

Statement of Objectives
University of Michigan
DE-FG07-98ID13645

Overall Project Goal: To construct and test compact Compton imaging systems using 3-dimensional position-sensitive, room-temperature semiconductor gamma-ray spectrometers. Conventional Compton imaging devices are based on scintillation and/or HPGe detectors. Their imaging ability and compactness are limited by either the poor energy resolution of the scintillation detector or by poor position resolution. The world's first two 3-dimensional position sensitive semiconductor gamma ray detectors were built at University of Michigan in 1998 using CdZnTe and operated at room temperature. Energy resolution of ~1.7% FWHM and position resolutions of ~1×1×0.5 mm were achieved. With significantly better energy resolution than that of a scintillation detector and position resolution of ~1 mm, it is now possible to construct very compact Compton scattering gamma-ray imaging system based on these newly available detectors. Within the project period of 3 years, at least one prototype Compton imaging device will be built and tested.

Phase 2: – Phase 2 will have a duration of 12 months and will begin after the completion of phase 1. The main task in phase 2 is to construct the actual detector system designed in phase 1. Other tasks include the advanced research in imaging reconstruction algorithms, and testing and refinement of the electronic readout system.

Phase 2 Deliverable: A summary report at the end of phase 2 will describe the accomplishments as measured against the phase 2 objectives.

Phase 2 Funding - \$172,759

Phase 2 Period - July 1, 1999 – June 30, 2000

Phase 3: Testing the integrated Compton imaging system using radiation sources. Modify and refine the imaging system based on the test results.

Phase 3 Deliverable: A final report at the end of phase 3 will describe the accomplishments as measured against the whole project objectives.

Phase 3 Funding - \$147,921

Phase 3 Period - July 1, 2000 – June 30, 2001