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Unraveling the Nature of HAWC J1844–034 with Fermi-LAT Data Analysis and Multiwavelength Modeling

The extended ultra-high-energy (UHE) gamma-ray source HAWC J1844–034 is closely associated with two other sources, HAWC J1843–032 and HWC J1846–025. Moreover, other gamma-ray observatories like HESS, LHAASO, and Tibet AS γ have detected UHE gamma-ray sources whose spatial positions coincide with the position of HAWC J1844–034. The UHE gamma-ray data from several observatories aid analysis of the spectral features of this source in detail at teraelectronvolt energies. Of the four pulsars near HAWC J1844–034, PSR J1844–0346 is closest to it and possibly supplies the cosmic-ray leptons to power this source. We have analyzed the Fermi–Large Area Telescope (LAT) data to explore this source’s morphology and identify its spectral features in the Fermi-LAT energy band. After removing the contribution of the pulsar to the gamma-ray spectral energy distribution (SED) by pulsar-phased analysis, we obtained upper limits on the photon flux and identified the gigaelectronvolt counterpart PS J1844.2–0342 in the Fermi-LAT energy band with more than 5σ significance, which may be a pulsar wind nebula (PWN). Finally, the multiwavelength SED is modeled, assuming HAWC J1844–034 is a PWN.

Collaboration(s)

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