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Development and demonstration of gamma-ray tracking based Compton imaging instruments[1] KAI VETTER, Glenn T. Seaborg Institute, Lawrence Livermore National Laboratory — Recent developments in the manufacture of large and two-dimensionally segmented, high-resolution Si and Ge detectors along with advances in digital signal processing enable the implementation of compact and highly sensitive Compton imaging spectrometers. A hybrid system of low-Z material such as Si and a higher Z material such as Ge promises a high Compton imaging sensitivity between 100keV and several MeV, which is an energy range of significant interest for applications in homeland security, astrophysics, and nuclear medicine. The excellent energy resolution of the low-temperature detectors being used provide isotope identification and spectroscopic background suppression as well as excellent imaging capabilities. The imaging capability of a Compton camera not only enables to localize and image radioactive sources but also enables to potentially increase the sensitivity in finding weak or hidden gamma-ray sources by increasing the signal-to-background ratio in the image.

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