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Constraining the Dark Matter lifetime with very deep observations of the Perseus cluster with MAGIC

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We present the results on Dark Matter searches from the Perseus galaxy cluster observations with the MAGIC Telescopes. MAGIC is a system of two Imaging Atmospheric Cherenkov Telescopes located in the Canary island of la Palma, Spain. Galaxy clusters are the largest known gravitationally bound structures in the Universe, with masses of $\sim 10^{15}$ Solar Masses. There is strong evidence that galaxy clusters are Dark Matter dominated objects, and therefore promising targets for dark matter searches, particularly for decay signals. We analyze almost 300 hours of good-quality observations of Perseus taken between 2009 and 2015. This is the deepest observational campaign on any galaxy cluster performed so far in the very high energy range of the electromagnetic spectrum. We search for signals of dark matter particles in the mass range between 100 GeV and 20 TeV. We apply a likelihood analysis optimized for the spectral and morphological features expected in the dark matter annihilation and decay signals from the Perseus cluster. We achieve sensitivities to decay life times above $\sim 10^{26}$ s for masses of the order of hundreds of GeV. This result is the most stringent limit obtained on the lifetime of dark matter candidates in the studied mass range, improving previous limits by one order of magnitude.

Collaboration

MAGIC

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