# PULSAR ELECTRODYNAMICS: PRODUCTION OF FAST PARTICLES

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The three-dimensional structure of a pulsar magnetosphere is hard to calculate. Instead we start with a two-dimensional model (Kahn, 1971). It consists of a vacuum electromagnetic field generated by a line of rotating dipoles, from $-\infty$ to $+\infty$, perpendicular to the rotation axis. This field resembles that in the equatorial plane of a rotating dipole aligned perpendicular to its rotation axis. In both cases the electric field E is perpendicular to the magnetic induction B.

In this field charged particles slide along magnetic field lines (MFL). If the MFL are bent in the forward direction, the particle energies increase very sharply close to the speed of light cylinder (SLC). The particles then have so much inertia that they leave the MFL. In the case of a short period pulsar like the Crab, radiative effects become very important. A typical calculation performed for a MFL which is almost radial at the SLC showed that electrons which have travelled a distance about 1.1 km beyond the SLC have $2.5 \times 10^7$ their rest energy and radiate a power of $5.7 \times 10^{16}$ $eVs^{-1}$. The central frequency of the radiation is $4.3 \times 10^{22}$ Hz.

This is only one of many examples of the way in which particles acquire high energies and radiate $\gamma$-rays. These results establish a new mechanism for the production of incoherent radiation.

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## REFERENCES

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*W. Sieber and R. Wielebinski (eds.), Pulsars, 153.*