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Performance of a single-plane readout Compton camera

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We present the experimental validation and performance of a compact single-plane Compton camera that simplifies conventional multi-layer architectures by optically coupling the scatterer and absorber through a light guide, enabling one-sided SiPM readout. A prototype consisting of two 8×8 arrays of GAGG:Ce scintillators (3×3×3 mm³) coupled by 20 mm light guides was constructed and read out using an 8×8 SiPM matrix and TOFPET2 electronics. The measured energy resolutions were 8.9% ± 1.9% for the front layer, and 10.8% ± 1.6% for the layer closer to the SiPM, respectively. Imaging of Cs-137 and Na-22 point sources demonstrated angular resolutions of 12.4°–14.3° for 511 keV, and 14.3°–16.8° for 662 keV photons, with intrinsic efficiencies ranging between 7.7 10^{-6} and 7.8 10^{-6} for the 511 keV, and from 4.3 10^{-5} to 5.0 10^{-5} for the 662 keV gammas. These findings validate the feasibility of the single-plane approach and highlight opportunities for improved uniformity, noise reduction, and advanced event classification to further enhance performance of a Compton camera, based on this concept.

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