Contribution ID: **129** Type: **Talk**

Strong gravitational lensing: Nature's cosmic telescope to reveal dark matter and the faintest galaxies in the universe

Saturday, November 26, 2022 10:15 AM (15 minutes)

The strong gravitational lensing effect is a powerful technic to study both the deflector of light and the magnified sources behind it. In this talk, I will first review lens modelling approaches of galaxy clusters and present a state-of-the-art lensing mass model combining at the same time the Hubble Space Telescope, James Webb Space Telescope and large spectroscopic coverage. Such a combination allows us to have a very refined mass distribution (dark matter and baryons) of a cluster of galaxies. An analysis of a larger sample of strong lensing clusters reveals that the lensing strength has a stronger correlation with the slope of the density profile revealing the properties of the dark matter. I will also detail recent analyses revealing how the detailed study of the lensing effect distortion can discover a yet unobserved population of wandering supermassive black holes.
The second part of the talk will focus on the magnified universe behind the lens. Strong gravitational lensing offers unique opportunities that have no match in so-called regular fields, from the highly magnified galaxies seeing as they were 10 billion years ago about half the age of our universe, to the most distant galaxies at the dawn of the universe. Finally, I will discuss how the James Webb Space Telescope and future facilities such as the Rubin observatory or Euclid combined with strong lensing will revolutionise our view of the universe in the near future.

Category

Particle / Astroparticle / Cosmology (Experiment)

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Session Classification: Physics Talks - Astroparticle Physics

Track Classification: Physics talks