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Constraint on the internal structure of neutron stars from pulsar glitches

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Pulsars are spinning extremely rapidly with periods ranging from milliseconds to seconds and delays of a few milliseconds per year at most, thus providing the most accurate clocks in the Universe. Nevertheless, sudden spin up have been detected in some pulsars like the emblematic Vela pulsar. These abrupt changes in the pulsar's rotation period have long been thought to be the manifestation of a neutron superfluid permeating the inner crust of neutron stars. However, the neutron superfluid has been recently found to be so strongly coupled to the crust that it does not carry enough angular momentum to explain the Vela data. We explore to which extent pulsar timing observations can be reconciled with the standard glitch theory considering the lack of knowledge of dense matter properties.

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