

Performance of a silicon PIN photodiode based radon detector for low radioactivity environment

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Content

It is very important to monitor the amount of radon (Rn-222) in the underground experiments such as rare decay and dark matter experiments with ultra low background requirements. The radioactivity from the radon can be a significant background source to the experiments and need to be measured precisely. We have upgraded a radon detector with a volume of ~70 L which was used in the KIMS (Korean Invisible Matter Search) experiment by replacing with a Hamamatsu silicon PIN photodiode and a Hamamatsu pre-amplifier. The positively charged radon's daughter particles (Po-214 and Po-218 mostly) produced in the air of the detector chamber are collected by the photodiode in a negative high voltage. The energy resolutions of alpha particles emitted from the decays of the daughter particles are measured to be better than 0.6% with very clean signals to be identified. We also have had about 3 months of data with the air sealed after closing the chamber. The half-lifetimes of Rn-222 from two daughter particles measured together with the background level of the chamber are going to be presented.

Summary

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