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Unveiling galaxy mass assembly via strong gravitational lenses with Euclid

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Strong gravitational lensing provides the most precise mass probe in the Universe. It not only enables the constraint of total mass within lensed structures (arcs, rings, or multiple images), but also facilitates the exploration of mass density profiles, dark matter content, and the Initial Mass Function within lens galaxies. Therefore, *strong lenses have the potential to obtain unique constraints on how dark matter and stars have been assembled in the most massive galaxies across the cosmic history.*

Only a few hundred strong lenses have historically been well-characterized, which has limited the ability to conduct comprehensive analyses. However, the landscape is rapidly changing. Ongoing wide-field ground-based surveys like KiDS@VST, and the forthcoming Euclid space mission, promise an unprecedented influx of new gravitational lenses up to z = 2, 100 times larger than the existing samples, by surveying vast portions of the sky.

The development of these large datasets has motivated the community to conceive novel and fast methodologies for their analysis. In this presentation, I will delve into our research employing Convolutional Neural Networks, to identify gravitational lenses with KiDS@VST data. Additionally, I will also present our ongoing efforts in the lens modelling in light of the upcoming Euclid data.

I will discuss the exciting prospects of applying these cutting-edge techniques to Euclid data, as well as the collaborative efforts within the Euclid mission. Finally, I will outline future avenues of exploration, and the impact that this research can have on our understanding of massive galaxy evolution.

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Galassie e Cosmologia

Primary author: TORTORA, Crescenzo (Istituto Nazionale di Astrofisica (INAF))

Presenter: TORTORA, Crescenzo (Istituto Nazionale di Astrofisica (INAF))

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