Contribution ID: **71** Type: **Oral Presentation**

Thermal-neutron detection with GAGG:Ce

Tuesday, 16 April 2019 10:00 (15 minutes)

The focus on the scintillator Gd3Al2Ga3O12 (GAGG) has generally been on its exploitation for medical physics applications, predominantly positron emission tomography. GAGG has brightness comparable to other high-light yield scintillators at 40-55,000 ph/MeV (depending on the exact formulation), and with a density of 6.63g/cm3 coupled to an effective Z-number of 54 results in a scintillator with high stopping power and sensitivity to gamma rays. More importantly however, is the gadolinium content. The isotope Gd-157 has one of the highest thermal-neutron capture cross sections known at 250,000 barns, which means that even relatively small pieces of GAGG will retain an almost 100% efficiency for thermal-neutron detection. GAGG therefore has the potential as an extremely suitable material for compact neutron detection systems. In this work we present the findings of a NuSec PDRA grant and discuss the suitability of GAGG for neutron detection applications.

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Session Classification: Session 5: Imaging and Detection 1 (Session Chair Richard Hewitt)