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Angular momentum conservation and core superfluid dynamics for the pulsar J1734-3333

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Pulsars emit pulsed radiation in well-defined frequencies. In the canonical model, a pulsar is assumed to be a rotating, highly magnetized sphere made mostly of neutrons that has a magnetic dipole misaligned with respect to its rotation axis, which would be responsible for the emission of the observed pulses. The measurement of the pulse frequency and its first two derivatives allows the calculation of the braking index, n. One limitation of the canonical model is that for all pulsars it yields n = 3, a value that does not correspond to observational values of n. In order to contribute to the solution of this problem we proposed a model for pulsars'rotation frequency decay assuming that the star's total moment of inertia would vary with time due to mass motions inside the core. As a result, we found that the pulsar J1734-3333 has total angular momentum practically conserved, a phenomenon that we explain relating the motion of neutron superfluid vortices in the core to torques associated to radiation emission.

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