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Vortex pinning in the superfluid core of neutron stars and the rise of pulsar glitches

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Pulsar glitches are commonly interpreted as sudden transfers of angular momentum from a more rapidly rotating superfluid component to the rest of the neutron star, triggered by large-scale vortex unpinning events. However, large uncertainties remain concerning, e.g., the microscopic interactions between the neutron vortices and the proton flux tubes that are expected to be present in the outer core of neutron stars. In particular, the possible pinning of vortex lines onto flux tubes may affect significantly the dynamical evolution of both the rotation and magnetic field of the star. Within this context, the neutron star core may thus provide a sufficient reservoir of angular momentum to explain giant glitches as observed in the Vela pulsar. In this talk, I will present our recent results about the role of the core neutron superfluid on the dynamics of the glitch rise.

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