

Recent Activities on Neutron Standardization at NMIJ/AIST (1)

- Improvement of Position Dependence of Output Signal of an NE213 Scintillator -

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An NE213 liquid scintillator is one of the most useful neutron detectors. One of the problems with the NE213 is that the pulse height of the output signal depends on the position of radiation interactions. This position dependence makes the energy resolution worse compared to its intrinsic one. The position dependence occurs due to different self-absorption of the scintillation light. The scintillation light photons emitted at a far point from a photomultiplier tube(PMT) window tend to undergo more severe absorption by NE213 itself compared to those emitted at a near point. In this work, we studied how the position dependence of the output signal was improved by using a simple light guide disk of which side was covered with a black sheet. When the light guide is inserted between the NE213 scintillator cell and the PMT, the photons emitted at a near point to the PMT tend to escape from the side wall of the light guide. Therefore the position dependence of the output signal is compensated. Figure 1 shows the energy resolution for several energies of gamma rays as a function of thickness of the light guide disks when the NE213 scintillator encapsulated in a cell with a diameter of 5 cm and a length of 5 cm is used. The light guide disk with a thickness of 14 mm almost completely compensate the position dependence and gives the best energy resolution.

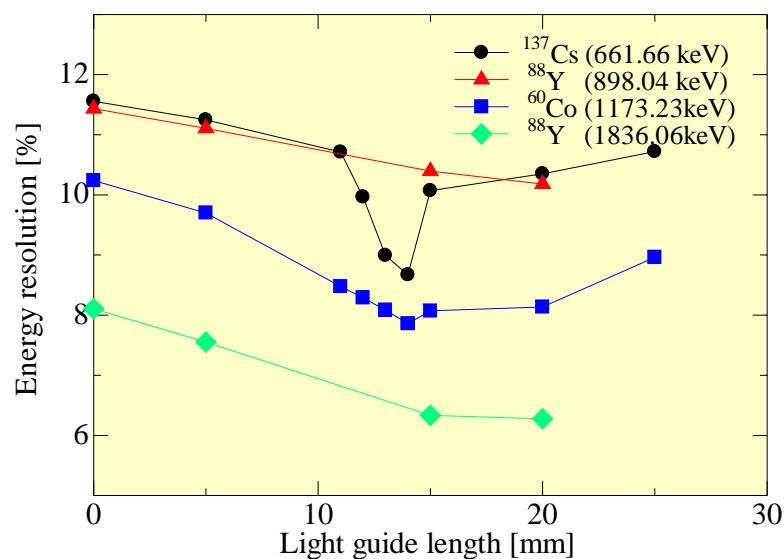


Fig. 1 Energy resolution vs. length of light guide