Contribution ID: **446** Type: **Poster**

Novel imaging technique for thermal neutrons using a fast optical camera

Monday, 23 May 2022 15:43 (1 minute)

A novel imaging technique for thermal neutrons using a fast-optical camera is presented. Thermal neutrons are reacted with Lithium-6 to produce a pair of 2.73 MeV tritium and 2.05 MeV alpha particles, which in turn interact in a thin layer of LYSO crystal scintillator to produce a localized flash of light. These photons are directed by a pair of lenses to a micro-channel plate intensifier, the optical camera, TPX3CAM is connected to the intensifier output. The setup is shown in figure 1 (attached).
The results from the camera are reconstructed through a custom algorithm. Each reconstructed neutron event is made up of several sub-clusters, each cluster represents a group of photons, which were produced by the photon multiplier from a single photon input. A neutron hit is calculated to produce 3-6 photons at the intensifier input. The background of this experiment consists of low energy beta particles and x-rays, which produces single photons. Figure 2 (attached) shows 3 groups of photons, which are relatively close to each other both spatially and temporally, this event was is determined as the result of a neutron hit.
In conclusion, this new optical neutron imaging technique allows remote and long-distance detection from the radiation source also magnifies the field of view of a detector by using an appropriate set of focusing lenses.

Collaboration

Primary authors: Dr ROBERTS, Adam (University of Liverpool); Prof. NOMEROTSKI, Andrei (Brookhaven National Laboratory); Prof. DA VIA, Cinzia (University of Manchester and Stony Brook University); Dr D'AMEN, Gabriele (Brookhaven National Laboratory); Dr SVIHRA, Peter (University of Manchester); Dr BURDIN, Sergey (University of Liverpool); GAO, Tianqi (University of Manchester)

Presenter: GAO, Tianqi (University of Manchester)

Session Classification: Photo Detectors and Particle ID - Poster session