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Abstract:

HAWC is a large array of water Cherenkov detectors recording continuously air-shower particles at 4,100 m altitude in the slopes of the Sierra Negra volcano in Central Mexico. The event reconstruction can discriminate between hadronic and electromagnetic showers providing the incoming direction and energy of the primary cosmic or gamma ray. Every day HAWC scans 2/3 of the sky with an instantaneous aperture of 1 sr above it. The high statistics cosmic ray spectrum from 10 TeV to 1 PeV shows signs of a break from a single power law. The incoming direction of cosmic rays has been analysed in collaboration with IceCube to cover the full sky and shows anisotropies at large and small scales. We will show our updated TeV gamma ray sky and discuss our recent observation of TeV halos surrounding middle-aged pulsars and their contribution to the positron excess observed near Earth. HAWC carries out several multi-frequency and multi-messenger studies of galactic and extragalactic sources including searches for counterparts to the LIGO/VirGO gravitational wave detections and IceCube high energy neutrinos.