

Search for upward-going showers with the Fluorescence Detector of the Pierre Auger Observatory

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We present the results of a search for upward-going showers using the Fluorescence Detector (FD) of the Pierre Auger Observatory. Upward-going air showers are a possible interpretation of the recent events reported by the ANITA Collaboration in the energy range above 10^{17} eV. Given its operation time and wide field of view, the FD is sufficiently sensitive to upward-going events and can be used to support or constrain this interpretation. If confirmed, it would require either new phenomena or significant modifications to the standard model of particle physics.

To perform this search, a set of quality selection criteria was defined by using 10% of the available FD data from 14 years of operation. This subset was mainly used to clean the data to remove laser events, used to monitor the atmosphere, which were not properly labelled. The background for this search consists of cosmic-ray events with specific geometric configurations which can be reconstructed erroneously as upward-going events in a monocular reconstruction. To distinguish candidates from these false positives, calculate exposure and obtain the expected background, dedicated simulations for signal (upward-going events) and background (downward-going events) have been performed. The detector exposure is large enough to strongly constrain the interpretation of ANITA anomalous events. Results of the analysis after unblinding the data set are presented.

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Primary authors: MASTRODICASA, Massimo (University of L'Aquila & INFN LNGS); FOR THE PIERRE AUGER COLLABORATION

Presenter: MASTRODICASA, Massimo (University of L'Aquila & INFN LNGS)

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