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Silicon PIN photodiode based radon detectors for an underground experiment environment.

It is very important to monitor the amount of radon (Rn-222) in the underground experiments such as rare decay search 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 upgraded a radon detector with a volume of ~70 L which was used in the KIMS (Korean Invisible Matter Search) experiment by replacing 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 be identified. In this presentation, We also made two more radon chamber detectors and have been testing them to be used in the underground experiment facility. We will present performances of the radon chamber detectors in the tests.

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