

Perspectives of inorganic scintillator GAGG application for precision electromagnetic calorimetry

Tuesday, 12 July 2022 11:20 (20 minutes)

Scintillation crystals made of a new promising material $Gd_3Al_2Ga_3O_{12}$ (GAGG) are considered because of their high radiation resistance, density and light yield [1, 2]. These crystals can be used in addition to lead tungstate (PbWO₄) crystals for development of a new generation electromagnetic calorimeter with good spatial and energy resolutions in a wide energy range. PbWO₄ crystals enable accurate detection of high energy photons, while the addition of GAGG crystals makes it possible to precisely measure photon energies down to a few MeV.

Different options of composite electromagnetic calorimeter based on PWO and GAGG crystals are considered to optimise spatial and energy resolutions in a wide energy range (from 1 MeV to 100 GeV). Optimisation is based on GEANT4 simulations with accounting of light collection using different photodetectors and a noise of electronics. The simulations are verified using measurements of GAGG samples obtained with radioactive sources and test beam measurements of PbWO₄ based Photon Spectrometer of the ALICE experiment at CERN [3].

1. K. Kamada, T. Yanagida [et al.], IEEE trans. on nuclear science 59(5):2112-2115 (2012)
2. Y. Zhu, S.Qian [et al.], Optical Materials 105, 109964 (2020)
3. D.V. Aleksandrov [et al.], Nucl. Instrum. Meth. A550, 169–184 (2005)

The speaker is a student or young scientist

Yes

Section

1. Applications of nuclear methods in science and technology

Primary authors: Mr AVERYANOV, Dmitry (NRC "Kurchatov Institute"); BLAU, Dmitry (NRC "Kurchatov Institute")

Presenter: Mr AVERYANOV, Dmitry (NRC "Kurchatov Institute")

Session Classification: Applications of nuclear methods in science and technology