



Contribution ID: 25

Type: **Invited**

The power of gaining and sharing: introducing internal gain and built-in charge sharing in silicon sensors

Monday, 13 March 2023 13:50 (30 minutes)

In this contribution, I will review the performance improvements that two design innovations, low-gain (LGAD) and resistive read-out (RSD), have brought to silicon sensors. Large signals lead to improved temporal precision, while charge sharing has removed the need for very small pixels to achieve excellent spatial precision. LGAD- and RSD- based silicon sensors are now adopted, or considered, in several future experiments and are the basis for almost every next 4D-trackers. Finally, I will show how the introduction of multiple sampling front-end electronics and reconstruction methods based on machine learning can further improve the performances of future 4D trackers.

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Session Classification: Tracking

Track Classification: Tracking