

Experimental Characterisation of a Single-Shot Spectrometer for High-Flux, GeV-Scale Gamma-Ray Beams

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We report on the experimental characterisation of a gamma-ray spectrometer designed to spectrally resolve high-flux photon beams with energies in the GeV range. The characterisation was performed at the Apollon laser facility using a bremsstrahlung source driven by laser-wakefield accelerated electron beams (maximum energy >1.5 GeV and total charge of 200 pC). The experimental results confirm the possibility of performing single-shot measurements, without the need for accumulation. Scaling the results to photons in the multi-GeV range could yield percent-level energy resolution, as required, for instance, by the next generation of experiments probing strong-field quantum electrodynamics.