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A Preliminary Look at the 4HWC Very-High-Energy Gamma-Ray Source Catalog

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The High Altitude Water Cherenkov (HAWC) observatory is highly suitable for large-scale survey work. The high duty time (95+%), large FoV (2 sr), and sensitivity from 300 GeV to above 100 TeV make it ideal for creating a catalog of very high energy (VHE) sources. Over the lifetime of the HAWC observatory, 4 catalogs have been produced 3 of which were constructed using the full HAWC energy range while another used a restricted (>56 TeV) range. This talk will focus on the status of the planned 4HWC (full energy range) catalog including the newly developed Multi-Source Fit algorithm inspired by the Fermi Extended Source search method. Using over 1000 additional days of data, improved event reconstruction algorithms using HAWC's fifth pass through data, and the improved search algorithm we expect a major improvement in the sensitivity and accuracy. The previous (3HWC) catalog found 65 sources above 5 sigma and I anticipate the 4HWC search will result in over 100 significant sources. In addition, the new search is more suited to fitting extended sources and disentangling complex regions. The 3HWC catalog found that 56 of 65 sources were associated with pulsars so it will be of interest to observe how this may change. In addition to a discussion surrounding the creation of the 4HWC catalog, I will present a preliminary look at the results of the new catalog search method in several regions of interest in HAWC maps such as the Crab Nebula, Cygnus Cocoon, and near the Geminga pulsar.

Submitted on behalf of a Collaboration?

Yes

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