Contribution ID: **44** Type: **Oral**

The Silicon Electron Multiplier

Thursday, 16 March 2023 14:25 (20 minutes)

Silicon sensors for the future generation of collider physics experiments will require high performances on spatial (< 10 μm) and time resolution (20-50 ps) with a radiation tolerance up to fluences of $10^{17} n_{eq}$. To meet these challenges, a new silicon sensor architecture has been proposed, enabling internal gain without relying on doping, the Silicon Electron Multiplier (SiEM). The SiEM incorporates a set of metallic electrodes within the silicon substrate which are used to create a high electric field region that provides charge multiplication. Simulations of SiEM configurations with TCAD and Garfield++ show a promising performance with a gain exceeding 10. Metal assisted chemical etching is a process shown to be compatible with the desired geometry, and is used to make a demonstrator. Results from a production comprising pillars with a radius of 500nm and a height of up to 8 μm on a hexagonal grid with a 1.5μm pitch will be presented along with key results from the simulations.

Primary author: HALVORSEN, Marius (CERN)

Co-authors: COCO, Victor (CERN); ROMANO, Lucia (ETH Zürich, Paul Scherrer Institute); GKOUGKOUSIS, Evangelos Leonidas (CERN)

Presenter: HALVORSEN, Marius (CERN)

Session Classification: Tracking

Track Classification: Tracking