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Neutron star kick velocity induced by neutrino chirality flip and a lower bound for the neutrino magnetic moment

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We study the neutrino chirality flip during the birth of a neutron star, produced in a core made of strange quark matter. This mechanism is applied to the neutron star kick velocity problem and we show that it is efficient when the neutrino magnetic moment is not smaller than $4.7 \times 10^{-15}\mu_B$, where μ_B is the Bohr magneton. When this lower bound is combined with the most stringent upper bound, our results set a range for the neutrino magnetic moment given by $4.7 \times 10^{-15} \leq \mu_\nu/\mu_B \leq (0.1 - 0.4) \times 10^{-11}$. The obtained kick velocities for natal conditions are consistent with the observed ones and span the correct range of radii for typical magnetic field intensities.

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