New Structures

New structures based on silicon substrates are, possibly together with materials other than silicon, the most promising options to extend radiation tolerance to the region of 7-8×10^{17} n_{eq}/cm^2.

- Milestones [2018-2022]
  - WP3.1 3D sensors [6 MS]
  - WP 3.2 LGAD [4 MS]
  - WP 3.3 CMOS [6 MS]
  - WP 3.4 New Materials [5 MS]

New Structures

Upcoming milestones

- WP 3.1. 3D detectors
  - M1: full radiation tolerance study of 3D pixels connected to the RD53A chip (Q3/2019).
  - M2: radiation tolerance studies of 25x250 µm2 pixel cell design and feasibility (yield) studies for the 25x100 µm2 pixel cell layout (Q4/2019).
  - M3: final radiation tolerance study of 3D pixels connected to the RD53B chip (Q4/2020)
  - M4: Understanding the limit of the radiation hardness of the 3D geometry up to $1017 n_{eq}/cm^2$ (Q2/2021)
  - M5: Evaluation of the time performances of new 3D geometries (Q3/2020).
  - M6: Design and simulation of new 3D detectors geometries for operation at $8x10^{17} n_{eq}/cm^2$ (Q4/2022).
- WP 3.2. Sensors with intrinsic gain
  - M1: Understand the effect of Carbon and Gallium on gain after irradiation (Q1/2019)
  - M2: Model the acceptor removal effect after irradiation (Q3/2019)
  - M3: Produce new LGAD design to increase the fill factor (Q2/2020)
  - M4: Design and simulate new LGAD geometries for operation at $1\times10^{17} n_{eq}/cm^2$ (Q4/2022)

New Structures

- WP 3.3. CMOS and monolithic devices
  - M1: Characterization of the diodes and readout electronics of unirradiated and irradiated RD50-MPW1 samples (Q4/2018).
  - M2: Design and submission for fabrication of RD50-ENGRUN1 (Q4/2018).
  - M3: Characterization of unirradiated and irradiated RD50-ENGRUN1 samples (Q3/2019, Q3/2020).
  - M4: Characterization of irradiated backside biased RD50-ENGRUN1 samples for operation beyond 1016 neq/cm2 (Q4/2020).
  - M5: Studies of stitching process options (Q4/2021).
  - M6: Characterization of unirradiated and irradiated stitched samples (Q4/2022).
- WP 3.2. New Materials
  - M1: Fabricate new radiation detectors in different Wide Band Gap (WBG) high quality materials (Q4/2019).
  - M2: Study the radiation hardness of detectors based on WBG materials (Q2/2020).
  - M3: Understand the feasibility of large areas detectors based on WBG materials (Q2/2021)
  - M4: Investigate the fabrication of radiation detectors based on 2D materials (Q3/2021).
  - M5: Explore operations at 8×1017 neq/cm2 (Q4/2022) using innovative materials.