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Gravity.jl: a fast software for strong gravitational lens modeling

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Strong gravitational lensing by galaxy clusters is one of the most powerful tools to accurately probe the dark matter mass distribution in the densest regions of such structures, where multiple images are formed, and to test the currently accepted Λ CDM cosmological paradigm. Present and future observational facilities, such as the Euclid space telescope and the Vera Rubin observatory, are expected to observe thousands of massive galaxy clusters, increasing by more than an order of magnitude the number of known systems. Therefore, given the huge amount of data acquired, a software capable of performing both accurate and fast lensing analyses is required to investigate the structure of these systems, to constrain the values of the cosmological parameters and to study high-redshift sources.

In my talk, I will present Gravity.jl, a new Julia-based strong lensing modeling software. In contrast with previous codes, Gravity.jl combines an unprecedented speed with a wide variety of sampling techniques. I will show how Gravity.jl works and how it has been applied in currently-studied clusters. I will conclude by presenting several ongoing analysis that would not be possible without such a flexible code, as well as the cosmological analyses this software allows.

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