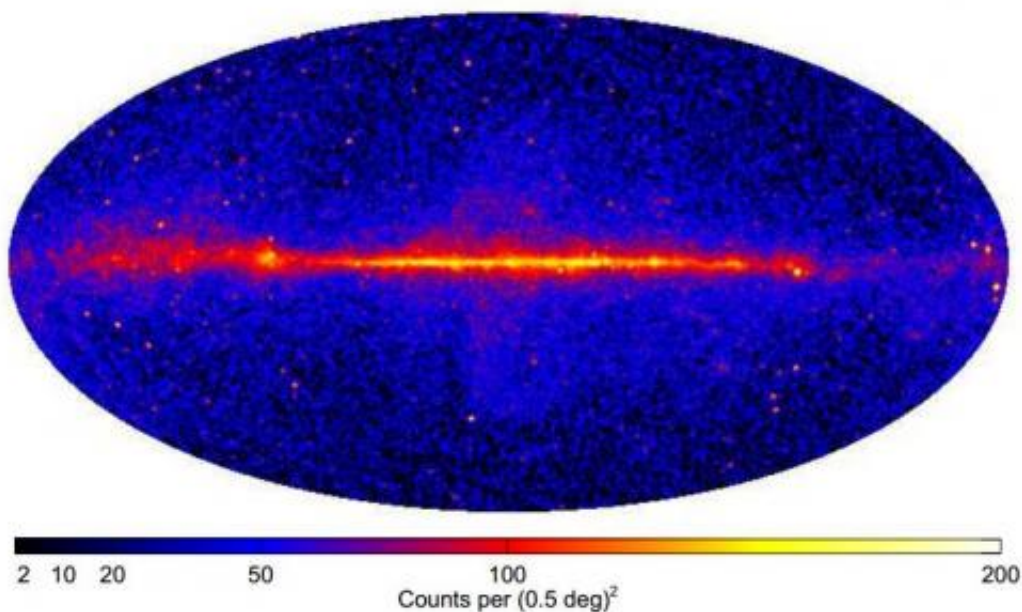


Fermi team releases catalog of gamma-ray sources at energies above 10 GeV

July 3 2013, by Bob Yirka



Sky map of gamma-ray counts above 10 GeV in Galactic coordinates in Hammer-Aitoff projection. The binning is 0.5° and the image has been smoothed with a 2-dimensional Gaussian of full width at half maximum 0.75° . Credit: arXiv:1306.6772 [astro-ph.IM]

(Phys.org) —The team of scientists associated with the Fermi Gamma-ray Space Telescope mission has published a catalog of gamma-ray sources at energies above 10 GeV. In their paper uploaded to the preprint server *arXiv*, they outline the various sources of gamma-ray emissions above 10 GeV detected by the Large Area Telescope (LAT)

currently orbiting the Earth.

Because it's in orbit, the LAT is capable of looking at space from every direction—it can read data from the entire cosmos in just three hours and does so over and over all day long, every day. In this new catalog, the researchers present data from the first three years of the telescope's mission—focusing specifically on the energy range above 10 gigaelectronvolts, which they note hasn't been adequately outlined in prior catalogs.

The team explains that this new catalog is meant to serve as a bridge between other catalogs created using data received from the LAT (which generally have thousands of sources) and ground-based telescopes. It offers a new way to look at the higher energy [gamma ray emissions](#) and hopefully will help to identify those that are still unknown. Also, the team sees their catalog as an opportunity to help identify which sources are also emitting other types of radiation at high [energy levels](#).

The team notes that the telescope detected a total of 514 10 GeV sources—the catalog details the location of each, its spectra and any associations with other cataloged sources. They add that 449 of the sources noted have previously been associated with a known source, leaving 65 of them described as "unassociated." The team doesn't know what is causing the emissions—they suggest they might be previously unknown classes of objects. Others in the field have suggested they could be "dark galaxies" which are [galaxies](#) rich in [dark matter](#). Those sources that have been previously associated with known entities include [active galactic nuclei](#), blazars, and pulsars.

The team says that although the proportion of unassociated sources is lower than prior catalogs created, they plan to follow up on those listed in this new catalog with the hope of eventually identifying them as well.

More information: The First Fermi-LAT Catalog of Sources Above 10 GeV, arXiv:1306.6772 [astro-ph.IM] arxiv.org/abs/1306.6772

Abstract

We present a catalog of gamma-ray sources at energies above 10 GeV based on data from the Large Area Telescope (LAT) accumulated during the first three years of the Fermi Gamma-ray Space Telescope mission. The first Fermi-LAT catalog of >10 GeV sources (1FHL) has 514 sources. For each source we present their locations, spectra, a measure of their variability, and associations with cataloged sources at other wavelengths. We found that 449 (87%) could be associated with known sources, of which 393 (76% of the 1FHL sources) are active galactic nuclei. Of the 27 sources associated with known pulsars, we find 20 (12) to have significant pulsations in the range >10 GeV (>25 GeV). In this work we also report that, at energies above 10 GeV, unresolved sources account for 27 \pm 10 % of the isotropic gamma-ray background, while the unresolved Galactic population contributes only at the few percent level to the Galactic diffuse background. We also highlight the subset of the 1FHL sources that are best candidates for detection at energies above 50-100 GeV with current and future ground-based gamma-ray observatories.

© 2013 Phys.org

Citation: Fermi team releases catalog of gamma-ray sources at energies above 10 GeV (2013, July 3) retrieved 11 May 2024 from <https://phys.org/news/2013-07-fermi-team-gamma-ray-sources-energies.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.