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Timing noise induced by plasmoid formation at the light cylinder

Pulsar-timing is plagued by several sources of noise whose physical origin is unclear. In recent years, pulsar magnetosphere models have shown that reconnection around the light cylinder plays a key role in particle acceleration and in the origin of the pulsed gamma-ray emission. The pulsar current sheet breaks up into a series of dynamical magnetic islands, which in turn lead to fast and time-dependent reconnection. In this work, we measure the impact of plasmoid formation on the fluctuating torque slowing down (spinning up) the star and we investigate whether this effect could contribute to the observed timing noise.

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