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T3.1-P07. Development of a Phoswich Detector for Radioxenon Field Measurements

Most radioxenon detector systems employed by the Comprehensive Nuclear-Test-Ban Treaty Organization are stationary by design, with heavy lead shields and delicate components that do not match the requirements of on-site inspections. We present in this paper a novel detector designed for field measurements, based on a simple phoswich geometry where beta and gamma scintillators are read out by a single photomultiplier and coincidences are detected by digital pulse shape analysis. Size, weight, and complexity have been reduced with only minor compromises in sensitivity. The overall weight is ~32 kg including the lead shield. Gain stabilization utilities have been integrated into photomultiplier base to compensate temperature drifts. Several options have been studied to mitigate the memory effect of Xe trapped in the beta scintillator, including use of crystal Stilbene for the Xe cell.

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