

January 19, 2021

Summary of activities and open questions.

Lorenzo, Eugenio, Olek, Seba ...

Auguri Seba!



Scusa per le foto orribili.....



Maestro di:

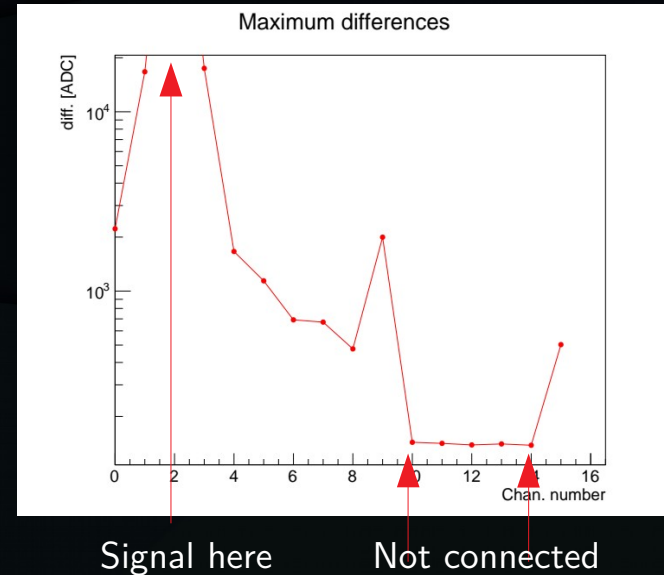
- Karate
- Elettronica
- Psicologia
-

Il Karate – Zan Shin Do è una Via graduale di autoconoscenza che passa attraverso il coraggio (Shin significa cuore).

Channel coupling & saturation problem

- Coupling between different channels is present: it is mainly due to the cable but it is present even if we isolate the chip.
- When a channel saturates a large signal is injected into the nearby channels:
 - Saturation @ $\sim 800\,000$ ADC, nearby signals $\sim 20\,000$

Lines ID	C (pF)	1/R (μ S)
Ca19-Ca21	0.3	0.035
Ca22-Ca23	1.1	0.26
Ca26-Ca27	6.7	0.21



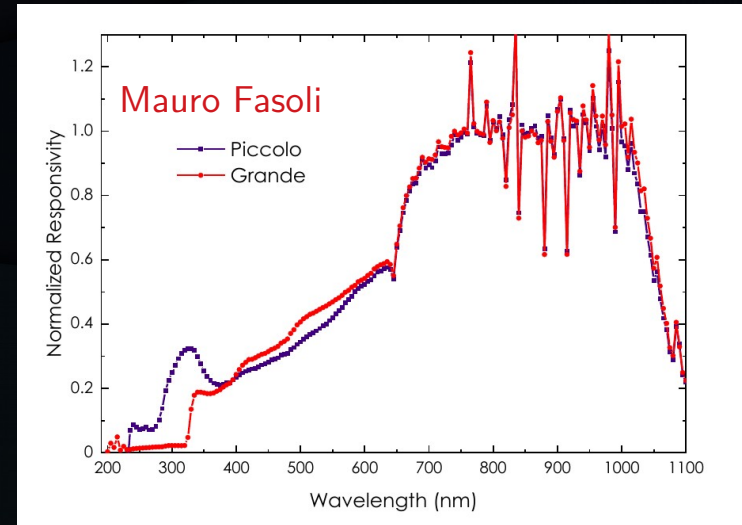
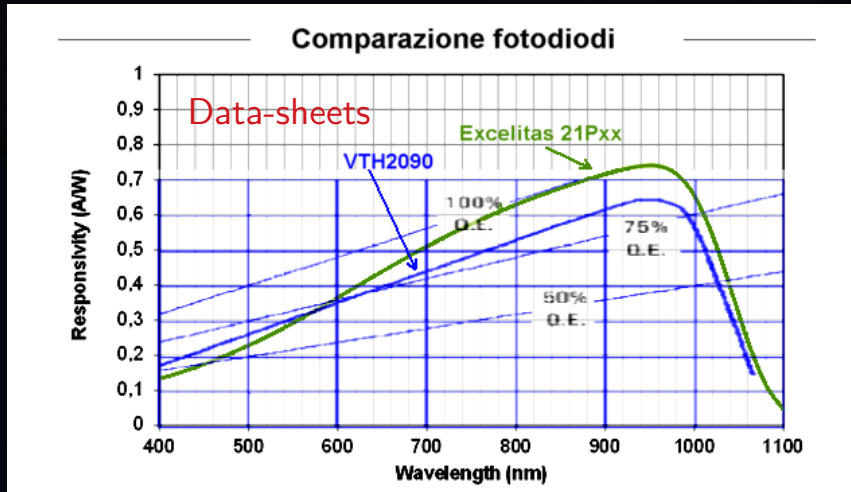
Discussion about the saturation.

- The current configuration: the LPD and SPD are coupled by the cable (even those are connected to independent chips).
- Update the HIDRA chip (design suggested by Zampa N. and G.): channels with LPD will be switched off when the signal $>$ thresholds near by the saturation level (crowbar mechanism).
 - Apply this solution to the LPDs only, keeping the LPD-SPD on the same chip.
 - The self-trigger circuit (which add the signal of 2 near channels) will be not updated.
- Completely separate the LPD and SPD (Firenze suggestion): using two cable or different cable edges for the 2 PDs. Using different chip for different PDs.
 - It requires a re-work of the trigger circuit and it requires to apply the crowbar to each channel; do we need crowbar for SPD (simulation by Sergio).
- Cable update: we should reduce the coupling between channels due to the cable tracks:
 - Using micro-COAX cable?

MIP measurement

- New PD 5x5 mm² → MIP ~ 120 ADC.
- Old PD 9.2x9.2 mm² → MIP ~ 320 ADC
- Area ratio: ~ 3.4; MIP ratio ~ 2.6
- Spectral response does not explain the difference:

Grande (9x9 mm² VTH2090H?)
Piccolo (5x5 mm²)



Optical coupling

- Discussion, let's consider a cube with one PD (excluding fibers and SPD):

- 1) For an ideal cube (w/o attenuation), w/o wrapping, the number of photons detected by a PD is proportional to the effective area
- 2) For an ideal cube (w/o attenuation), with ideal wrapping (100% reflection), all the photons goes into the effective area, thus the signal does not depend on the area.

2) < reality < 1)

- Optical simulation: by Alessio.

- Measurements: using a 5x5 window on the VTH2090 to “simualte” the new PD and check the MIP peak (asap).

Other items.

- We bought 20 5x5 PDs.
- How to use those:
 - Ask IHEP colleagues to give away 20 LYSO: wrapping? Fibers?
 - “Disrupt” 20 of 30 cubes that we already have: it is difficult since those are assembled inside layers and the old PDs are glued to the cubes.
 - Try to build 20 homemade monolithic packages?
- Start a discussion with Chinese colleagues regarding the cube assemble procedure looking forward to the SPS beam test?
 - 2019 solution: we received “nude” cubes, we assembled the cubes with vikuiti and LPD+SPD. They came to Firenze to assemble the fibers.
 - I would like to use their wrapping procedure to get consistent measurements of the MIP.
- Space qualification: schedule a dedicated meeting (including Sergio R.)?