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Flexible X-Ray Imaging Detectors Using Scintillating Fibers

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Some medical and industrial X-ray imaging applications need to reconstruct an image on a flexible surface, so they use photographic film rather than electronic detectors. Current flat-panel X-ray imaging detectors are difficult to adapt to these applications. We will present the FleX-RAY project, which aims to create an electronic X-ray detector with the flexibility of photographic film, suitable for a variety of applications.

FleX-RAY uses a sheet of flexible scintillating fibers to detect X-rays and guide the scintillation light to arrays of silicon photomultipliers. The detector also self-reports its curved shape using optical waveguides with Bragg gratings in a flexible glass substrate, which act as curvature sensors. Multiple reconstruction algorithms have been developed, suitable for different X-ray energies.

In this contribution, we present the advances in scintillating fibers, self-shape-reporting sensors, and image reconstruction algorithms made by the FleX-RAY collaboration. We will also present simulations of the expected detector performance and results of the initial tests on the FleX-RAY prototype.

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Primary author: WILBUR, Scott (University of Sheffield (GB))

Co-authors: COMANESCU, Brindus (Optoelectronica 2001 S.A.); ANASTOPOULOS, Christos (University of Sheffield (GB)); ASFIS, Giorgos (TWI Hellas); MAGUIRE, Helen Ruth (University of Sheffield (GB)); KOCH, Jannis (Fraunhofer HHI); SAOUCHA, Kamal (University of Sharjah); LOHWASSER, Kristin (University of Sheffield (GB)); LINDBLOM, Magnus (Research Institutes of Sweden); ANGELMAHR, Martin (Fraunhofer HHI); MARINOS, Nikolaos (TWI Hellos); PANAGOPOULOS, Nikos (TWI Hellas); MARGULIS, Walter (Research Institutes of Sweden)

Presenter: WILBUR, Scott (University of Sheffield (GB))

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