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General relativistic corrections to the pulsar spin-down luminosity MILTON RUIZ, VASILEIOS PASCHALIDIS, STUART SHAPIRO, University of Illinois at Urbana-Champaign — Pulsar magnetospheres are typically modeled in flat spacetime. Adopting our new method for smoothly matching general relativistic ideal magnetohydrodynamics to its force-free limit, we perform the first systematic study of pulsar magnetospheres in general relativity. We endow the neutron star with a general relativistic dipole magnetic field, and model the dense interior with ideal magnetohydrodynamics, and assume force-free electrodynamics in the exterior. Normalizing the spin-down luminosity by its corresponding Minkwoski value, we find that relativistic effects give rise to a modest enhancement: the maximum enhancement for $n = 1$ polytropes is $\sim 23\%$, and for a rapidly rotating $n = 0.5$ polytrope we find an enhancement of $\sim 35\%$. We expect stiffer equation of state and more rapidly rotating neutron stars to lead to even larger enhancements in the spin-down luminosity.

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