

Indirect Dark Matter searches in the gamma-ray channel toward the Sun with the Fermi LAT

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The Sun is a possible target for indirect dark matter (DM) searches, as it can gravitationally capture DM particles from the Galactic halo, which can be trapped in external orbits or sink into the solar core. We have performed a dedicated analysis of solar gamma rays collected by the Fermi Large Area Telescope (LAT) to search for possible flux excesses, which could be ascribed to DM. Gamma rays in final states of DM annihilations occurring outside the Sun can in fact reach the Earth and be detected by the LAT. Alternatively, DM particles can annihilate inside the Sun core into pairs of long-lived mediators, which are able to escape from the Sun and can decay outside the Sun, yielding gamma rays in the final state. All these processes are expected to yield an excess in the gamma-ray flux from the Sun, which appears as a specific spectral feature. Although no evidence of a DM signal has been found, we have obtained upper limits on the DM gamma-ray flux, which have been converted into constraints on the DM-nucleon scattering cross sections.

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