

# Silicon Sensor Development for the CMS Upgrade

## Requirements for future CMS Tracker Silicon Sensors

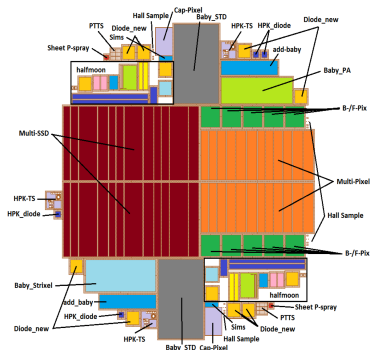
### The High Luminosity LHC (HL-LHC) will feature

- a tenfold increase in luminosity
- a much higher radiation field for the inner tracker layers
- dramatically increased track density

### future Silicon Sensors will require

- increased radiation hardness
- high granularity and spatial resolution
- reduced material budget

CMS ordered 6" Wafers at Hamamatsu Photonics (HPK) to investigate technologies and materials for future Si sensors



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## HPK Campaign

### R&D Effort is put into

- Si Substrates
  - ▶ rad. hard material
  - ▶ different doping schemes
  - ▶ different insulation schemes
- design, layout, geometry
  - ▶ strips, long pixels, strixels, pixels
  - ▶ physical and active-volume thickness
- module design
  - ▶ on-chip readout, 2<sup>nd</sup> metal layer signal routing

The campaign includes irradiations with protons, neutrons and mixed irradiation

- electrical tests to investigate material properties and process quality
- measurements to determine **operating parameters** on sensors
- charge collection efficiency (CCE) & TCT measurements
- source and beamtests

First results and an overview of the Campaign are presented on the poster.

