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Performances of the Fermi-LAT silicon strip tracker after 14 years of operation

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The Large Area Telescope (LAT) is the primary instrument of the Fermi Gamma-ray Space Telescope launched on June 11 2008. It is an imaging, wide field-of-view, gamma-ray telescope, covering the energy range from 30 MeV to more than 300 GeV. The LAT tracker is formed by silicon strips planes alternated with tungsten foils and is used to convert the incoming photon into an electron-positron pair and to measure its direction. The tracker comprises 36 mutually orthogonal planes of single-sided silicon strip detectors, for a total of 73 square meters of silicon and about 900,000 independent electronics channels. The tracker system was designed to achieve a single-plane hit efficiency in excess of 99% within the active area and a noise occupancy at the level of ~ 1 channel per million. Here we describe the performances of the LAT tracker, that has been constantly monitored using calibration and science data. In particular we show that, after almost 14 years of continuous operation in space, the fraction of defective channels is less than 0.5% while the readout noise increased less than 5%.

Collaboration

Fermi-LAT collaboration

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