Contribution ID: **11**   Type: **Poster**

Galaxy cluster cosmography with BayesLens

Friday 25 March 2022 16:05 (1h 40m)

Lensing using galaxy clusters is a sensitive and promising probe of cosmology, complementing classical probes such as the CMB, SN and BAO. It presents an independent way of probing the background geometry of the universe, and has shown to be sensitive to total matter density and dark energy equation of state parameters. This probe is, however, currently limited by the accuracy of lensing models which make use of rigid assumptions. BayesLens is a state-of-the-art hierarchical modelling code created to alleviate these rigid assumptions, and has shown increased performance both on mocks and real clusters.

In this project, we aim to extend the BayesLens code to include cosmological parameters as hyperparameters. With this we would create a code that models the lensing properties and underlying cosmology at the same time, with which we aim to increase precision and accuracy of cluster lensing cosmography. We aim to first prove performance on mock clusters with predefined parameters. After this, the aim of the project is to recreate current cluster lensing cosmography studies using the extended code, to determine improvements and impact when considering real-life clusters.

Field of study

Astrophysics

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Session Classification: Poster session