

Searching for Q-balls with the High Altitude Water Cherenkov Observatory

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The High Altitude Water Cherenkov (HAWC) Observatory is a gamma-ray experiment currently under construction at Sierra Negra in Mexico. When complete it will consist of a 22,000 square meter array of 300 water Cherenkov detectors. Although HAWC is designed to study gamma rays from galactic and extra-galactic sources, the large volume of instrumented water (each tank holds ~188,000 liters) gives the opportunity to search for rare objects. One such relic from the early universe are Q-balls, which are naturally produced by the Affleck-Dine mechanism during the inflationary epoch. Q-balls are very massive, subrelativistic particles that can have a large baryon number and can be stable since their creation in the early universe. They are an appealing candidate for the dark matter of the universe, but their large mass means their flux is very low. HAWC has a flexible data acquisition system which, with a dedicated trigger algorithm for non-relativistic species, allows a search for Q-balls traversing the detector. The trigger algorithm, expected sensitivity, and preliminary analysis will be presented.

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