Comparing Affine Invariant Samplers on Radial Velocities

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Abstract

Bayesian analysis of radial velocities (assuming a keplerian orbit) can yield information on the system's parameters. Previous studies from Price-Whelan et al. [1] use affine invariant samplers [2] & Hamiltonian Monte Carlo to sample these posteriors. Here we compare these previous methods to a new affine invariant method: Affine Invariant Hamiltonian Monte Carlo [3].

1 Introduction

References

[1] Price-Whelan, A. M., Hogg, D. W., Foreman-Mackey, D. & Rix, H.-W. The joker: A custom monte carlo sampler for binary-star and exoplanet radial velocity data. *The Astrophysical Journal* **837** (2017). URL http://dx.doi.org/10.3847/1538-4357/aa5e50.

[2] Foreman-Mackey, D., Hogg, D. W., Lang, D. & Goodman, J. emcee: The mcmc hammer. *PASP* **125**, 306–312 (2013). 1202.3665.

[3] Chen, Y. New affine invariant ensemble samplers and their dimensional scaling (2025). URL https://arxiv.org/abs/2505.02987. 2505.02987.