



Siddhant Mishra-Sharma (MIT/AI FI) | AI FI Summer School



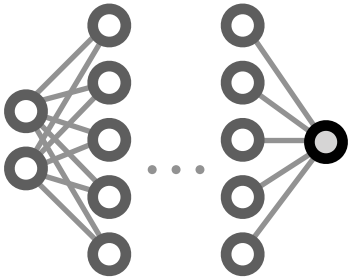
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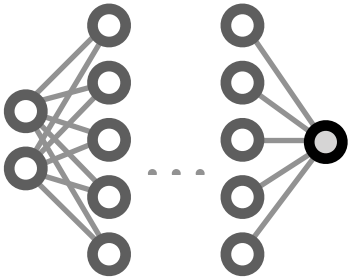
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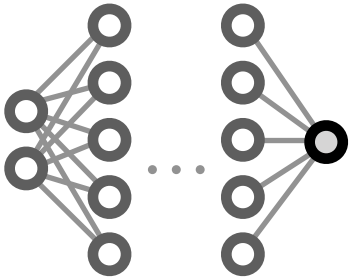
[Nguyen, Smith et al 2022]

Extracting the dark matter distribution

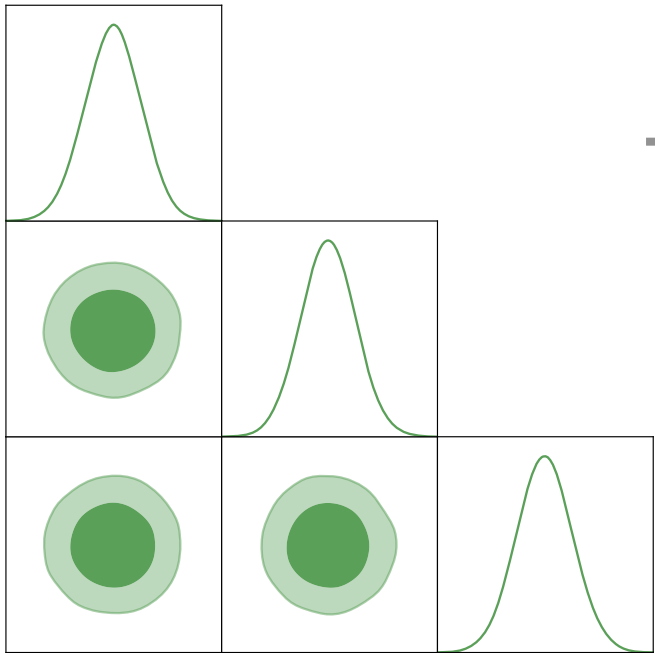








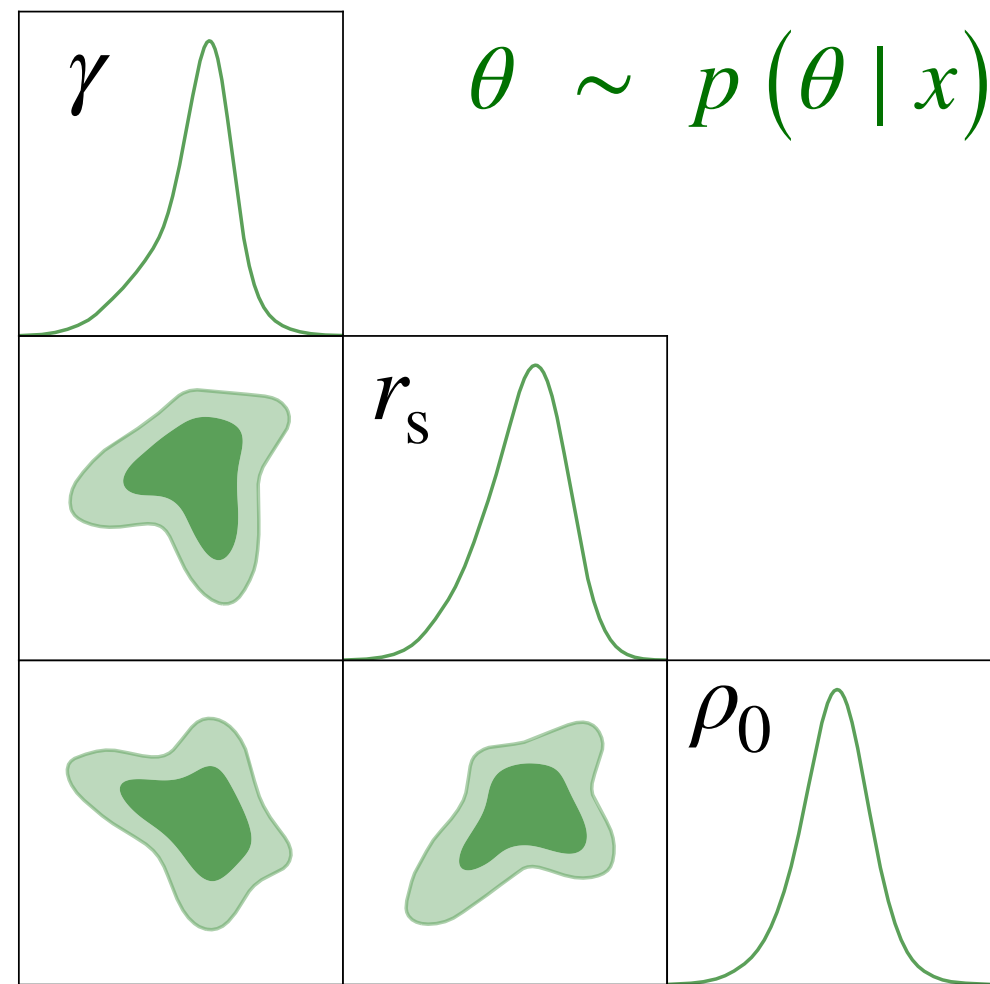
Base distribution  $\mathcal{N}(u)$

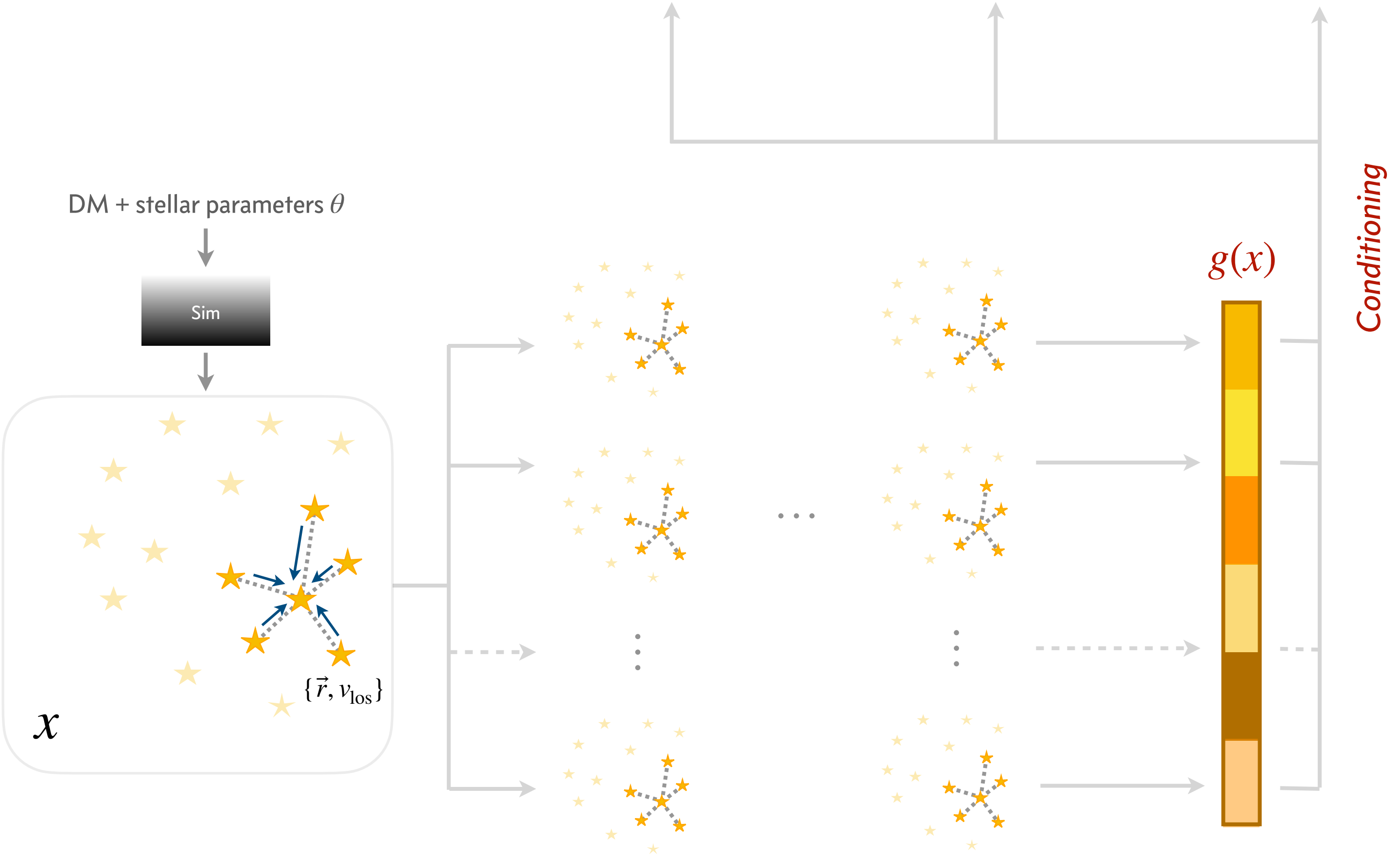


Conditional flow transformation  $\theta = f(u)$



Posterior distribution  $p(\theta | x)$



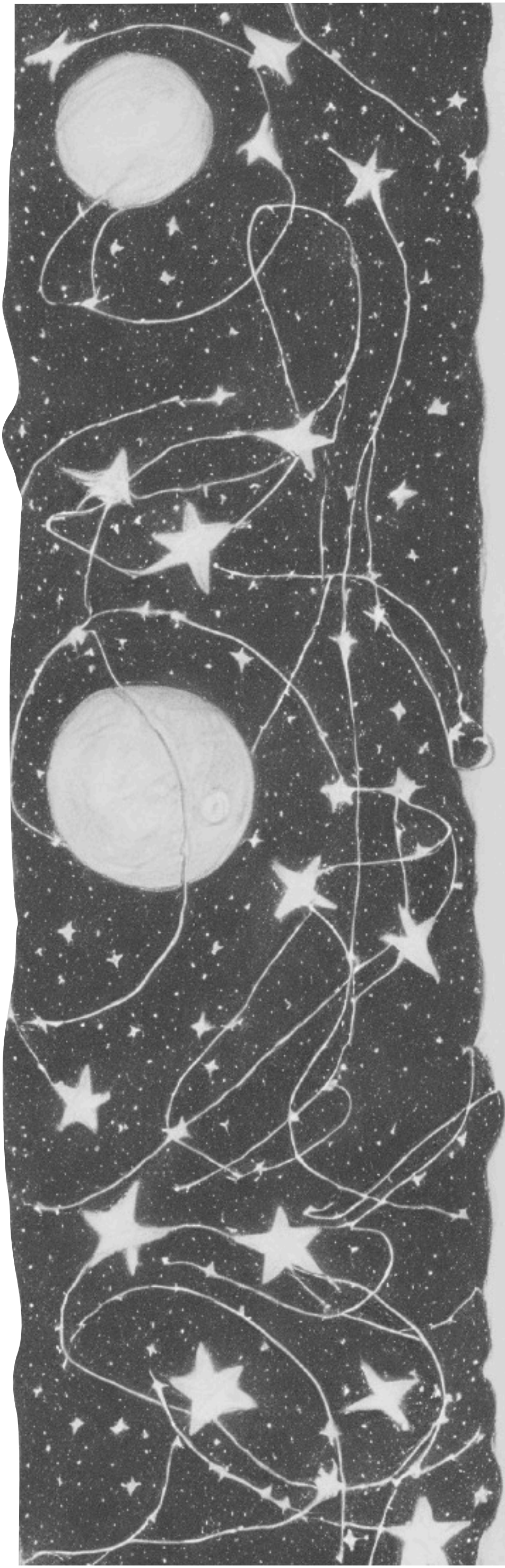


Training objective:

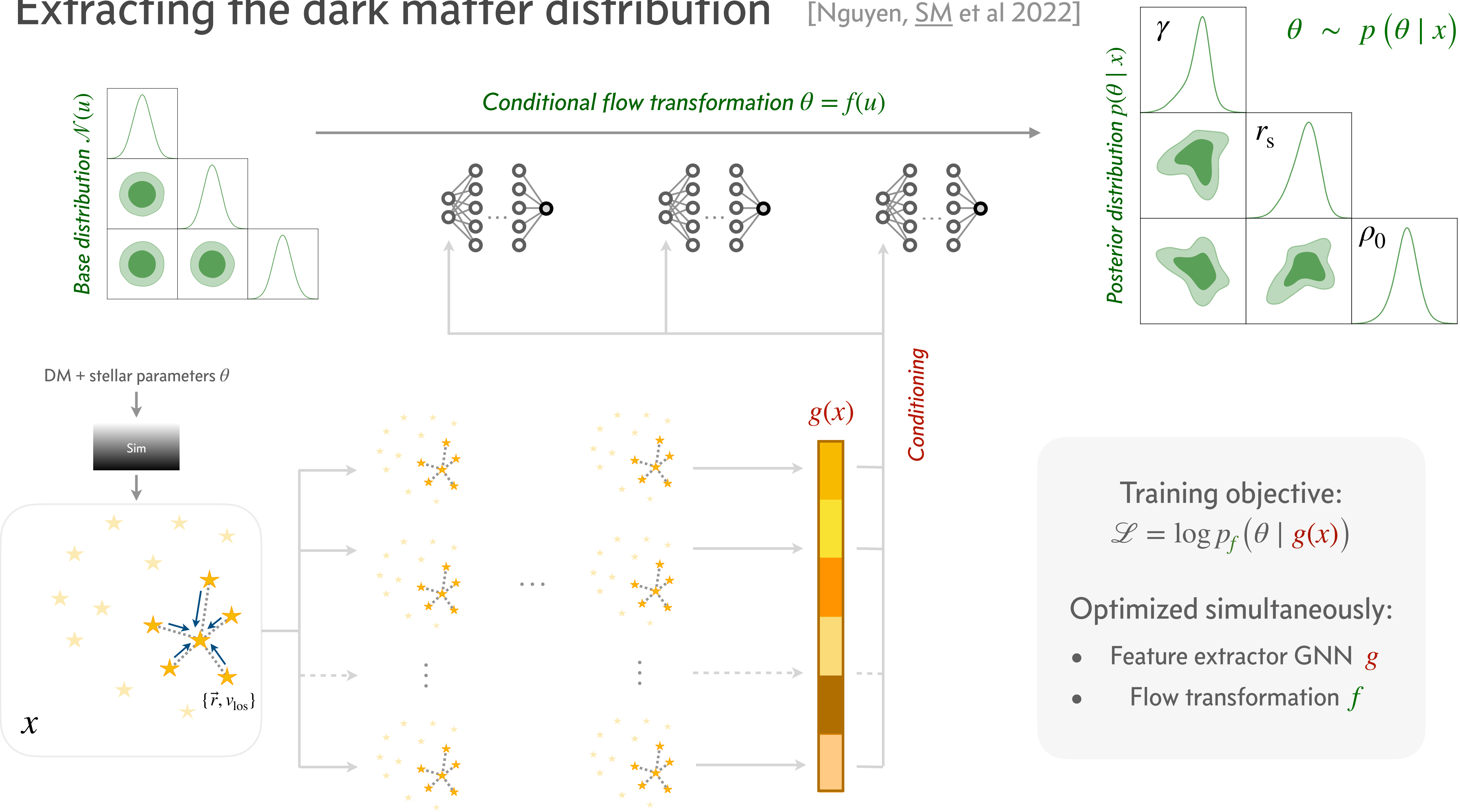
$$\mathcal{L} = \log p_f(\theta \mid g(x))$$

Optimized simultaneously:

- Feature extractor GNN  $g$
- Flow transformation  $f$



# Extracting the dark matter distribution [Nguyen, SM et al 2022]





# Back to diffusion: the *probability flow ODE*

For any diffusion process, there exists a corresponding deterministic process whose trajectories share the same marginal probability densities  $p(x_t)$  as the SDE [Song et al 2021]

