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Table 1. A non-exhaustive list of major implementations of nested sampling.

Name	Publication
`MultiNest`	**?**
`PolyChord`	**?**
`nestle`	**?**
`dyNesty`	**?**

1 INTRODUCTION

The standard model of the universe and its evolution in modern cosmology is the ΛCDM model (**?**), so named after the main components of the universe: the cosmological constant Λ and cold dark matter. It has six major citep:Condon2018 independent [1] parameters: the physical baryon density $\Omega_{\rm b}h^2$; the physical (cold) dark matter density $\Omega_c h^2$; the angular parameter $100\theta_{\rm s}$; re-ionisation optical depth τ_{reio}; power spectrum slope $n_{\rm s}$ and amplitude $\ln(10^{10}A_{\rm s})$ **?**

The task of the present study is to develop better tools for evaluating the agreement of our observations from the Planck mission with ΛCDM, estimating the parameters in the process. In the language of Bayesian statistics [2], our goal is efficient Bayesian inference.

While said inference can be executed analytically in principle, it is often intractable even when performed numerically. For context, the standard ΛCDM inference run requires an HPC cluster with at least 128 nodes, each with at least 6GB of memory and an equivalent of three full days of operation. To add insult to injury, the error margins on the parameters and the evidence, if computed at all, are staggering. Even then such a result requires judicious tuning and careful consideration of the model, which at present cannot be automated. Equivalent inference for any model other than ΛCDM is thus out of reach of most cosmologists. This we shall aim to correct.

Multiple numerical algorithms exist to perform Bayesian inference: Metropolis-Hastings (**?**) in conjunction with the Gibbs sampler (**?**); Hybrid (Hamiltonian) Monte Carlo (**??**), and nested sampling (**?**). Each of these algorithms has different advantages: Metropolis Hastings is the fastest at estimating the model parameters, at the cost of not evaluating the evidence, which is a universal metric of model fitness.

Additionally, Most inference methods can benefit from proposals, so much so that these proposals are often provided with the Cosmological inference packages (**?**). Nested sampling is the exception, because it does not take proposals as separate input, and using them as priors may adversely affect the results. Thus, most cosmologists nowadays prefer to avoid the expensive but full Bayesian inference via Nested Sampling.

[1] there can be other equivalent parameter sextuplets.
[2] See **?** for comparison to frequentist statistics.