THE LYSO:Ce CRYSTALS OF SICCAS, SAINT-GOBAIN AND ZECOTEK COMPARISON

Artikov A.M.[1], Baranov V.Yu.[1], Budagov J.A.[1], Cordelli M.[2], Corradi G.[2], Dane E.[2], Davydov Yu.I.[1], Glagolev V.V.[1], Giovannella S.[2], Happacher F.[2], Martini M.[2], Miscetti S.[2], Saputi A.[2], Sarra I.[2], Simonenko A.V.[1], Shalyugin A.N.[1], Tereschenko V.V.[1], Usubov Z.U.[1]

[1] *Joint Institute for Nuclear Research, Dubna, Russia,*
[2] *Laboratori Nazionali di Frascati, INFN, Frascati, Italy,*
davydov@jinr.ru

The Mu2e experiment at Fermilab aims to search for the neutrinoless coherent conversion of a negative muon into electron in the Coulomb field of a nucleus. The Mu2e detector apparatus consists of a magnetic spectrometer for measurement of the electrons momentum, and an electromagnetic calorimeter (EMC) which provides an independent measurement of the electron energy, timing and position.

Calorimeter comprises about of 2000 individual crystals. Different crystal types are considered and tested before the final choice of crystals will be made. One of candidates to use in the Mu2e EMC was crystal Cerium-doped Lutetium Yttrium Oxyorthosilicate (LYSO:Ce). In this paper we present results of comparison of LYSO crystals from three vendors – Saint-Gobain, SICCAS and Zecotek (LFS, Lutetium Fine Silicate). Energy resolution, light output, longitudinal response uniformity, attenuation length of the three crystals were compared. The crystals have been irradiated by ^{22}Na, ^{60}Co, ^{137}Cs gamma sources covering 511–2500 keV energy range. The best parameters were demonstrated by the Saint-Gobain sample. In particular, it showed energy resolution $\sigma/E=2.5\%$ at E = 2500 keV.