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Surveying the TeV Sky with the High Altitude Water Cherenkov (HAWC) Gamma-Ray Observatory

Friday 12 January 2018 17:00 (20 minutes)

HAWC is an array of 300 large volume water Cherenkov detectors spread over an area of 20,000 square meters situated at 4,100 m altitude in the mountains of central Mexico. It detects continuously TeV air showers over a large field of view of 2 sr observing 2/3 of the sky each day and is able to separate gamma rays from cosmic rays utilizing the differences between electromagnetic and hadronic shower topologies. The first HAWC gamma ray catalog with 18 months of data identified ˜40 sources of which one quarter were previously unknown. Two extragalactic blazers Markarian 421 and Markarian 501 show strong flaring activity in the daily light curve measurements. Now more than 30 months of data are available. In the galactic plane HAWC has discovered large TeV halos around nearby middle aged pulsars like Geminga and Monogem that strongly constraint their contribution at Earth to the positron excess measured by the PAMELA, Fermi and AMS detectors in space. In the surveyed sky there are many dark matter rich objects like dwarf and irregular galaxies whose analysis have placed the strongest constraints up to date on annihilating or decaying dark matter with masses of more then 10 TeV. The large field of view of HAWC has allowed us to make several multi-wavelength and multi-messenger observations with gamma-ray satellites (Fermi), gravity-wave detectors (LIGO-Virgo) and neutrino observatories (IceCube).

Author: SANDOVAL, Andres (Universidad Nacional Autonoma (MX))

Presenter: SANDOVAL, Andres (Universidad Nacional Autonoma (MX))

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