



A. Bergamaschi , M.Carulla, S.Finizio, J.Zhang:: Paul Scherrer Institut

Test of TI-LGAD and iLGAD for single photon per bunch resolution for energies lower than 1 keV



Goal: Single photon resolution for each bunch for energies between 500-1000 eV with collection times shorter than 2ns, in order to avoid pile-up from photons from different bunches (e- bunch injection rate 500 MHz).

<u>SLS electron bunch filling pattern:</u> Hybrid-mode filling pattern Short: 390 filled bunches out of 480 bunches, with camshaft at bunch 465

Setup:

Pin hole ϕ = 50 µm Current amplifier 60dB

<u>TI-LGAD:</u>

Sensor 2.3, just pixel 1 measured ⁴ Bias voltage fixed to 320V. Not possible⁵





Pollux beamtime

<u>TI-LGAD (50 μm thin sensor):</u>

- Single bunch resolution down to 500eV (but the high harmonics were not suppressed). We couldn't measure It for lower energies due to the small opening on the metallization.
- Collection time ~ 500 ps.

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Since we have two iLGAD with TEW from W14 already mounted, we also tested the one with higher gain ~ 4.66 at 300V for 1keV photons.



Pollux beamtime

iLGAD with TEW(300 µm thin sensor):

- It was possible to see the camshaft bunch in the bucket bunch down to 300 eV.
- Collection time ~ 7 ns
- Gain @ 300V for 1keV photons -> 4.66 (measured at SIM beamline)



Keysight Infinitum : Nonday, April 4, 2022 3:14:41 Pl