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Small but mighty: Dark matter substructures

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The fundamental properties of dark matter, such as its mass, self-interaction, and coupling to other particles, can have a major impact on the evolution of cosmological density fluctuations on small length scales. Strong gravitational lenses have long been recognized as powerful tools to study the dark matter distribution on these small subgalactic scales. In this talk, we discuss how gravitationally lensed quasars and extended lensed arcs could be used to probe non minimal dark matter models. We comment on the possibilities enabled by precise astrometry, deep imaging, and time delays to extract information about mass substructures inside lens galaxies. To this end, we introduce a new lensing statistics that allows for a robust diagnostic of the presence of perturbations caused by substructures. We determine which properties of mass substructures are most readily constrained by lensing data and forecast the constraining power of current and future observations.

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