

# ProtoDUNE SC mounting and testing

## Lessons Learned

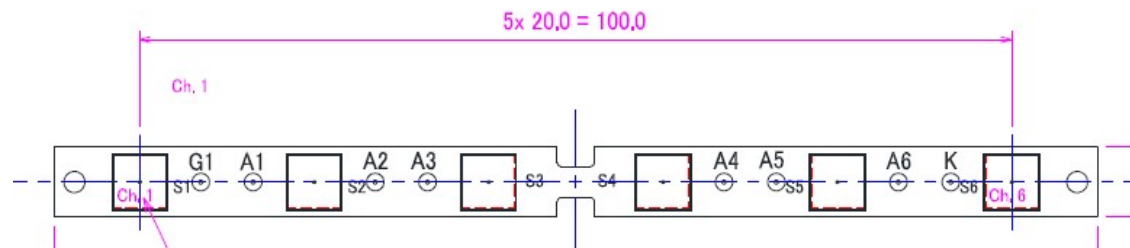
Antonio Verdugo on behalf of Ciemat Group

Photon Detection - HD - MiniWorkshop@UNICAMP

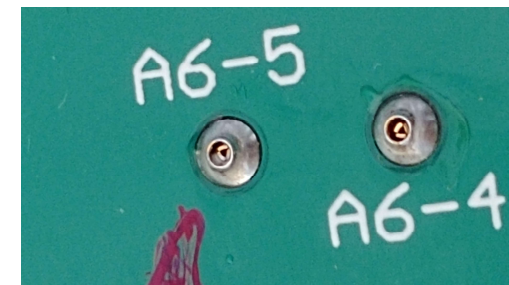
November 14<sup>th</sup>, 2022

# Some mounting issues

- Symmetric design of the SiPMs PCB allows reverse mounting. An asymmetric placement of the PINs would avoid mounting errors.



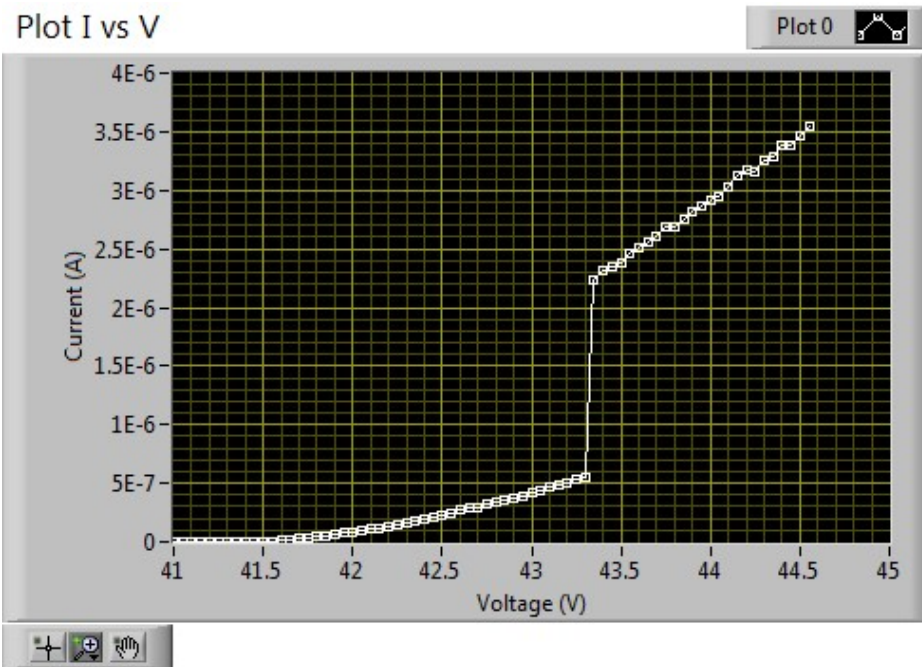
- Length of the PINs too tight and routing board bending when screwed causes PINs miss-connections.
- Some routing boards sockets found with tin inside.



# Noisy SiPMs

- Some (less than 1%) SiPMs showed a high DCR in LN2.
- Checking those SiPMs after the problem was detected, they showed also a jump on the reverse I-V curve at operating voltages. It could not be detected during the previous I-V tests because only values around  $V_{bd}$  were taken.
- To be confirmed if this I-V jump was present before LN2 immersions.
- To try to detect this problem extended I-V curves will be taken during massive testing.

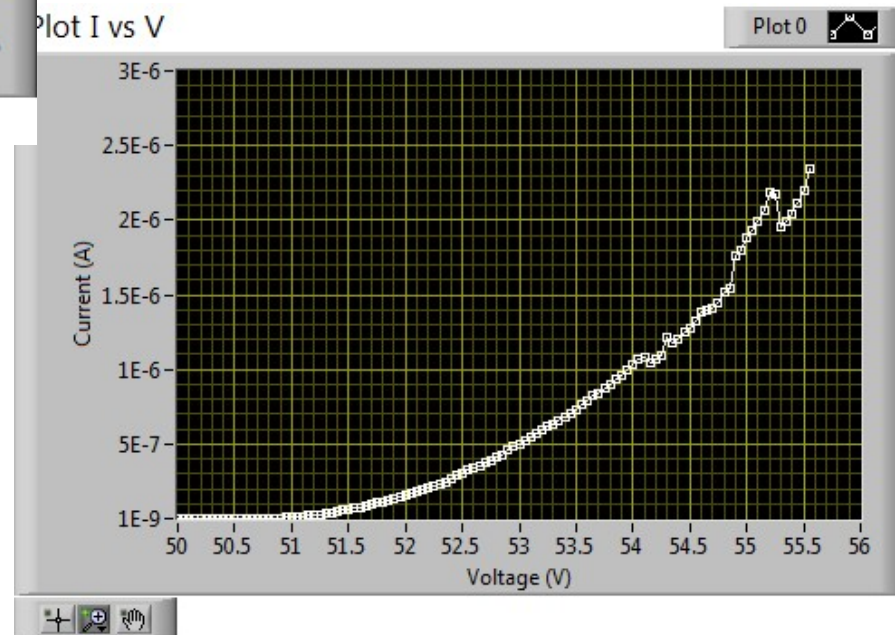
# Example of reverse IV for noisy SiPM



Current jump is more evident in LN2

Reverse I-V in LN2  
 $V_{bd} = 41.4V$

Reverse I-V at RT  
 $V_{bd} = 51.4V$



# Another noisy SiPM with the same behavior

## 75LQR – Faulty SiPM #5 on board 75

LN2 after ganging tests

Almost normal response obtained only once after a new immersion

