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3.1-P13. Improvement of plastic scintillator energy resolution for 131mXe conversion electron using Monte Carlo simulation of optical photon

Detection of four radioxenon isotopes (131mXe, 133mXe, 133Xe and 135Xe) is typically based on beta–gamma coincidence spectroscopy system. In the most of detection systems, plastic scintillator is used as container of radioxenon isotopes and beta particles detector. Because of unusual geometry of beta detector, optical photons undergo attenuation and scattering. These effects can change the energy resolution of beta detector. To improve non-uniformity of optical photon collection, some systems (ARSA and SAUNA) use two PMT's to collect scintillation on both side of plastic scintillator. This method can improve energy resolution but gain matching of PMT's increases the complexity of systems. In this paper, a new detection system consist of a well-type NaI(Tl) detector as gamma detector and plastic scintillator with a PMT as beta detector is introduced. The geometry of system was simulated with Gate7 Monte Carlo code and reflective layer effect on energy resolution of plastic scintillator was studied. The 131mXe radioxenon was injected in the beta cell and conversion electron peak was obtained. The best condition that has best resolution was selected by comparison of simulation and experiment results.

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