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Gamma-Rays from Pion Production in the Milky Way Halo[1]

MIKHAIL MEDVEDEV, University Of Kansas — Low-energy cosmic rays (CRs) below the "knee" are believed to be produced by galactic sources (supernova remnant shocks, pulsars) and are trapped in the galactic magnetic fields whereas higher-energy CRs, up to $\sim 10^{18}$ eV, are leaking from the Galaxy. In a recent work, a model of the "Galactosphere" — the up-scaled analog of the Heliosphere — has been suggested to exist around the Milky Way and produce lower-energy CRs at the galactic termination and bow shocks. We proposed the observational test of the model via pion-produced gamma-rays generated by these TeV "anomalous extra-galactic CRs" propagating through the Galactic halo and interacting with hydrogen gas in high-velocity clouds (HVCs) and inside the Galaxy. We estimate the peak of the gamma-ray spectrum to be in the 10 GeV range, hence the signal from HVCs and the north-south galactic asymmetry of the gamma-ray background are potentially detectable by LAT on board of FermiGST.

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