

# TOPOLOGICAL CURRENTS, NEUTRONS STAR KICKS, AND TOROIDAL MAGNETIC FIELDS\*

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The effects of anomalies in high density QCD are striking. We consider a direct application of one of these effects, namely topological currents, on the physics of neutron stars. All the elements required for topological currents are present in neutron stars: degenerate matter, large magnetic fields, and P-parity violating processes. These conditions lead to the creation of vector currents capable of carrying momentum and inducing magnetic fields. We estimate the size of these currents for many representative states of dense matter in the neutron star and we argue that these currents could be responsible for both the large proper motion of neutrons stars (kicks) and the toroidal magnetic field needed for stability of the poloidal field.

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