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Galactic Cosmic Ray increase associated to an interplanetary magnetic cloud observed by HAWC

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We present the observation of an anomalous increment of the galactic cosmic ray (GCR) flux observed by the HAWC array during October 2016. We propose that an anisotropy of the GCR flux caused by a magnetic flux rope (MFR) i. e., by the helical magnetic field of an interplanetary coronal mass ejection observed at 1 AU at the same time, was responsible for the GCR increment.
We computed the trajectory of protons with energy in the 10 to 60 GeV range traveling inside the helicoidal magnetic field observed in situ. The direction of these particles changes towards the axis of the MFR resulting in an anisotropy of the GCR flux along this axis.
This model shows that the alignment between the MFR axis and the HAWC´s asymptotic direction, combined with the high sensitivity of HAWC, allowed us to observe the effect of the passage of the MFR on the GCR flux.
We present the HAWC observation associated with the passage of the MFR as well as the heliospheric circumstances around such phenomenon.

Keywords

Interplanetary Coronal mass ejections: magnetic clouds, magnetic flux rope, cosmic ray modulation

Collaboration

HAWC

other Collaboration

Subcategory

Experimental Results

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