

Follow-up Analysis to Geminga's contribution to the Local Positron Excess with HAWC Gamma-Ray Observatory

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The experiments PAMELA and AMS-02 measured an anomalous local positron excess above energies of 10 GeV. The reason for this excess is not well understood but has been considered as indirect evidence of dark matter, but could also be produced from nearby pulsars. The HAWC collaboration previously studied the extended gamma-ray emission of two nearby pulsars, Geminga and PSR 0656+14, but found these two pulsars did not contribute a significant amount to this excess. The previous study of HAWC led to the reinterpretation of our result and initiated the concept of inverse Compton (IC) halos. Fitting a new halo model together with 1343 days of data from the HAWC gamma-ray observatory may better constrain the contribution of these pulsars to the positron excess. This halo model utilizes 3D templates of gamma-ray emission from electron IC interactions to fit the diffusion coefficient and electron injection spectral index. This model can further help study the energy dependent diffusion and incorporate anisotropic diffusion with the proper motion of the pulsar.

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Collaboration

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Subcategory

Experimental Results

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