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# Study the method for measurement of an optimized LYSO energy resolution

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Compared with other scintillation materials used for scintillation detectors, the cerium-doped lutetium yttrium silicate (LYSO:Ce) crystal is found to feature high density, high light output, fast decay time and non-hygroscopic, showing great potential to improve the performance of scintillation detectors. Silicon photomultipliers (SiPMs) are the new type of high-performance semiconductor photodetector, which generally have a higher photon detection efficiency than photomultiplier tubes (PMTs) and are beneficial to realize a better energy resolution. The optimized energy resolution measurement of SiPM-coupled LYSO:Ce crystals were studied by optimizing the photon detection efficiency (PDE), the operating voltage, the wrapper, the surface finish and the coupling method between the SiPM and crystal, hoping to contribute to the design of scintillation detectors based on the LYSO:Ce crystal coupled with SiPMs. Considering the output saturation of SiPMs in a high light intensity, a preliminary correction method was applied to the saturation response of SiPMs and energy resolution of 662 keV gamma-rays from 137Cs was obtained after correction. The results show that the optimized energy resolution at 662 keV measured by the SiPM of 50 μm microcells can reach 7.6%. In this contribution, the measurement method for an optimized LYSO energy resolution is discussed in details.

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