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The modified carousel model of drifting subpulses: one year after

In Szary & van Leeuwen (2017) we proposed a modification to the carousel model which follows from the insight that the discharging regions, i.e., sparks, do not rotate around the magnetic axis per se, but rather around the point of maximum potential at the polar cap. The model allows us to link the observed subpulse shift with the underlying spark motion, and hence explore conditions at the polar-cap which are essential for plasma generation processes in the inner acceleration region. We developed a simulation which allows to generate single pulses for a given pulsar geometry and structure of surface magnetic field. The simulation was used to explain the highly unusual bi-drifting feature of PSR B1839-04. We found that A) the variation of global electric potential at the polar cap that leads to a solid-body-like rotation of spark forming regions is favourable, and B) the main parameter that affects the occurrence of bi-drifting is the impact factor divided by the opening angle (β/ρ), the lower the value, the more likely the bi-drifting is.

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