Contribution ID: **55** Type: **poster**

Simulations of charge collection of a gallium-nitride-based pin thin-film neutron detector

Wednesday, September 15, 2021 12:51 PM (1 minute)

The development of new fast neutron reactors and nuclear fusion reactors requires new neutron detectors in extreme environments. Due to its wide bandgap (3.4 eV) and radiation resistance capability, gallium nitride (GaN) is a candidate for neutron detection in extreme environments. In this study, a GaN-based pin thin-film thermal neutron detector with lithium fluoride (LiF) converter layer is modelled by Geant4. After obtaining the neutron energy deposition distribution in the sensitive volume of the detector, the Hecht equation is used to calculate the charge collection efficiency at different position of the detector under a uniform electric field. In addition, considering charge recombination processes, the Shockley-Ramo theorem is applied to obtain more accurate simulation results. The result of the charge collection simulations is used to study its influence on the californium-252 (^{252}Cf) energy spectrum measurement of the detector.

Institute

Lancaster University

Your name

Zhongming Zhang

email

z.zhang56@lancaster.ac.uk

Title

Mr

Nationality

Primary authors: ZHANG, Zhongming (Lancaster University); Dr ASPINALL, Michael (Lancaster University)

Presenter: ZHANG, Zhongming (Lancaster University)

Session Classification: Poster Session 2 (X-ray and Gamma Ray Detectors; Applications in Nuclear Physics and Nuclear Industry; Detectors for FELS, Synchrotrons and Other Advanced Light Sources; Detectors for Neutron Facilities; Novel Ionising Radiation Detection Systems)

Track Classification: Applications in Nuclear Physics and Nuclear Industry