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Optimal Filtration and a Pulsar Time Scale

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An algorithm is proposed for constructing a group (ensemble) pulsar time based on the application of optimal Wiener filters. This algorithm makes it possible to separate the contributions of variations of the atomic time scale and of the pulsar rotation to barycentric residual deviations of the pulse arrival times. The method is applied to observations of the pulsars PSR B1855+09 and PSR B1937+21, and is used to obtain corrections to UTC relative to the group pulsar time PT$_{\rm ens}$. Direct comparison of the terrestrial time TT (BIPM06) and the group pulsar time PT$_{\rm ens}$ shows that they disagree by no more than $0.4\pm 0.17\; \mu$s. Based on the fractional instability of the time difference TT(BIPM06) -- PT$_{\rm ens}$, a new limit for the energy density of the gravitational-wave background is established at the level $\Omega_g {h}^2\sim 10^{-9}$.

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