

# The Structure and Signals of Neutron Stars, from Birth to Death



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## Radio pulsar emission and crustal field evolution

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Models of pulsar radio emission that are based on an inner accelerating region require the existence of very strong and small scale surface magnetic field structures at or near the canonical polar cap.

The aim of this paper is to identify a mechanism that creates such field structures and maintains them over a pulsar's lifetime. The likely physical process that can create the required 'magnetic spots' is the Hall drift occurring in the crust of a neutron star.

It is demonstrated, that the Hall drift can produce small scale strong surface magnetic field anomalies (spots) on timescales of  $10^4$  years by means of non-linear interaction between poloidal and toroidal components of the subsurface magnetic field. These anomalies are characterized by strengths of about  $10^{14}$  G and curvature radii of field lines of about  $10^6$  cm, both of which are fundamental for generation of observable radio emission.

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