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The HAWC gamma-ray observatory: generating big data in Mexico

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Abstract

The High Altitude Water Cherenkov (HAWC) gamma-ray observatory is a wide field view and high duty cycle TeV detector located at an altitude of 4100m in volcán Sierra Negra site, one kilometer North of the Gran Telescope Milimétrico Alfonso Serrano (GTM/ LMT). Both major instruments share the basic site infrastructure, including the Internet connection. HAWC is an array of 300 water Cherenkov detectors, each instrumented with four photomultiplier tubes, designed to register the constant arrival of atmospheric cascades induced by primary cosmic and gamma-rays. The HAWC data acquisition system controls and monitors over 1100 channels, recording about 15,000 events per second. Timing and charge deposit information along the whole array are used to infer the arrival direction and energy of primary cosmic particles and photons. With this information, HAWC is able to permanently monitor 1.8 Sr and daily survey 2/3 of the sky to a depth corresponding to the detection of the Crab nebula in a single transit. HAWC generates over 1 TB of data every day; the low level of connectivity of the Sierra Negra site remains a handicap for the full exploitation of both HAWC and GTM.