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Diffusion meets Nested Sampling

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Sampling techniques are a stalwart of reliable inference in the physical sciences, with the nested sampling paradigm emerging in the last decade as a ubiquitous tool for model fitting and comparison. Parallel developments in the field of generative machine learning have enabled advances in many applications of sampling methods in scientific inference pipelines.

This work explores the synergy of the latest developments in diffusion models and nested sampling. I will review the challenges of precise model comparison in high dimension, and explore how score based generative models can provide a solution. This work builds towards a public code that can apply out of the box to many established hard problems in fundamental physics, as well as providing potential to extend precise inference to problems that are intractable with classical methods. I will motivate some potential applications at the frontiers of inference that can be unlocked with these methods.

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