Abstract Submitted
for the APR20 Meeting of
The American Physical Society

NANOGrav: Characterizing and Mitigating Noise in the Pulsar Timing Array (PTA) Detector[1] DAN STINEBRING, Oberlin College, NANOGRAV NOISE BUDGET WORKING GROUP COLLABORATION — The North American Nanohertz Observatory for Gravitational Waves (NANOGrav) collaboration is working towards the detection and study of low-frequency gravitational waves using an array of rapidly rotating, highly stable radio pulsars distributed across the Galaxy. We measure the times of arrival of pulses from these accurate and precise pulsar clocks and compare them with a model that includes: the rotational motion of the pulsar, orbital motions, time-variable interstellar propagation delays; random timing noise from the pulsars themselves; and a correlated GW signal. Characterizing the many noise processes within our data is paramount for a robust gravitational wave detection and future characterization of these sources. We will highlight work being done within the NANOGrav collaboration to understand correlated (red) and uncorrelated (white) noise processes in the detector. Since time-variable propagation delays in the interstellar medium depend on the path between the Earth and the pulsar, and since several other noise processes are pulsar dependent, full detector noise characterization requires an appropriately weighted sum of noise along each of the baselines, as we will emphasize.

[1]The NANOGrav Physics Frontiers Center is supported by NSF award number 1430284.

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Date submitted: 10 Jan 2020 Electronic form version 1.4