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A First Look at the Very Highest-Energy Gamma-Ray Sky from HAWC

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TeV observations of gamma-ray sources are very important probes of cosmic-ray accelerators, as leptonic and hadronic spectra differ in this energy range. The High Altitude Water Cherenkov (HAWC) Observatory, located in Puebla, Mexico, is capable of detecting air showers initiated by gamma rays in the multi-TeV energy range. The upper end of this range is previously unexplored. The detector consists of 300 water Cherenkov tanks located at an altitude of 4100m, each instrumented with 4 PMTs. Because its instantaneous field of view is ˜2sr and it has a duty cycle > 95% percent, the array is well-suited to performing all-sky surveys. I will present a method to reconstruct energy of the primary gamma rays on an event-by-event basis by measuring the charge density as a function of distance to the air shower axis. This greatly improves the dynamic range compared to the current method used by HAWC, which assigns a mean energy value for all events of a given shower size. I will use the method to show the latest HAWC observations of gamma-ray sources above 50 TeV, which are among the highest-energy gamma rays ever studied.

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