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Simulation-Based Inference in Strong Gravitational Lensing

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In the coming years, a new generation of sky surveys, in particular, Euclid Space Telescope, and the Rubin Observatory's Legacy Survey of Space and Time (LSST) will discover more than 200,000 new strong gravitational lenses, an increase of more than two orders of magnitude compared to currently known samples. Accurate and fast analysis of such large volumes of data within a clear statistical framework is crucial for all sciences enabled by strong lensing. In this talk, I will discuss the critical role of simulation-based inference (SBI) in the context of strong gravitational lensing analysis for these surveys. I will present our results related to obtaining the posteriors of the macro-parameters of individual strong lenses using machine learning models and share our ongoing work in inferring population-level statistics using hierarchical models.

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