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Dispersion Measure Variations in the NANOGrav 9-Year Data Release MEGAN JONES, MAURA MCLAUGHLIN, MICHAEL LAM, West Virginia University, JIM CORDES, Cornell University, LINA LEVIN, University of Manchester, NANOGRAV INTERSTELLAR MEDIUM MITIGATION GROUP TEAM, NANOGRAV TIMING GROUP TEAM — The principal goal of the North American Nanohertz Observatory for Gravitational Waves (NANOGrav) is to detect gravitational waves in the nanohertz regime of the gravitational wave spectrum using a pulsar timing array (PTA). In order to detect gravitational waves, we must construct an accurate timing model that accounts for all known effects on the pulsar times-of-arrival (TOAs) over decade timescales. One of the parameters that must be fit in the timing model is the dispersion measure (DM). When the pulsar signal propagates through the ISM, interactions with free electrons cause dispersion that is characterized by a frequency dependent time delay. This time delay can be significant when compared to the pulsar period, and therefore must be fit when creating a timing model. We analyze DM variations of 37 milliseconds pulsars in the 9-year NANOGrav data release and constrain the sources of these variations. We fit for trends in DM measurements with time to measure the scale and periodicity, if any, of the variations. We present the structure functions of these DM time series and compare them to that expected for a Kolmogorov medium. We discuss explanations for any departures.

Megan Jones
West Virginia Univ

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