



ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

DIPARTIMENTO DI FISICA E ASTRONOMIA
Department of Physics and Astronomy - DIFA

Title of the Project: Methods for Lensing cluster mass measurements in Euclid

Supervisors: Lauro Moscardini, Mauro Sereno (INAF-OAS)

Duration: 1 year

Scientific Case:

Abundance and properties of galaxy clusters can probe the nature of the dark matter and dark energy. Ongoing (e.g. KiDS, HSC-SSP) and future (e.g. Euclid, Rubin-LSST) surveys are collecting and detecting an unprecedented number of galaxy clusters. To constrain cosmological parameters, we need unbiased and accurate measurements of the cluster mass, which can be inferred through weak lensing observations.

Lensing masses can suffer from statistical noise, intrinsic scatter, or systematic uncertainties. Clusters form at the nodes of the cosmic web and the effects of correlated or uncorrelated matter have to be understood. Euclid lensing surveys need cluster mass calibration at the percent level. This is challenging and considerable efforts have been dedicated to this goal, see e.g. the Euclid consortium activities led by the science working group on clusters of galaxies and the connected OU level 3 processing functions (COMB-CL).

The goal of this project is to assess the different sources of errors and to develop efficient methods for lensing mass measurements of either single cluster or stacked samples of them.

Outline of the Project:

The candidate is expected to work in one or more of the following topics:

- development of a pipeline for mass measurement based on a parametric mass model for the main halo and the surrounding matter;
- comparison of different approaches for mass measurements, e.g. parametric fitting vs aperture mass;
- tests on existing data-sets, like KiDS;
- forecasts for stage IV lensing surveys, e.g. Euclid.

Contacts:

Lauro Moscardini (lauro.moscardini@unibo.it)

Mauro Sereno (mauro.sereno@inaf.it)