

Dark Matter search in dwarf irregular galaxies with the Fermi Large Area Telescope

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Dwarf irregular (dIrr) galaxies have been shown to be dark matter (DM) dominated systems and proposed as interesting targets for the indirect search for DM with gamma rays. In this work, we analyze 11 years of Fermi-LAT data corresponding to the sky regions of 7dIrrs at a distance of less than ~ 1 Mpc. Due to the current uncertainty in the DM density distribution in these objects, we consider two different DM profiles, based on both the fit to the rotation curve (in this case a Burkert cored profile) and results from N-body cosmological simulations (i.e., NFW cuspy profile). We also include halo substructure in our analysis, which is expected to boost the DM signal importantly in field halos such as those of dIrrs. For each DM model and dIrr, we create a spatial template of the expected DM-induced gamma-ray signal to be used in the analysis of Fermi-LAT data. No significant emission is detected from any of the targets in our sample. Thus, we compute upper limits on the DM annihilation cross-section versus mass parameter space. Among the 7dIrrs, we find IC10 and NGC6822 to yield the most stringent individual constraints, independently of the adopted DM profile. We also produce combined DM limits for all objects in the sample. These results are independent from and complementary to those obtained by means of other targets. They also show the great potential of this type of objects in the context of DM searches, this work representing the first step in that direction.

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