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Fermi LAT Limits on Primordial Black Hole Evaporation CHISTIAN JOHNSON, University of California, Santa Cruz, DMITRY MALYSHEV, STEFAN FUNK, Kavli Institute for Particle Astrophysics and Cosmology, STEVEN RITZ, University of California, Santa Cruz, FERMI LAT COLLABORATION — Primordial black holes (PBHs) of sufficiently small mass emit gamma rays in the Fermi Large Area Telescope (LAT) energy range. PBHs with lifetimes shorter than the Fermi observation time will appear as moving point sources with gamma-ray emission that becomes harder and brighter with time until the PBH completely evaporates. Previous searches for gamma rays from PBHs have focused on either short time scale bursts or the contribution of PBH bursts to the isotropic diffuse emission. Here we use Fermi LAT point source catalogs to search for PBH candidates that evaporate on a time scale of several years. In addition to looking for the spectral signatures of a PBH, we also develop an algorithm to detect proper motion. There are a few unassociated point sources with spectra consistent with PBH evaporation; however, none of these sources show significant proper motion. We derive a conservative limit on PBH evaporation rate in the vicinity of the Earth by using a threshold on the gamma-ray flux above 10 GeV such that there are no sources above this threshold with spectra consistent with Hawking radiation from PBHs. The derived limit is more stringent than the limits obtained with ground-based gamma-ray observatories.

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