Evaluation of a ZnS:⁶LiF based scintillation neutron detector at high counting rates

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Introduction

ZnS scintillator loaded with ⁶Li neutron absorber is widely used as a sensitive medium in detectors for thermal neutrons. The long afterglow of the scintillator is regarded as a factor preventing operation of this kind of detectors at high counting rates [1,2]. Here we revisit this problem.

Detector

single detection element of a multipixel detector (imbedded WLS fibers; SiPM readout)

Measurements

S – Plexiglas sample, C_ref – fast reference detector (GS20 Li-glass, Δ = 160ns), C – detector under test, V-slit – slit at the end of the neutron guide to adjust the beam intensity at the sample

Conclusion

Operation of a ZnS:⁶LiF based thermal neutron detector at counting rates of several tens kHz with event losses ≤ 10% is proved. Such count rate capability substantially exceeds the previously reported values [2] and is comparable to that of ³He based detectors [1].

Reference: