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A new era of strong gravitational lensing by galaxy clusters

Thursday, 11 July 2024 15:00 (30 minutes)

The advent of a new generation of observational facilities, such as the James Webb Space Telescope (JWST) and the Euclid space telescope, has just inaugurated a new era of discoveries that are destined to revolutionize all fields of astrophysics, including strong gravitational lensing by galaxy clusters. The JWST's spectrophotometric data, of unprecedented spatial resolution and sensitivity, have allowed us to increase by at least an order of magnitude the number of multiple images included in the lens models. Furthermore, extensive area surveys such as the Euclid's Wide Survey and the Legacy Survey of Space and Time (LSST) will increase the number of known cluster lenses by several orders of magnitudes. In parallel to observations, state-of-the-art gravitational lensing software exploiting the computing power of the most modern machines are being developed to fully exploit the enormous amount of available data.

During my talk, I will outline the groundbreaking advancements underway in the field of strong gravitational lensing, culminating in the development of the most sophisticated and accurate lens models to date. Furthermore, I will illustrate how these cutting-edge lens models are opening new windows of inquiry into some of the biggest challenges of modern astrophysics, ranging from the studies of the first stellar complexes that have appeared in the Universe to the detailed mapping of the dark matter distribution in clusters, in the effort to advance our understanding on the nature of dark matter.

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