

DeepLensingFlow: scored and flow-based networks for Weak-lensing map statistics

Wide-field astronomical surveys provide unprecedented data that allow us to reconstruct the gravitational lensing maps tracing the large-scale distribution of matter in the Universe. In the weak lensing regime, these maps serve as a powerful probe of the Lambda-CDM cosmological model. However, their high dimensionality (millions of correlated pixels) poses significant challenges for traditional statistical analyses. In this talk, I will present DeepLensingFlow, a framework that uses advanced generative machine learning models, including normalizing flows and diffusion models, to learn and reproduce the statistical distribution of weak-lensing convergence maps. I will demonstrate how these models can generate novel, physically consistent maps that recover key summary statistics, and discuss their applicability to upcoming surveys such as Rubin-LSST.

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