ID de Contribution: **6** Type: **Talk**

From Images to Dark Matter: End-To-End Inference of Substructure From Hundreds of Strong Gravitational Lenses

jeudi 9 juin 2022 11:20 (40 minutes)

Constraining the distribution of small-scale structure in our universe allows us to probe alternatives to the cold dark matter paradigm. Strong gravitational lensing offers a unique window into small dark matter halos ($< 10^{10} M_\odot$) because these halos impart a gravitational lensing signal even if they do not host luminous galaxies. We create large datasets of strong lensing images with realistic low-mass halos, Hubble Space Telescope (HST) observational effects, and galaxy light from HST's COSMOS field. Using a simulation-based inference pipeline, we train a neural posterior estimator of the subhalo mass function (SHMF) and place constraints on populations of lenses generated using a separate set of galaxy sources. We find that by combining our network with a hierarchical inference framework, we can both reliably infer the SHMF across a variety of configurations and scale efficiently to populations with hundreds of lenses. We then explore how the distribution of line-of-sight structure affects our constraints. By conducting precise inference on large and complex simulated datasets, our method lays a foundation for extracting dark matter constraints from the next generation of wide-field optical imaging surveys.

Auteur principal: WAGNER-CARENA, Sebastian (Stanford University)

Orateur: WAGNER-CARENA, Sebastian (Stanford University)

Classification de Session: Progress in strong-lensing methods and techniques