Simulation of the energy response function of BGO and Gd2O2S scintillators for flash radiography applications

Olivier Delattre[1], Alexandre Friou[1]

[1]*CEA DAM, Bruyères-le-Châtel, France*
Corresponding Author Email: olivier.delattre@cea.fr

The EPURE experimental platform is an installation operated jointly by Great Britain and France in order to perform hydrodynamic experiments [1]. Radiographs can be acquired on 3 different axes with a CCD camera placed behind scintillators. The images acquired this way are deteriorated by stray-dose induced scattering and saturated CCD pixels (due to the interaction of gamma rays with the CCD). In order to alleviate these issues, the performance of the scintillators must be optimized. In this preliminary study, the energy response functions 400 µm thick BGO and Gd2O2S:Tb scintillators were obtained through Monte Carlo simulations for an energy range of 0 to 19 MeV. The same simulations were then performed with the addition of a 100 to 1000 µm copper and a 100 to 1000 µm tantalum layer in order to determine the most optimal buildup layer in terms of material and thickness. We then discuss the results. In the future, the same approach could be applied to more innovative materials and the result of the simulations could be compared with experimental data.

1. C. M. Alvinerie, R. Delaunay, R. Maisonny, “Investigating the Electron Beam Transport in a Linear Induction Accelerator for X-Ray Flash Radiography,” IEEE International Conference on Plasma Science (ICOPS), 1 (2022).