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Effect of geodetic precession on the evolution of pulsar high-energy pulse profiles as derived with the striped-wind model.

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Geodetic precession has been observed directly in the double-pulsar PSR J0737-3039. Its rate has even been measured and agrees with predictions of general relativity. Very recently, the double pulsar has been detected in X-rays and gamma-rays. This fuels the hope observing geodetic precession in its high-energy pulse profile. Unfortunately, the geometric configuration of the binary renders any detection of such an effect unlikely. Nevertheless, this precession is present in other relativistic binaries or double neutron star systems containing at least one X-ray or gamma-ray pulsar. We compute the variation of the high-energy pulse profile expected from this geodetic motion according to the striped-wind model. We compare our results with two-pole caustic and outer gap emission patterns. For a sufficient misalignment between the orbital angular momentum and the spin angular momentum, a significant change in the pulse profile as a result of geodetic precession is expected in X-rays and gamma-rays. The essential features of the striped wind is summarized in several plots showing the evolution of the maximum of the pulsed intensity, the separation of both peaks, if present, and the variation in the width of each peak. We highlight the main differences with other competing high-energy models. Some predictions about possible future detection of high-energy emission from double neutron star systems with the highest spin precession rate are made. Such observations will definitely favor some pulsed high-energy emission scenarios.

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