Abstract Submitted
for the APR15 Meeting of
The American Physical Society

Milagro Limits and HAWC Sensitivity for the Rate Density of Evaporating Primordial Black Holes[1] SAMUEL MARINELLI, Michigan State Univ, HAWC COLLABORATION, MILAGRO COLLABORATION — Primordial black holes (PBHs) are gravitationally collapsed objects that may have been created by density fluctuations in the early universe and could have arbitrarily small masses down to the Planck scale. Hawking showed that due to quantum effects, a black hole has a temperature inversely proportional to its mass and will emit all energetically allowed species of fundamental particles thermally. PBHs with initial masses of order 5.0×10^{10} g should be expiring in the present epoch with bursts of high-energy particles, including gamma radiation in the GeV – TeV energy range. The Milagro high-energy observatory, which operated from 2000 to 2008, is sensitive to the high end of the PBH evaporation gamma-ray spectrum. Due to its large field of view, more than 90% duty cycle, and sensitivity up to 100-TeV gamma rays, the Milagro observatory is well suited to perform a search for PBH bursts. A search of five years of Milagro data yielded no detections at 5σ and set a local (parsec-scale) upper limit of 3.6×10^4 PBH bursts/year/pc^3. In addition, we will report the sensitivity of the Milagro successor, the High-Altitude Water-Cherenkov (HAWC) observatory, to PBH evaporation events.

[1]This work was supported by the National Science Foundation.

Samuel Marinelli
Michigan State Univ

Date submitted: 09 Jan 2015 Electronic form version 1.4