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Newborn pulsars as ultrahigh energy cosmic accelerators

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Particles can be accelerated to above 10**19 eV by newborn pulsars with spin period less than 10 millisecond. These cosmic rays travel through the dense stellar remnant surrounding the pulsar, and then reach the earth. With the appropriate injection composition, ultrahigh energy cosmic rays from extragalactic pulsars can fit both the energy spectrum and composition (Xmax and RMS-Xmax) measured by the Auger Observatory. Meanwhile, cosmic rays from pulsar population inside the Milky Way peak between 10**16 and 10**18 eV, depending on Galactic diffusion models. This component can bridge the gap between predicted contribution from other Galactic sources and the observed spectrum and composition just below the ankle. The propagated cosmic rays are accompanied with neutrino messengers, which originate from interactions between cosmic rays and the ambiance. The neutrino emissivity is dependent on the source evolution models, the chemical composition of primary cosmic rays, and space distribution of the sources. A fast spinning pulsar born in the Local Group will be detectable by current neutrino detectors like IceCube. Finally, about 0.5% of the cosmological pulsar population contribute to neutrinos above a PeV.

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