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Dark Matter Subhalos In the Fermi First Source Catalog

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The Milky Way's dark matter halo is thought to contain large numbers of smaller subhalos. These objects can contain very high densities of dark matter, and produce potentially observable fluxes of gamma rays. In this article, we study the gamma ray sources in the Fermi Gamma Ray Space Telescope's recently published First Source Catalog, and attempt to determine whether this catalog might contain a population of dark matter subhalos. We find that, while approximately 20-60 of the catalog's unidentified sources could plausibly be dark matter subhalos, such a population cannot be clearly identified as such at this time. From the properties of the sources in the First Source Catalog, we derive limits on the dark matter's annihilation cross section that are comparably stringent to those derived from recent observations of dwarf spheroidal galaxies.

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