Contribution ID: 39

Type: Parallel oral presentation

Performance and Geant4 simulation of particle detection with low-cost CMOS technology

Monday 14 November 2022 15:15 (15 minutes)

Low-cost imaging technology is widely used for particle detection. In this work, we test the performance of an Omnivision 5 Mp CMOS sensor for measuring radioactive sources (Sr90 and Cs137). Our experimental setup includes a light-tight box, a lift table and a Raspberry Pi 3 for data taking using fixed camera settings. To reduce the background we apply a correlated double sampling method for the fixed pattern and 3 sigma threshold in ADC. We developed a detailed Geant4 simulation of the sensor and the radioactive sources given their activities. The matrix of deposited energy in the sensor's pixels is converted into 10-bit ADC values via an electron-hole transformation. In addition, we include the crosstalk caused by inter-pixel capacitance with a two-dimensional symmetry model. Using the OpenCV libraries, clusters, representing particle tracks, are searched for in all images. For each cluster we get its size, mean, maximum and total ADC signal. We find a good agreement between measured data and simulations for these parameters and their correlations, and for the fluxes at different distances. However, it is not possible to distinguish between radioactive sources using this method.

Poster fallback option for rejected abstracts for parallel oral presentations

No

Authors: Mr BONNETT, Miguel (Pontificia Universidad Catolica del Peru); Mr HELACONDE, Rodrigo (Pontificia Universidad Catolica del Peru); Mr SONCCO, Carlos (Pontificia Universidad Catolica del Peru); Prof. BAZO, Jose (Pontificia Universidad Catolica del Peru (PE)); Prof. GAGO, Alberto (Pontificia Universidad Catolica del Peru); BAZO, José

Presenter: BAZO, José

Session Classification: Parallel session B

Track Classification: New frontiers and computing in fundamental physics