

FIRST USE OF BACKGROUND REJECTION IN AN EAS ARRAY TO DETECT TEV GAMMA RAYS FROM AN ASTRONOMICAL SOURCE

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The Milagro gamma ray telescope is the first extensive air shower array to use a large continuous pool of water as a detection medium. Milagro consists of two layers of PMTs submerged in a 6 million gallon water reservoir. The top layer of PMTs is submerged under 1.5 meters of water and is used to reconstruct the direction of the primary cosmic ray. The second layer of PMTs is submerged under 6 meters of water and is used to image the penetrating component of extensive air showers initiated by hadronic cosmic rays. We have developed a method that uses the information from the bottom layer of Milagro to remove over 90% of the cosmic-ray background while retaining over 50% of the gamma ray signal events. In this paper we discuss the technique and demonstrate its effectiveness with a detection of emission from the Crab nebula at high statistical significance.