## Differentiable Multiscale Strong Lens Modeling

*Submitter: Aymeric Galan*
*Authors: Aymeric Galan, Austin Peel, Luca Biggio, Frederic Courbin, Jean-Luc Starck, Giorgos Vernardos*

The striking observational phenomenon called strong gravitational lensing is a unique tool to study the evolution of the Universe and its content. In particular, it allows us to resolve distant background galaxies that would otherwise be too faint, and constrain both the dark and luminous mass distribution of the foreground galaxies. Current and future high-resolution imaging data involve solving challenging inverse problems in high dimensional space in order to capture all the complexity of the lens and source galaxies. I will discuss about recent developments in the field of (galaxy-scale) strong lens modeling, with a particular emphasis on novel multiscale techniques and deep learning approaches that heavily rely on automatic differentiation. In this context, I will also discuss how well-established regularization techniques based on sparsity and wavelet transforms can be cast in a probabilistic framework, and how they compare to more modern techniques such as continuous neural fields. I will also present specific examples of lens modeling applications to imaging data from the Hubble Space Telescope.