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## Evaluation of Compton recoil electron tracking capability of fine-pitch pixel silicon detector with a Monte Carlo simulation

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Compton imaging can visualize a radioactive source visualization without any mechanical collimators based on the Compton scattering kinematics. The conventional imaging method confines the source location only on a conical surface with a calculated scattered angle from the energy depositions and interaction positions in a scatterer and an absorber. However, Compton cones causes an artifact in a reconstructed image and decreases the signal-to-background ratio (SBR). The measurement of recoil electron tracks is a promising technique to overcome this limitation because the source position can be estimated from on a conical surface to an arc surface.

We have developed fine-pitch pixel silicon detectors for electron tracking Compton imaging, which generate triggers to readout only radiation hit pixels. One is a silicon-on-insulator (SOI) pixel detector with pixel size of 36  $\mu$ m  $\times$  36  $\mu$ m, and the other is a hybrid detector of pixel silicon sensor and pixel application specific integrated circuit (ASIC) with pixel size of 18  $\mu$ m  $\times$  18  $\mu$ m. In this study, we have evaluated the capability of recoil electron tracking measurement of these detectors with a Monte Carlo simulation using GEANT4 toolkits. We will report on the simulated performance of electron tracking Compton imaging with 18  $\mu$ m or 36  $\mu$ m pitch pixel silicon detectors, such as detection efficiency, SBR, accuracy of incident direction measurement, and so on.

## Your name

Mizuki Uenomachi

## Institute

Kyoto University

## **Email address**

uenomachi.mizuki.6a@kyoto-u.ac.jp

Author: UENOMACHI, Mizuki (Kyoto University)

Co-author: SHIMAZOE, Kenji (The University of Tokyo)

Presenter: UENOMACHI, Mizuki (Kyoto University)

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