

Abstract Submitted
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Improving Visualization Techniques for Nanohertz Gravitational Wave Searches¹ KYLE GERSBACH, JEFFREY HAZBOUN, University of Washington, Bothell, NANOGrav PHYSICS FRONTIERS CENTER COLLABORATION — The complexity of modern computational modeling and simulation techniques in all areas of astrophysics has skyrocketed in recent years. The Bayesian modeling techniques used for gravitational-wave analyses by the North American Nanohertz Observatory for Gravitational waves (NANOGrav) incorporate 14+ years of pulsar timing data from over 70 pulsars. They use Markov Chain Monte Carlo (MCMC) sampling to numerically calculate likelihoods consisting of hundreds of parameters, often taking weeks to run a full analysis.

In conjunction with the output of the NANOGrav data analysis suite, we visualize the in-progress MCMC sampling using an interactive plotting package in Python called Bokeh. Through this easy-to-use interface this software allows for real-time debugging and monitoring of Bayesian analysis, giving the user a chance to catch mistakes early on in weeks-long computations. This visualization especially benefits those with limited experience with the MCMC process.

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