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Time series of glitches in Neutron Stars

Glitches are spin-up events that punctuate the smooth rotation of pulsars.
We analyze the glitch sizes $\Delta\nu$ and the times between consecutive events of the seven pulsars with more than 10 detected glitches.

The distributions of glitch sizes of the individual pulsars are different between them (and none of them resembles the global distribution of all known glitches). In particular, we find that both PSR B1737−30 and PSR J0631+1036 exhibit very similar distributions, which are best described by a power law with index $1.4(1)$. On the other hand, the glitch sizes of the Vela pulsar and PSR J0537−6910 are best described by Gaussian distributions centered at 21 and 15 μ Hz, and with dispersions of the order of 10 μ Hz. This range of glitch sizes does almost not overlap with the ranges covered by the other pulsars in the sample. PSR B1758−23 is the only pulsar with a size distribution described by and exponential function, and the size distribution of the Crab pulsar, and possibly PSR B1338−62, are best described by log-normal functions.

The distributions of times between consecutive glitches exhibit less variety and can be classified between Gaussian (the Vela pulsar and PSR J0537−6910) and exponential (all other pulsars). PSR J0537−6910 is the only pulsar that exhibits a significant correlation between glitch sizes and times to the next glitch. We used simulations to explore the possibility that other pulsars also have correlated glitches. Our conclusion is that the data are consistent with an scenario in which pulsars produce correlated glitches only above certain size and the smaller glitches are uncorrelated.

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