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Search for DM-induced gamma-rays from Galaxy Clusters with the Fermi-LAT

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Galaxy Clusters are the largest gravitationally bound structures in our universe. The majority of their mass is believed to be in the form of dark matter (DM). If DM manifests itself as weakly interacting massive particles (WIMPs) these WIMPs may self-annihilate or decay, and galaxy clusters would then be excellent targets for searches of DM-induced gamma rays. In addition, N-body cosmological simulations predict galaxy clusters to host thousands of DM sub halos. The presence of these substructures may yield an enhancement of the expected DM-induced gamma-ray flux, making galaxy clusters potentially observable with current gamma-ray observatories such as the Large Area Telescope on board the Fermi satellite.

Here we present initial results of a joint likelihood analysis searching for DM signatures towards the direction of a sample of 34 galaxy clusters in 5 years of existing LAT data. In the absence of a DM signal, we provide updated constraints on the DM annihilation cross section, which are possible thanks to our improved understanding of the DM modeling and the gamma-ray sky.

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