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DR2low and IISM turbulence with LOFAR

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Low-frequency radio data are highly valuable for studying propagation effects in pulsar signals, such as dispersion measure (DM) variations. In this work, we combine for the first time observations from LOFAR (100–200 MHz) and NenuFAR (30–90 MHz) with EPTA DR2new+ data to build a new dataset, the so-called DR2low. It consists of 12 pulsars observed over a time span of ~11 years with radio frequencies spanning from ~30 to ~2500 MHz. We perform the same noise analysis as for EPTA DR2 to compare the results and update the favoured noise models for these pulsars. The extended frequency coverage improves the ability to disentangle red noise from chromatic effects, constrains DM variations more tightly, and reveals scattering in several sources.

Beyond the noise characterisation, these data open up new opportunities to study the turbulent ionised interstellar medium. In a separate work, I focus on LOFAR observations to identify and characterise discrete H II regions along the lines of sight to nearby pulsars, investigating their possible role in shaping the observed DM variations.

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