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Design and DAQ development of a scaleable flat-panel PET system for In-room detection in proton therapy.

Proton therapy achieves a precise cancer treatment due to a localized dose deposition. However there are several sources of range uncertainties that pose a risk to the vital organs in the vicinity of the Bragg peak, thus limiting the scope of the proton therapy. Range verification through secondary particle detection can help us overcome this problem. Our group has developed a scaleable flat panel detector design for an in-beam PET system that can be reconfigured in different geometries for use in treatment or diagnostic PET. The multi-channel readout system is based on the 64 channel STiC3 asic (University of Heidelberg). Each unit of our scaleable design is a palm sized PET module of 10cmx5cm comprising 512 channels of 3mmx3mmx20mm LYSO crystals coupled to 3mmx3mm SiPMs with each channel individually read out by the asic to receive the time and energy information. The current design works for the beam-off measurement and will be upgraded for a beam-on measurement in future. A 16vs16 channel system based on an evaluation system was used to detect the positron emitter distribution created by irradiating 130MeV protons on a PMMA phantom at the proton center in Chang-Gung Memorial hospital. The measured distribution of the coincidences agrees to within 1 mm of the simulated values at the entrance, the peak and the 50% fall off positions. The dedicated readout and the DAQ system developed in our group is currently being tested. The design challenges and the results will be discussed in this talk.

Minioral

No

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No

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No

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