CMOS-LGAD

Plans before/during/after TB summer 2024

Lab - characterisation

- Passive structures tests with probe station (A2 and A1)
  - C(V) and I(V) to be checked with Trento measurements
- Bonding of MadPix of 4 TestBoards (4 central pixels):
  1. 3 with gain
  2. 1 No Gain -> Now in Bologna
- MadPix tests flow:
  1. Bonding of A2
  2. I(V) curves with no resistor for TP
  3. Bonding of A1
  4. I(V) curves with no resistor for TP
  5. Mounting of TP resistor
  6. Test of the electronics
  7. Sr90/laser analysis of the most central pixel

Operating conditions

- Itop(Vback)
  - Vback min at which Itop reaches the minimum -> V depletion
- Iback(Vback)
  - Vback max at which Itop grows exponentially -> V punch-through

Measured at a starting Vtop given by the passive structures (Vtop>20)

From Vback found in the previous range:

- Itop(Vtop)
  - Start point of gain

➢ With laser measurements -> Depletion and Gain

TB June-July 24

- Acquisition with oscilloscope
  - Test of the **4** boards
  - **2/1** matrices per board
  - 3 most central pixels + LGAD
  - HV scan -> **3** voltages at minimum, 1 near breakdown
- Acquisition with Liroc+picoTDC
  - 1 board
  - 1 matrix
  - 4 pixels + LGAD
  - HV scan -> **2** voltages
  - Threshold scan -> **3** Values

6 days

24 runs, 5 hours per run,
4 long alignments (2h),
4 short alignments (1h)

2 days

6 runs, 5 hours per run

Bonus

LVDS 1.2 to LVDS 0.9

- Acquisition with Accrocchio+picoTDC
  - 1 board
  - 1 matrix
  - 4 pixels + LGAD
  - HV scan -> 1 voltages
  - Threshold scan -> **3** Values

1 day

3 runs, 5 hours per run

- During the CMOS-LGAD acquisition, 2 out of 4 planes are used
- SiPM test is possible on picoTDC (LGAD + SiPM or SiPM+SiPM)
- Need of an external trigger for PicoTDC

After TB June-July 24

- Jitter of MadPix with laser

Conclusions

- Fast test campaign -> working point of the sensor
- Test Beam -> 8/9 days are needed with two plane of the telescope
- Missing measurements with laser

TO DO

- Accrocchio
- Fast analysis framework for almost real time timing resolution with oscilloscope