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Search for continuous gravitational wave in EPTA dataset

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We have searched for continuous gravitational wave (CGW) signals produced by individually resolvable, circular supermassive black hole binaries (SMBHBs) in the latest EPTA dataset, which consists of ultra-precise timing data on 41 millisecond pulsars. Several algorithms have been used and depending on the adopted detection algorithm, the 95% upper limit on the sky-averaged strain amplitude lies in the range $6 \times 10^{-15} < A < 1.5 \times 10^{-14}$ at $5 \text{ nHz} < f < 7 \text{ nHz}$. The most robust upper limit –obtained via a full Bayesian analysis searching simultaneously over the signal and pulsar noise on the subset of our six best pulsars –is $A \sim 10^{-14}$. These limits, the most stringent to date at $f < 10 \text{ nHz}$, exclude the presence of sub-centiparsec binaries with chirp mass $Mc > 10^9$ solar masses out to a distance of about 25 Mpc, and with $Mc > 10^{10}$ solar masses out to a distance of about 1 Gpc ($z \sim 0.2$).

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