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A Trans-dimensional Bayesian Approach to Pulsar Timing Noise Analysis JUSTIN ELLIS, Jet Propulsion Lab, NEIL CORNISH, Montana State University — The modeling of intrinsic noise in pulsar timing residual data is of crucial importance for Gravitational Wave (GW) detection and pulsar timing (astro)physics in general. The noise budget in pulsars is a collection of several well studied effects including radiometer noise, pulse-phase jitter noise, dispersion measure (DM) variations, and low frequency spin noise. However, as pulsar timing data continues to improve, non-stationary and non-powerlaw noise terms are beginning to manifest which are not well modeled by current noise analysis techniques. In this talk we present a trans-dimensional approach to model these non-stationary and non-powerlaw effects through the use of a wavelet basis and an interpolation based adaptive spectral modeling. In both cases, the number of wavelets and the number of control points in the interpolated spectrum are free parameters that are constrained by the data and then marginalized over in the final inferences, thus fully incorporating our ignorance of the noise model. We show that these new methods outperform standard techniques when non-stationary and non-powerlaw noise is present.

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