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Development of Ultra Fast Silicon Detector for 4D tracking

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In this contribution I will review the progress towards the development of a new type of silicon detectors suited for picosecond tracking, the so called Ultra-Fast Silicon Detectors, designed to obtained concurrent precisions of ˜ 10 picoseconds and ˜ 30 microns with a 50 micron thick sensor.
UFSD are based on the concept of Low-Gain Avalanche Detectors, which are silicon detectors with an internal multiplication mechanism so that they exhibit a signal which is a factor of ˜ 10 larger than standard silicon detectors. This increased signal makes LGAD ideal for many applications, ranging from experiments requiring very low material budgets, to very high radiation environment, to applications that need very precise timing. The basic design of UFSD consists of a thin silicon sensor with moderate internal gain and pixelated electrodes coupled to full custom VLSI chips. An ultra-fast thin silicon sensor represents a new frontier in silicon sensor design and the development of a thin sensor combined with charge multiplication presents a major challenge. UFSD detectors are now considered in the proposal of the CT-PPS for the forward CMS tracker and for the upgrade of the ATLAS forward calorimeter.
I will report on first sensor measurements, the plan for future productions and the initial progress towards the development of the read-out electronics.

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