Contribution ID: **25** Type: **Presentation**

Overview of Silicon Carbide detector for synchrotron environments

Tuesday, 24 March 2026 14:55 (25 minutes)

Silicon carbide (SiC) sensors have been widely validated as compact, radiation-hard, and high-resolution X-ray beam diagnostics elements, able to perform in-line beam intensity and position monitoring with minimal perturbation of the photon beam.
The intrinsic properties of SiC as a wide-bandgap semiconductor, thermal and radiation resistant, with a silicon-like industrial maturity, make it particularly suitable for high-brilliance photon sources and harsh radiation environments.
This contribution provides an overview of different SiC-based detector concepts developed across a wide range of beamline conditions, from white-beam to monochromatic X-rays.

For high-power polychromatic beams, non-fully intercepting SiC sensors have been developed as white-beam monitors, capable of operating directly in the front-end sections of synchrotron beamlines. These devices typically feature a central aperture allowing the main photon beam to pass, while collecting a fraction of the radiation halo and higher-energy harmonics. The detection mechanism relies on internal photoemission at the semiconductor interface, providing signals significantly larger and more stable than conventional metal blade monitors. This approach enables robust beam intensity and position diagnostics upstream of monochromators, where radiation levels and spectral bandwidth would rapidly degrade conventional semiconductor detectors.

Among the most innovative monochromatic beams SiC detectors, resistive X-ray beam position monitors (rXBPMs) exploit lateral charge division on a resistive layer. Unlike conventional segmented XBPMs, whose response depends on the beam spot size and geometry, rXBPMs measure the beam centroid independently of the beam-spot size, enabling more robust and calibration-free position monitoring over a wide range of beam conditions.

Author: TROVATO, Gabriele (University of Catania)

Co-authors: Dr CAMARDA, Massimo (SenSiC GmbH); Mr LA ROSA, Niccolò (University of Catania); Dr MOSCATO, Samuele (University of Catania)

Presenter: TROVATO, Gabriele (University of Catania)

Session Classification: Session