

Nearby Pulsars and the Cosmic-Ray Positron Excess

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Recent measurements of the Geminga and B0656+14 pulsars by the gamma-ray telescope HAWC (along with earlier measurements by Milagro) indicate that these objects generate significant fluxes of very high-energy electrons. From the measured gamma-ray intensity and spectrum of these pulsars, one can calculate and constrain their expected contributions to the local cosmic-ray positron spectrum. Among models that are capable of reproducing the observed characteristics of the gamma-ray emission, we find that pulsars invariably produce a flux of high-energy positrons that is similar in spectrum and magnitude to the positron fraction measured by PAMELA and AMS-02. In light of this result, it appears very likely that pulsars provide the dominant contribution to the long perplexing cosmic-ray positron excess.

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