Contribution ID: **46** Type: **poster contribution**

Research on SiPM-based detector for gamma ray detection

Saturday, 25 August 2018 16:45 (10 minutes)

Nuclear medicine is an important application of nuclear physics in the field of medicine. As the primary means of nuclear medicine, Positron Emission Tomography (PET) and Gamma Camera are the most effective methods for early diagnosis of tumors by detecting and imaging the gamma rays produced by radioactive tracers. In this work, the characteristics of pixel silicon photomultiplier (SiPM) and the spatial resolution, energy resolution and time resolution of SiPM-based detector module were studied. On this basis, a large area double-plane detector were designed for early diagnosis of breast tumors with both PET and gamma camera imaging capability. The detector consists of pixelated LYSO scintillators and SiPM arrays with an effective detection area of 168.6×202.4 mm2, which could achieve the image of a single breast rapidly. Self-designed front-end electronics are used to simplify the readout circuit and retain good detector performances. Test results show that the detector have a good spatial resolution superior to 2mm, a 1.32ns coincidence time resolution and energy resolutions of 11.39%@511keV and 20.37%@141keV respectively. It suggests that the detector is promising to be applied in the dual modality system. In addition, the optimal performance of SiPM arrays under the discrete readout circuits is further studied by using application specific integrated circuit (ASIC) to enhance resolutions of the detector. In this case, the optimal coincidence time resolution is up to 417ps and the average energy resolution is increased to 9.7% @511keV, 20.6% @ 122keV respectively.

Primary author: Mr LU, Zhenrui (Institute of High Energy Physics, Chinese Academy of Sciences)

Co-author: Prof. HUANG, Xianchao (Institute of High Energy Physics, Chinese Academy of Sciences)

Presenter: Mr LU, Zhenrui (Institute of High Energy Physics, Chinese Academy of Sciences)

Session Classification: YSS