LGAD Discussion session

WP 3.2. SENSORS WITH INTRINSIC GAIN

M1: Understand the effect of Carbon and Gallium on gain after irradiation (Q1/2019)

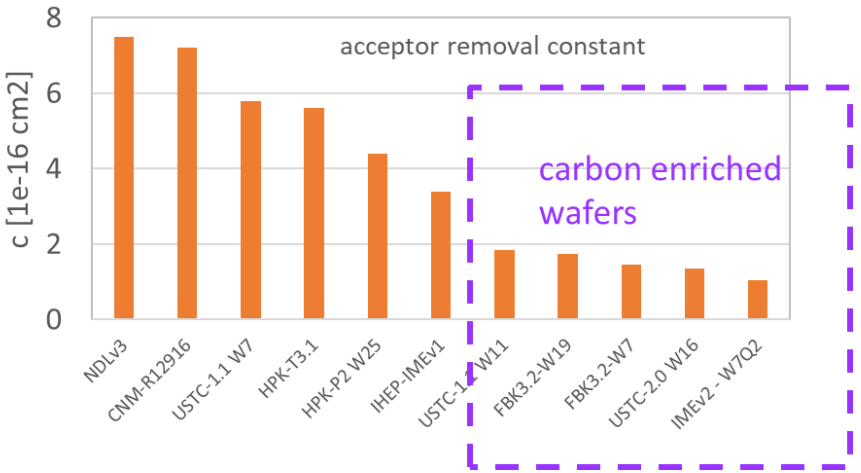
M2: Model the acceptor removal effect after irradiation (Q3/2019)

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)

LGADs – points for discussion

- SEB observed in particle beams
  - It driven by the average electric field in the device – safe <11 V/mm, danger >12 V/mm
  - Limits the operation voltage range and ability for compensation of radiation damage
  - Can we increase it by the device design?
    - Quenching resistors?
- Improvement of radiation hardness
  - C enrichment mastered to the level that sensors can survive 2.5e15 cm-2 (HL-LHC) timing was mastered by FBK/IME (IHEP,USTC). Very good results and promising performance in the TB recently.
  - Can we invent some other impurity that would reduce the removal constant even further?
  - Replace the B with something else?
  - Understanding the acceptor removal on microscopic level:
    - BiOi
    - g_{Bi}-g_{BiOi}= ?
- Improvement of inter-pad distance
  - TI-LGADSs
  - iLGADs ?
- Detection of non-mip particles?



LGADs – points for discussion

- AC-LGAD :
  - Lots of activities – investigation for 4D in less busy environments
  - Test beam with BNL AC-LGAD
  - ALTIROC readout
  - Deep junction-LGADs
- Extreme fluences