

Axion Production in Pulsar Magnetosphere Gaps

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Pulsar magnetospheres admit non-stationary vacuum gaps that are characterized by non-vanishing $\mathbf{E} \cdot \mathbf{B}$. These gaps play an important role in plasma production and electromagnetic wave emission and, as I will discuss, are very efficient axion factories. The density of gap-produced axions in the vicinity of the pulsar can exceed the local dark matter density by many orders of magnitude. Once produced, a fraction of the axions will convert to photons in the strong pulsar magnetic field. The photons give rise to broadband radio signals that may be seen with dedicated observations of nearby pulsars with radio telescopes and interferometers. This proposal has the potential to probe axion-photons couplings that are orders of magnitude lower than current astrophysical bounds.

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