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Si3: Simulation-Driven Design of a Next-Generation Semiconductor Detector for PET and SPECT Imaging

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The Si3 project aims at the development of a novel radiation detector for medical imaging applications such as Positron Emission Tomography (PET) and Single Photon Emission Computed Tomography (SPECT). The aim is to significantly enhance detector efficiency as well as improve resolution compared to current state-of-the-art.

The detector consists of compact, modular layers of semiconductor sensors with monolithic pixels. Unlike conventional SPECT systems, it operates without a collimator and unlike standard PET systems, it does not rely solely on fully absorbed photon events. Instead, it is designed to collect all interactions within the detector volume and reconstruct the causality of each interaction sequence in order to reconstruct the incident direction of the incoming photon.

This contribution presents an overview of the Si3 project along with some of the latest results and characterizations enabled by Allpix-Squared. Simulations within the Allpix-Squared framework are being used to investigate requirements and assess the best trade offs in terms of detector spatial resolution, time coincident events, charge collection time and more.

Finally, some remarks will be made concerning the next steps of the simulation set-up and the improvements needed to fully simulate the whole detector set-up.

Will the talk be given in person or remotely?

Remotely

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