

Polarisation of high-energy emission in a pulsar striped wind

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ABSTRACT: Recent observations of the polarization of the optical pulses from the Crab pulsar (Kanbach et al. 2005, AIP Proceedings, astro-ph/0511636) motivated detailed comparative studies of the emission predicted by the polar cap, the outer gap and the two-pole caustics models.

In this work, we study the polarization properties of the synchrotron emission emanating from the striped wind model. We use an explicit asymptotic solution for the large-scale field structure related to the oblique split monopole and valid for the case of an ultra-relativistic plasma (Bogovalov, A&A, 1999, **349**, 1017). This is combined with a crude model for the emissivity of the striped wind and of the magnetic field within the dissipating stripes themselves. We calculate the polarization properties of the high-energy pulsed emission and compare our results with optical observations of the Crab pulsar. The resulting radiation is linearly polarized. In the off-pulse region, the electric vector lies in the direction of the projection on the sky of the rotation axis of the pulsar, in good agreement with the data. Other properties such as a reduced degree of polarization and a characteristic sweep of the polarization angle within the pulses are also reproduced (Pétri & Kirk, ApJ Letters, 2005, **627**, L37).