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## DC resistive read-out silicon sensors for future 4D tracking: recent advancements and first prototypes characterization.

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Recent advancements in silicon sensor technology have paved the way for the development of high-resolution 4D-tracking detectors capable of simultaneously measuring the position and time of passage of charged particles within a single sensitive device. A key approach is the use of resistive read-out in thin Low Gain Avalanche Diode (LGAD) sensors, which introduces combined intrinsic signal sharing and internal gain within a single detector element.

This contribution focuses on the developments of a thin LGAD with a resistive DC-coupled read-out (DC-coupled Resistive Silicon Detector - DC-RSD).

The aim of the DC-RSD sensors is to achieve a spatial resolution of a few micrometers and an excellent time resolution of approximately 30 ps, using relatively large pixels (150-200 micrometers), which enables detectors with low channel density and low power consumption.

This contribution describes the development path and the design strategy of the first DC-RSD production, presently in progress at Fondazione Bruno Kessler. The strategy includes signal containment within a pre-determined number of electrodes, using isolating trenches (TI technology). Several test structures and application-oriented devices have been implemented in the wafer layout.

This first, proof-of-concept, prototype run will enable detailed studies of the charge sharing and charge containment mechanism in a large phase-space of all key parameters.

The production will be completed in September 2024.

Preliminary results from static characterization performed in the laboratory will be presented, along with initial studies of signal propagation and signal sharing properties, performed employing a Transient Current Technique laser setup.

The characterization of this first prototype production will provide us with immediate feedback on the soundness of the DC-RSD concepts.

**Auteurs principaux:** ARCIDIACONO, Roberta (Università del Piemonte Orientale e INFN Torino (IT)); AL., et

**Orateur:** ARCIDIACONO, Roberta (Università del Piemonte Orientale e INFN Torino (IT))

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