

Follow-up Study of the Energy-Dependent Morphology of Geminga with HAWC

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The local positron excess above 10 GeV measured by PAMELA, Fermi-LAT, and AMS-02 remains an essential question in the field of astroparticle physics. Dark matter particle decay/annihilation presents a viable mechanism to explain this positron excess. However, pulsars are also emitters of electrons/positrons. The HAWC collaboration studied the contribution from two-mid aged pulsars, Geminga and PSR B0656+14, with 500 days of observations, and found high efficiency with a slow diffusion coefficient suggesting no significant contribution to the above positron excess. This result introduced a new subclass of gamma-ray sources, TeV halos. Using five years of data from the HAWC gamma-ray observatory and a new inverse Compton halo model, we fit the diffusion coefficient and electron spectral index to study the energy-dependence of particle diffusion.

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