The GLAST Silicon-Strip Tracking System

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The GLAST instrument concept is a gamma-ray pair conversion telescope that uses silicon microstrip detector technology to track the electron-positron pairs resulting from gamma-ray conversions in thin lead foils. A cesium iodide calorimeter following the tracker is used to measure the energy. Silicon strip technology is mature and robust, with an excellent heritage in space science and particle physics. It has many characteristics important for optimal performance of a pair conversion telescope, including high efficiency in thin detector planes, low noise, and excellent resolution and two-track separation. The large size of GLAST and high channel count in the tracker puts demands on the technology to operate at very low power, yet with sufficiently low noise occupancy to allow self triggering. A prototype system employing custom-designed ASIC's has been built and tested that meets the design goal of approximately 200 microwatts per channel power consumption with a noise occupancy of less than one hit per trigger per 10,000 channels. Detailed design of the full-scale tracker is well advanced, with all components prototyped, and a complete 50,000 channel engineering prototype tower module is currently under construction and will be tested in particle beams in late 1999. The flight-instrument conceptual design is for a 4×4 array of tower modules with an aperture of 2.9 m^2 and an effective area of greater than 8000 cm^2.