Fastissimo

..or *the ultimate layout design for ultra-high speed radiation sensors*

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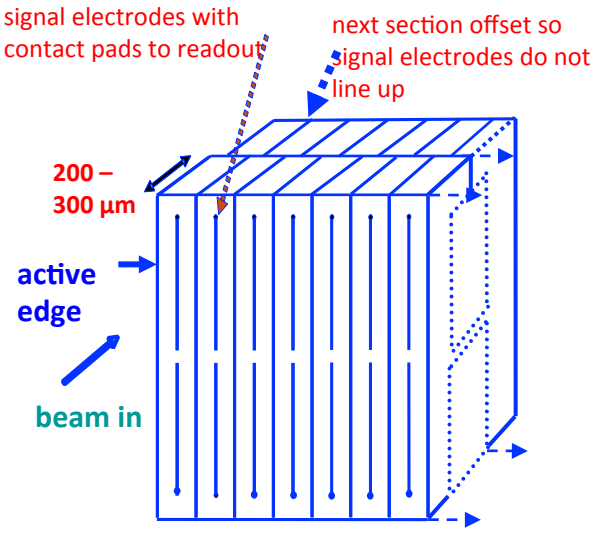
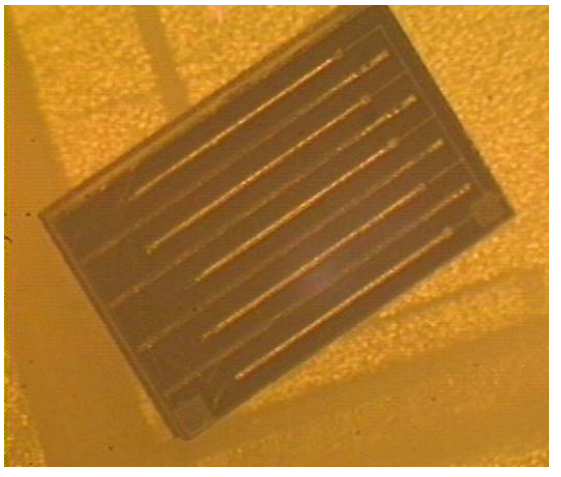
Introduction

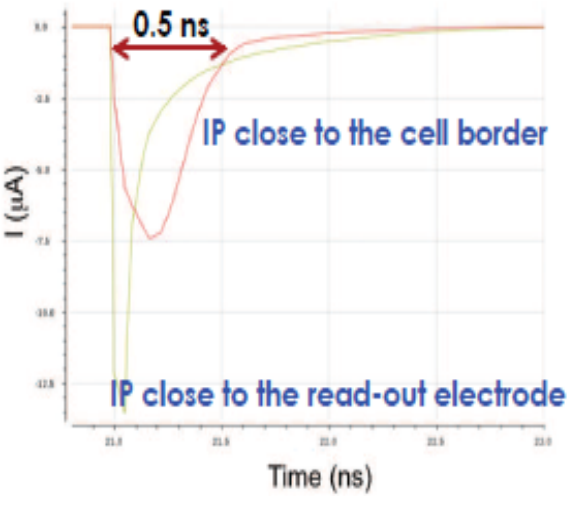
There is a need for sub-p-second imaging systems with aggressive spatial resolutions for applications in vertex reconstruction at high energy physics colliders, high intensity synchrotron sources and in-vivo dosimetry and particle beam monitoring during radio therapy cancer treatments.

The idea

The idea is to use silicon micro-machining to “tailor” the geometry of silicon sensors so the generated electrons-holes will get the fastest way to get towards the collecting electrodes. The secret for this is to have the strongest and most homogeneous and focused electric field throughout the sensor volume. This is achieved bringing the electrodes inside the detector’s bulk. Furthermore the right geometry would make a silicon imager very radiation hard which will guarantee the right signal for timing purposes.







Potential Impact

The potential impact is new physics discoveries with better vertex detection , better detectors for in-vivo dosimetry and particle beam monitoring during cancer therapy and better material analysis or protein crystallography at high intensity light sources.