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An updated glitch rate-age law inferred from radio pulsars

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Radio pulsar glitches probe far-from-equilibrium processes involving stress accumulation and relaxation in neutron star interiors. Previous studies of glitch rates have focused on individual pulsars with as many recorded glitches as possible. In this work we analyze glitch rates using all available glitch data, including objects that have glitched never or once. We assume the glitch rate λ scales phenomenologically with the characteristic spin-down age τ as $\lambda = A\left(\tau/\tau_{\rm ref}\right)^{-\gamma}$, where $\tau_{\rm ref} = 1$ yr is a reference time scale and A and γ are constants. We produce Bayesian posterior distributions on A and γ for the data set containing pulsars with one or more observed glitches, and a a new data set where objects with zero recorded glitches are included. The updated estimates still support increased glitch activity for younger pulsars, while demonstrating that the large number of objects with zero glitches contain important statistical information about the rate, provided that they are part of the same population as opposed to a disjoint population which never glitches for some unknown physical reason.

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