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

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Summary

Initial motivation:

Theoretical determination of pulsars' braking indices

(*After decades, still a challenge*)

Methods:

Proposal of a change in the canonical model, which admits that pulsars are rotating magnetic dipole: variable moment of inertia due to internal motion of superfluid mass

The model is related to data of PSR J1734-333.

Consequences:

1) Theoretical braking índices obtained with the new expression are close to observational ones: PSR J1734-3333 case.

2) The dynamics of the superfluid inner structure of the star proposed by the model relates to angular momentum conservation for this pulsar

Conclusions

- We modeled changes in moment of inertia, modifying the canonical model.

- Moment of inertia would change due to mass motions inside the star, quantified by a displacement parameter.

- We found that the displacement parameter relates to the velocity of superfluid neutron vortices when n=1.

- For young, solitary pulsars inner mass motions may contribute for the observed values of braking indices.