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Constraints on Lorentz-Invariance Violation Using HAWC Observations of the Crab Nebula SAMUEL MARINELLI, Michigan State Univ, HAWC COLLABORATION — The High-Altitude Water-Cherenkov (HAWC) experiment is a γ-ray observatory located in the state of Puebla, Mexico. The detector consists of 300 water-filled tanks, each instrumented with four photomultiplier tubes (PMTs). These PMTs detect Cherenkov light produced by the charged particles found in extensive air showers that occur when cosmic γ rays impinge on the Earth's atmosphere. The recent development of a new energy-reconstruction algorithm for HAWC utilizing an artificial neural network has enabled the precise measurement of γ-ray energies above [100]TeV in Monte Carlo simulations. This makes HAWC sensitive to the highest-energy components of the energy spectra of astrophysical sources and in particular to the spectral signature of Lorentz-invariance violation (LIV). LIV models predict that above a certain energy, γ decay to e^+e^- is allowed, with a probability approaching 1 for photons propagating over astrophysical distances. Very-high-energy γ-ray energy spectra should therefore have a hard cutoff at this energy. We will present preliminary results of a search for this phenomenon using HAWC's measurement of the spectrum of the brightest TeV source, the Crab Nebula.

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