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CLUES on Fermi-LAT prospects for mnuSSM gravitino dark matter extragalactic detection

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The mnuSSM is a supersymmetric model that has been proposed to solve the problems of other supersymmetric extensions of the standard model. The gravitino is a natural candidate for dark matter in the mnuSSM and could be detectable through the emission of a monochromatic gamma ray in a two-body decay.

We study the prospects of the Fermi-LAT telescope to detect such monochromatic lines in 5 years of observations of the most massive extragalactic objects.

The dark matter halo around the Virgo galaxy cluster is selected as a reference case, since it is associated to a particularly high signal-to-noise ratio and is located in a region scarcely affected by the presence of astrophysical point sources.

The simulation of both signal and background gamma-ray events is carried out with the Fermi Science Tools, and the dark matter distribution around Virgo is taken from a N -body simulation with constrained initial conditions provided by the CLUES project.

We find that a gravitino with a mass range of 0.5–10 GeV approximately, and with a lifetime of about $5e27$ s ($1e28$ s) would be detectable by the Fermi-LAT with a signal-to-noise of 5 (3).

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