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Exploring the TeV Universe with HAWC

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The High Altitude Water Cherenkov (HAWC) observatory is an extensive air shower detector optimized for studying gamma rays with energies between 100 GeV and 100 TeV.

Located at an elevation of 4100 m near Puebla, Mexico, the array consists of 300 water tanks instrumented with 4 photo-multiplier tubes each and was completed in March 2015.

A wide instantaneous field of view of ~ 2 sr and a duty cycle $>95\%$ allow HAWC to survey $2/3$ of the sky every day. These unique capabilities make it possible to perform an unprecedented survey of TeV emission over most of the northern and part of the southern sky in order to map galactic and extra-galactic particle acceleration sites and search for gamma rays from dark matter annihilation and decay. HAWC is also ideally suited to monitor variable gamma-ray fluxes and search for flares from active galactic nuclei, gamma-ray bursts, and other transient events, providing new insights into relativistic particle acceleration in astrophysical environments. We will present results from the first years of gamma-ray and cosmic-ray observations during the evolution of HAWC from a partial array to the completed observatory. Efforts to enhance our understanding of the high energy Universe through multi-wavelength and multi-messenger analyses will also be highlighted.

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