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Development of a Compton Gamma-ray Imager using Cubes of CsI(Tl)

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Devices that can produce images of gamma ray sources in the energy range from 100 keV to several MeV have applications in astronomy as well as safety and security. The technology of choice in this energy range relies on the phenomenom of Compton scattering. A gamma ray scatters in the front layer of the detector, giving up some of its energy. The scattered, lower-energy photon is then absorbed in the back layer of the detector. Knowing the energies and positions of these two events allows one to reconstruct the energy and incident direction of the gamma ray. Compton imagers are usually constructed from two layers of pixelated detectors but their cost and complexity scales as N^2 where N is the number of pixels in a row of an NxN array. Here we report on a way to reduce the scaling to 2N, by reading out the detector by rows rather than pixels.

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