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NON-SPECIALIST LECTURE: Cosmic rays from binary millisecond pulsars

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**Abstract content (Max 300 words)
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The Fermi Large Area Telescope discovered a number of gamma-ray sources that could not immediately be identified via correlation with known sources in other wavebands. Follow-up radio observations of those sources that exhibited pulsar-like spectral characteristics yielded 65 new millisecond pulsars (MSP) detections. Many of these new MSPs (26 to date) are in exotic systems known as black widows or redbacks. These are close binaries containing a rotation-powered MSP and a compact low-mass companion. A shock will form between the colliding pulsar and stellar winds, leading to particle acceleration. We investigate the contribution of these binary MSPs to the flux of terrestrial cosmic-ray electrons and positrons. We compute the transported electron-positron spectra at Earth, following their diffusion and energy loss (via synchrotron and inverse Compton emission) through the Galaxy. The cosmic-ray contribution of binary MSPs may reach a sizable fraction of the fluxes measured by AMS-02, PAMELA, and Fermi around tens of TeV, depending on model parameters.

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Yes

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