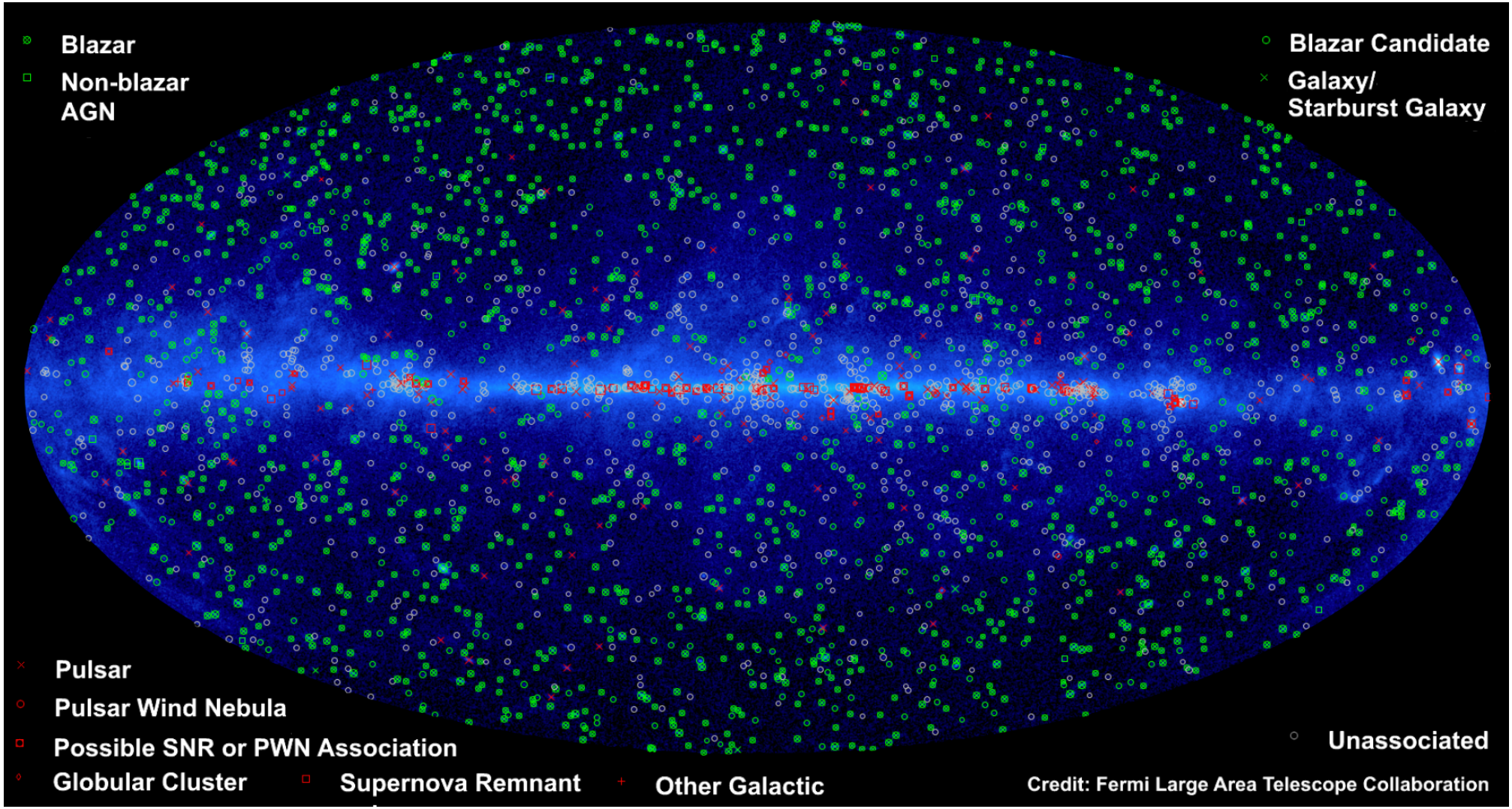
The 3FGL Catalog

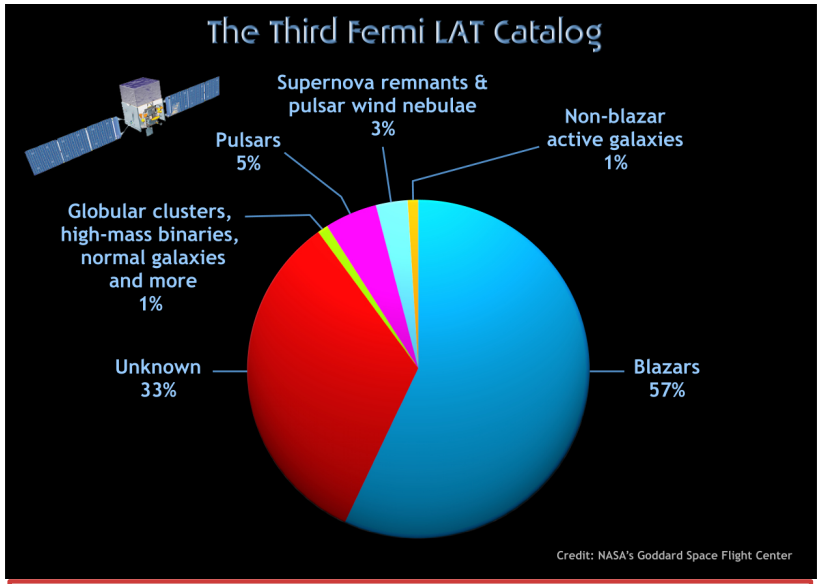


Characterizing the Sources in the Third Fermi LAT Catalog (3FGL)

Astronomical catalogs like the 3FGL Catalog provide a starting point for research. They serve as the basic input for population studies of source classes and offer key information about individual sources that enables deeper analysis. The Third Fermi LAT Catalog (3FGL) is no exception and represents the most complete catalog of gamma-ray sources available.

Creating the 3FGL catalog required an understanding of the full gamma-ray sky. Models of diffuse gamma-ray emission from the Galaxy and isotropic emission have been developed, as well as templates for sources that show significant spatial extension. The LAT team simultaneously fits multiple components with a set of seed source locations. This iterative procedure results in a suite of measured parameters for each significantly detected source. The parameters include:

- Position, flux, spectral index, and their uncertainties
- Associations with sources at other wavelengths
- Statistical significance
- Preferred spectral shape

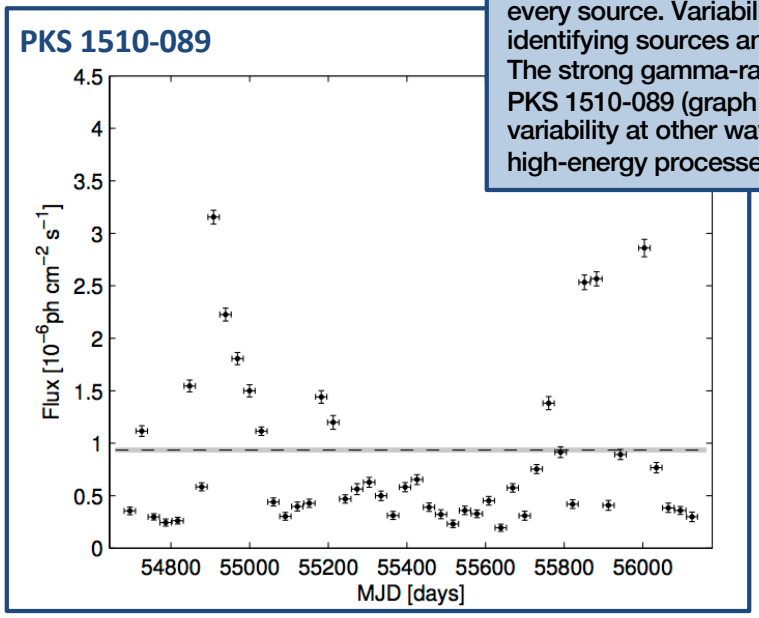


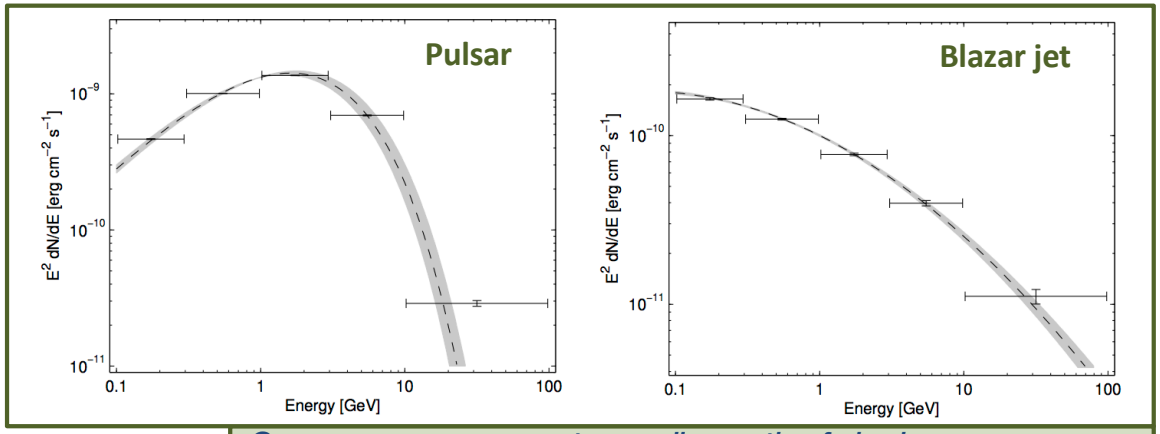
Demographics of the gamma-ray sky

Blazars - Active Galactic Nuclei with jets pointed toward the Earth - constitute the single largest source class seen by Fermi's LAT. The next most common class is "unknown," holding the promise of astrophysics mysteries waiting to be solved. Other types of sources reflect the high-energy, non-thermal nature of all LAT sources.

Variability

The 3FGL catalog includes a variability measure for every source. Variability is a valuable tool both for identifying sources and for studying their properties. The strong gamma-ray variability seen in the blazar PKS 1510-089 (graph at left), can be compared to variability at other wavelengths to learn about the high-energy processes taking place in the jet.





Gamma-ray energy spectra – a diagnostic of physics

The plots above show the energy spectra of a pulsar and the jet of a blazar. The pulsar shows a sharp cutoff above a few GeV, which is characteristic of the curvature radiation process taking place around this rotating neutron star. By contrast, the blazar jet spectrum shows a much gentler slope that results from processes not yet fully understood.

Fermi Gamma-ray Space Telescope

For more information, visit http://fermi.gsfc.nasa.gov/

NASA's Fermi mission is an astrophysics and particle physics partnership managed by NASA's Goddard Space Flight Center in Greenbelt, Md., and developed in collaboration with the U.S. Department of Energy, with important contributions from academic institutions and partners in France, Germany, Italy, Japan, Sweden and the United States.