

Hydrogenated Amorphous Silicon Pixel Detectors to Precisely Measure Ionizing Radiation

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Hydrogenated amorphous silicon (a-Si:H) particle detectors are highly regarded as alternatives to crystalline silicon detectors (c-Si) in high radiation environments, due to their exceptional radiation hardness. The INFN HASPIDE research program focuses on developing a-Si:H detectors designed for characterizing ionizing radiation beams. Integrating hydrogen into amorphous silicon plays a crucial role in reducing dangling bonds, thereby enhancing the charge collection efficiency of these devices. These detectors are made of thin layers of a-Si, just a few micrometers thick, deposited on various substrates, including flexible materials. The presentation will delve into the fabrication processes of a-Si devices, the characterization methods employed, and the preliminary results achieved in measuring ionizing radiation. The findings demonstrate high sensitivity levels and linearity in response to beam flux, comparable to those of diamond detectors, with very low variability observed across production batches.

References:

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- Passeri D. et al: TCAD modelling of a-Si:H devices for particle detection applications. Material Science in Semiconductor Processing 169 107870 (2024)
- Large M. J. et al: Characterization of a flexible a-Si:H detector for in vivo dosimetry in therapeutic x-ray beams. Medical Physics 51 4489-4503 (2024).

Type of presentation (in-person/online)

online presentation (zoom)

Type of presentation (scientific results or project proposal)

Presentation on scientific results

Primary authors: Dr KANXHERI, Keida (INFN - National Institute for Nuclear Physics); SERVOLI, Leonello (Universita e INFN, Perugia (IT)); MENICHELLI, Mauro (Universita e INFN, Perugia (IT))

Presenter: SERVOLI, Leonello (Universita e INFN, Perugia (IT))

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