Tutorials 1 and 2: variational inference and VAEs
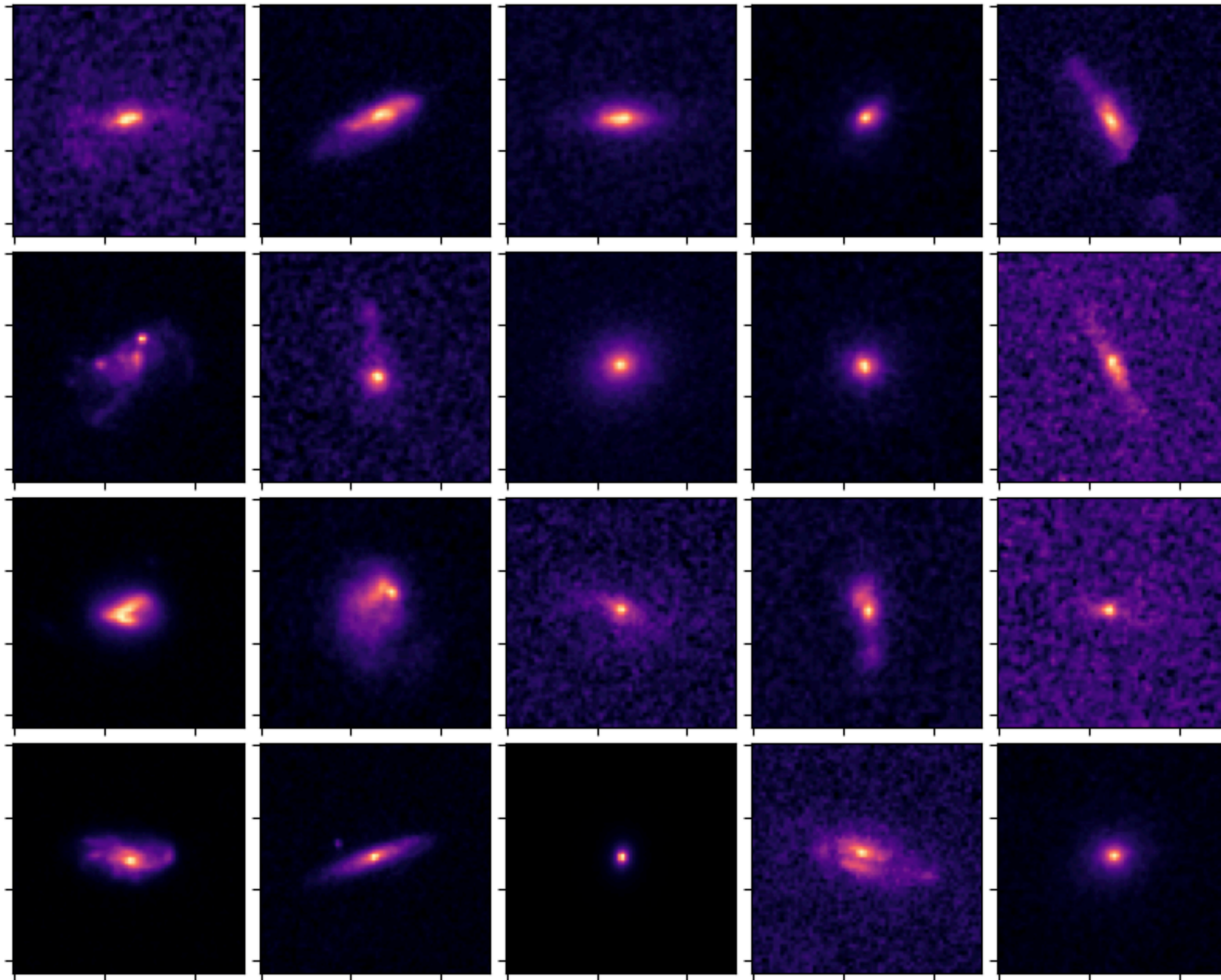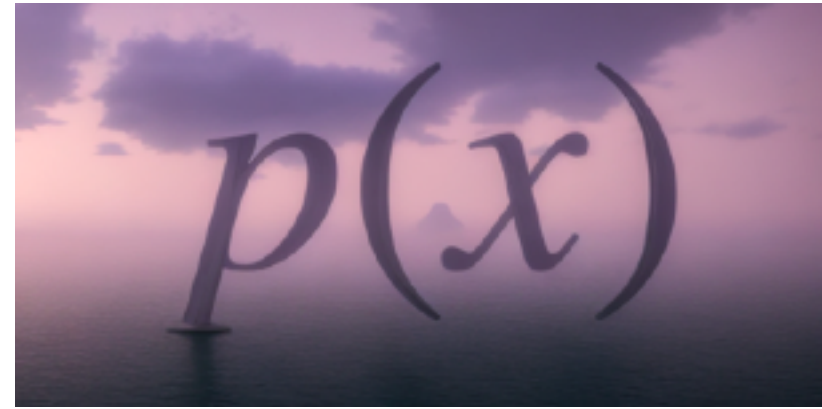
Lead: Carol Cuesta-Lazaro

- Implement the ELBO objective for variational inference

- Construct a VAE and use it to build a generative model of galaxy images using samples form the HST COSMOS dataset

- Boilerplate code for training/reconstruction/sampling for quick iteration

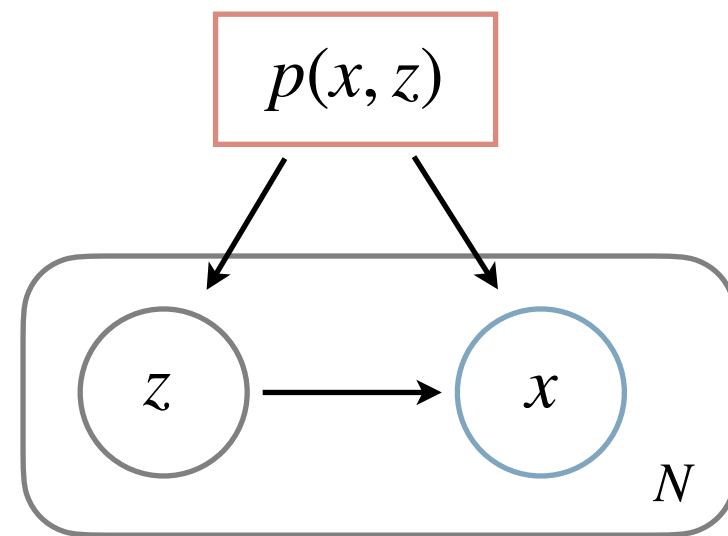- Experiment with trade-offs between pure reconstruction and a latent space regularization

[Mandelbaum et al; https://zenodo.org/record/3242143]
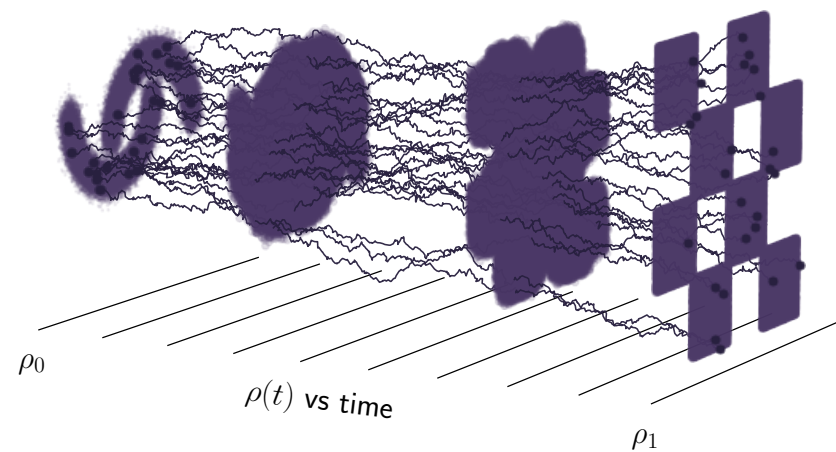
Outline

Why (deep) generative modeling?

What is it, and what can it do for you?

Variational auto encoders

Latent-variable modeling, and compression is all you need

Diffusion models

Models based on iterative refinement

Nonlinear flows

Invertible transformations