



Contribution ID: 189

Type: Oral presentation

#09-189 Characterization of lead tungstate crystals for the ClearMind Project

Friday, June 25, 2021 2:40 PM (20 minutes)

ClearMind project aims to develop a fast detection module for TOF-PET.

We propose a position-sensitive detector consisting of a monolithic PbWO_4 scintillating crystal on which is directly deposited a bialkali photoelectric layer. This detector optimizes the transmission of light photons to the photoelectric layer. Photons are generated by two processes: the Cherenkov effect and the scintillation. To fully exploit the potential of this detector, we need to characterize crystal properties such as the scintillation yield and the different time constants. According to the literature, the time dependence of the scintillating process can be modeled by a multi-exponential decay function; each of the exponential components are related to a different luminescent center. The scintillation of PbWO_4 presents two main scintillation time constants, a fast one about 2 ns and a slow one about 6-10 ns.

We studied the scintillation light yield and time constants as a function of the crystal temperature for four different PbWO_4 crystals, provided by three different producers: CRYTUR (CMS doping), EPIC (undoped) and SICCAS (CMS doping, Y-doping).

All crystals show a 4-fold increase in the scintillation light yield when cooled to -25°C . EPIC undoped crystal shows the highest yield. The time constants are similar to the different technologies and we observe that scintillation is slowing down when the crystal is cooled. This trend is more marked on the slow time constant.

Primary authors: FOLLIN, Megane (CEA/ IRFU); Dr YVON, Dominique (CEA/IRFU)

Presenter: FOLLIN, Megane (CEA/ IRFU)

Session Classification: 09 Environmental and Medical Sciences

Track Classification: 09 Environmental and Medical Sciences