

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

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We have studied the gamma-ray flux from the solar disk using the data collected by the Fermi Large Area Telescope (LAT) to search for possible flux excesses, which could be ascribed to dark matter (DM). We have searched for line-like features and box-like features in the solar gamma-ray spectrum, which would appear on the top of the continuous spectrum from the standard solar gamma-ray emission. These features correspond to two possible theoretical scenarios. A line-like feature is expected if DM particles orbiting around the Sun annihilate directly into gamma-ray pairs. A box-like feature is expected if DM particles inside the Sun annihilate into pairs of long-lived light mediators, which can escape from the Sun and then decay into gamma-ray pairs. Although we have found no evidence of such DM signals, 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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