Fermi at 18: Exploring the Gamma-Ray Universe with Fermi-LAT

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Abstract

The Fermi Gamma-ray Space Telescope is celebrating 18 years of successful operations. Since its launch, the Large Area Telescope (LAT), the mission's primary instrument, has transformed our view of the high-energy gamma-ray sky and played a central role in establishing survey and time-domain gamma-ray astrophysics. Thanks to its large field of view and continuous all-sky survey mode, Fermi-LAT has monitored the entire sky every three hours for nearly two decades. During this time, it has detected more than 7,000 persistent gamma-ray sources, the majority of which are active galactic nuclei, and discovered gamma-ray pulsations from more than 300 pulsars. In addition, Fermi-LAT has detected and characterized some of the most energetic transient phenomena in the Universe, including gamma-ray bursts, blazar flares, supernovae, and magnetar outbursts. These observations have provided unique insights into particle acceleration, relativistic outflows, and the physical processes operating under extreme conditions. This talk will review some of the mission's most significant recent scientific results and highlight the broad scientific legacy of Fermi-LAT, including its synergies with multi-wavelength and multi-messenger observations.

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