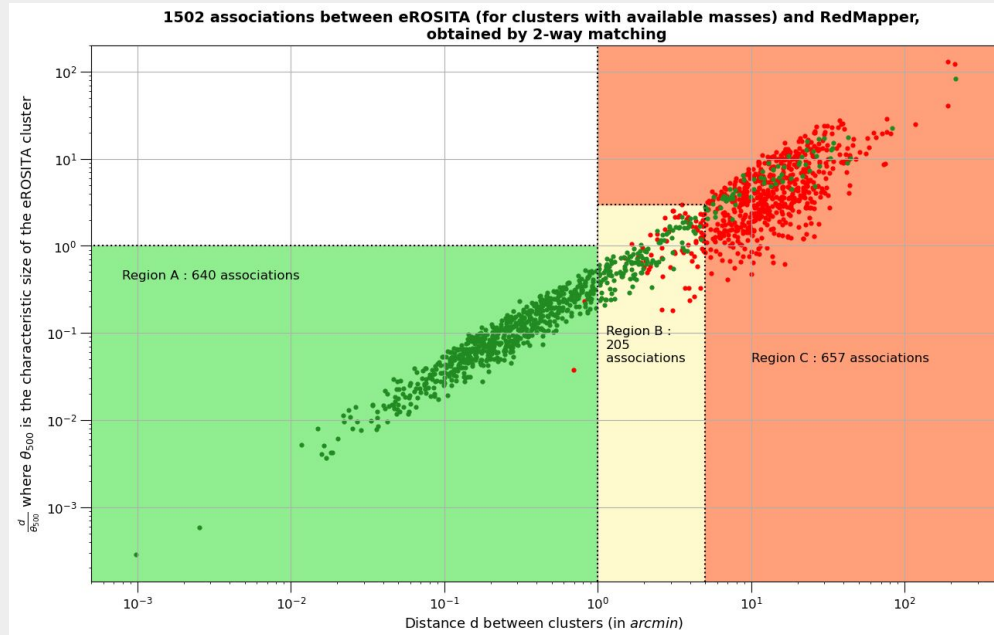
External data : X-ray, SZ, optical catalogues.
Newly discovered vs known clusters, prepare scaling relations analyses, study selection function.

Crossmatches between catalogs

DES Y1 redMaPPer instead of Euclid.
Comparisons with LC2, Abell, eROSITA.

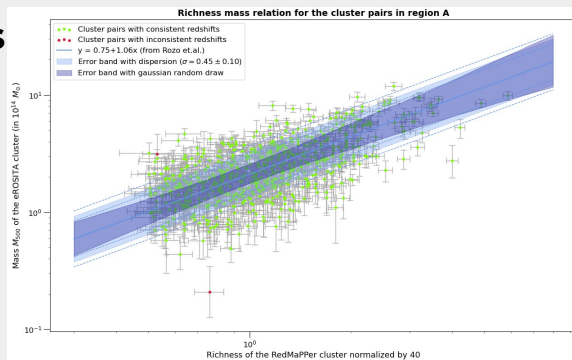
Two complementary physical matching (selection based on position, mass, redshift) or one positional matching if mass is not available. Check for consistency of other properties (richness, luminosity, gas mass, temperature, ...). Catalogue redMaPPer has been completed with all counterparts from multiple catalogs.

Paper : J-B. Melin et. al. "Euclid preparation: Validation of the Euclid catalogue of galaxy clusters with external data", in prep.



Scaling relations

Relations between properties of RM/eR : eg mass-richness.



Euclid selection function

Evaluation by simulations of catalogs. Variation of HOD (halo occupancy distribution) parameters (eg number of satellite galaxies in the halo) and study the associated selection function.