

Performance study of GAGG:Ce crystal

Tuesday, 26 November 2019 14:00 (20 minutes)

Inorganic scintillators with high density and high light output are widely used for the detection of ionizing radiation in high energy physics, space exploration, modern medical imaging and industry. Recently developed cerium-doped $\text{Gd}_3\text{Al}_2\text{Ga}_3\text{O}_{12}$ (GAGG:Ce) crystal is a promising scintillator with high density, high light yield, fast scintillation decay time and non-hygroscopicity used for calorimetry. In addition, the presence of Gd isotopes with a very high thermal neutron capture cross section makes the GAGG:Ce crystal efficiently sensitive for neutron detection. In this paper, performance of gamma and neutron detection based on GAGG:Ce scintillator has been studied. Emission spectra and decay time of different GAGG:Ce samples are studied. Energy resolution and linearity of GAGG:Ce crystals coupled with PMT and different SiPMs are compared. The excellent energy resolution of 3.4% at 662 keV measured with Hamamatsu S12571-6075CS SiPM is obtained. Besides the continuum gamma rays, Gd isotopes also produce low energy conversion electrons and X-rays at 34 and 74 keV. Thanks to very high light yield, the photopeaks due to these low energy radiations are successfully observed and can be used as n/gamma discrimination. In future, the time information of GAGG:Ce will be studied to do particle identification.

Primary author: WANG, Zhigang (Chinese Academy of Sciences (CN))

Co-authors: Dr ZHU, Yao; QIAN, Sen (Institute of High Energy Physics, CAS); CHEN, Pengyu; GUO, Hao; Dr MA, Lishuang

Presenter: WANG, Zhigang (Chinese Academy of Sciences (CN))

Session Classification: Sensors