hyphy: Mapping Dark Matter to Hydrodynamics with Posterior Inference

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Abstract

There has been an explosion of recent work using machine learning techniques for various tasks in parameter inference and mock data generation. However, comparatively little work has explored error estimation within this framework, either from uncertainty in the underlying mapping or errors introduced by limitations in the model. In this talk, I will discuss ongoing work to quantify these errors in the context of a domain to domain translation task; mapping from dark matter only simulations to full hydrodynamical outputs. Using a fully convolutional conditional variational autoencoder, we are able to infer realistic looking hydrodynamical posteriors which emulate known cosmological summary statistics. Video: https://youtu.be/pV6G1Wlfx-0

Keywords: intergalactic medium, machine learning, neural networks, variational autoencoders

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