Abstract Submitted
for the BPNMC18 Meeting of
The American Physical Society

Strontium-iodide (SrI2(Eu2+)) scintillator detector crystals in dual energy x-ray absorptiometry (DEXA) for bone densitometry imaging.[1] KRICIA RUANO ESPINOZA, ARNOLD BURGER, LIVIU MATEI, Fisk University — Dual-energy x-ray absorptiometry (DEXA) is a biomedical imaging tool designed to measure soft tissue and bone mineral in patients. The system is comprised of an x-ray source used to radiate over the area of interest, and a scintillator detector that measures the attenuated ray path in the patient at two different energy magnitudes. The low-dose x-rays facilitate the measurement of body composition: one mainly absorbed by bone, and the other by soft tissue. Scintillators are crystals that exhibit luminescence when struck by incoming light, and as a result can be used as radiation sensors in DEXA imaging systems. While there exists a myriad of crystals for use as scintillators, europium-doped strontium-iodide (SrI2(Eu2+)) are one of the most promising, low-cost, high-resolution (ΔE= 3.0 %), high light-yield (120,000 photons/MeV), and high effective atomic number (Z= 48) materials. SrI2(Eu2+) is coupled with a pixelated silicon photomultiplier (SiPM) array photosensor, that which generates an electrical signal proportional to the magnitude of the incoming attenuated radiation. A 2D-array can resolve the signals spatially and generate a "pixel representation" image of the reference anatomy observed. A limited pixel array system can be used to generate an image of a complex mixture bone sample to prove the concept of operation, and warrant large-scale implementation with multi-pixel detectors for human-scale bone densitometry scanning.

[1]NSF CREST Program HRD-1547757

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Date submitted: 17 Oct 2018 Electronic form version 1.4