

Large Volume Germanium Detectors for the Advanced Compton Telescope

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The sensitivity that can be achieved by the Advanced Compton Telescope (ACT) mission in the 0.5 to 30 MeV energy range is determined by its ability to reject instrumental backgrounds. This is done through precise measurements of both position and energy of each gamma-ray interaction, and careful analysis of each event. The instrument concept is discussed elsewhere in this conference. The enabling technology to make this possible is in the detectors. Germanium is the natural choice, as it is available in large volumes (up to 700 cm³ per detector); provides the best possible energy resolution among the semiconducting, gas, and liquid detectors (as good as 1.3 keV FWHM at 1 MeV, and 410 eV FWHM at 100 keV); and is capable of fine spatial resolution (less than 1 mm). Achieving the best possible performance in arrays of large detectors is a technical challenge, but the basic properties and characteristics of the germanium detector have all been demonstrated on smaller scales. We discuss the current status of the germanium detector technology. New results from the characterization of a crossed strip detector using amorphous-germanium contacts are presented, along with developments in modular packaging concepts.