ALTCRISS COLLABORATION

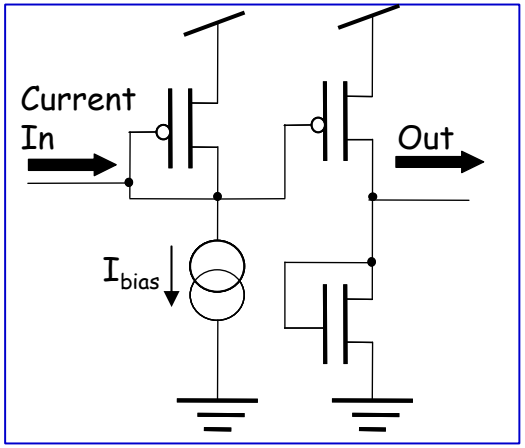
# A CMOS Front-End for SiPM devices aimed to TOF applications with adjustable threshold and high dynamical range

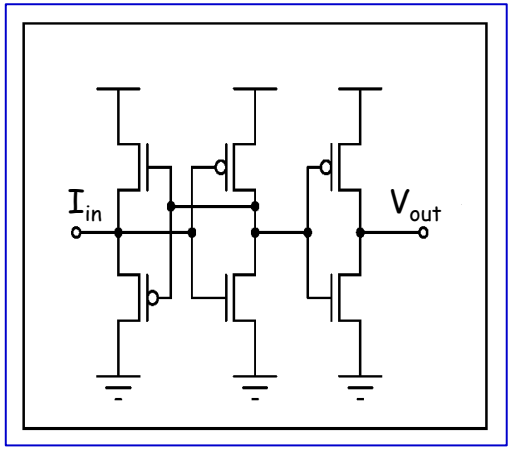
**Davide Badoni**[(a)], **Francesco Gonnella**[(a,b)], **Roberto Messi**[(a,b)], **Dario Moricciani**[(a)], **Flavio Archilli**[(a,b)], **Lorenzo Iafolla**[(a,b)]
**(a)** "Roma Tor Vergata" Section I.N.F.N. - **(b)** Physics Department University "Tor Vergata"

## Main building blocks of the produced chip

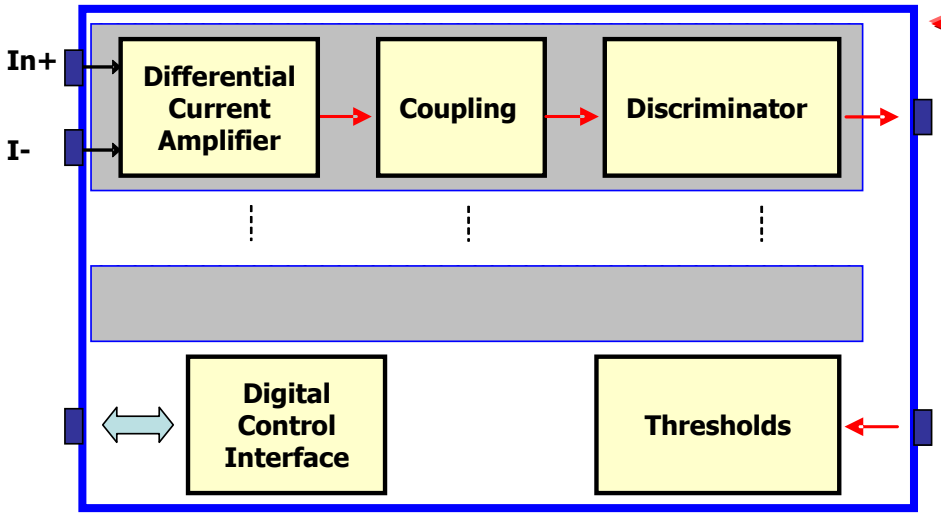
Simplified schematic of the Current amplifier "fully balanced" with current mirror.

Fully differential functionality with a feedback using two identical circuits.



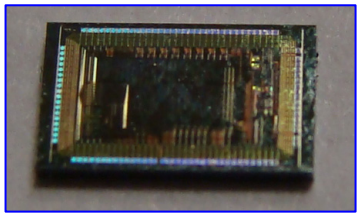




Simplified schematic of the fast and wide range current comparator.

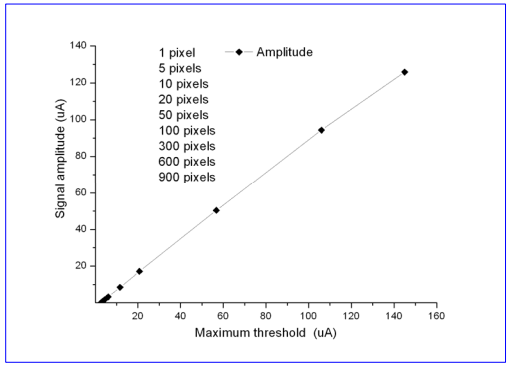



General architecture of the chip:
Eight channels with independent adjustable thresholds.

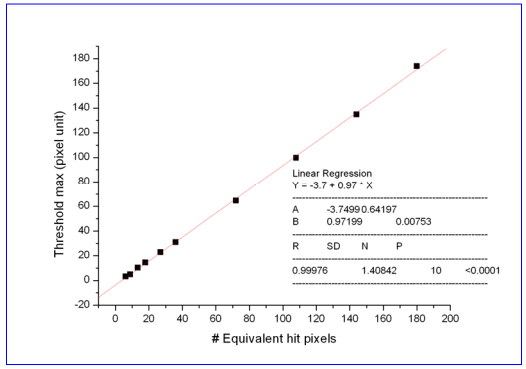
The chip. The technology used is AMS 0.35 μm, four metals, double polysilicon.



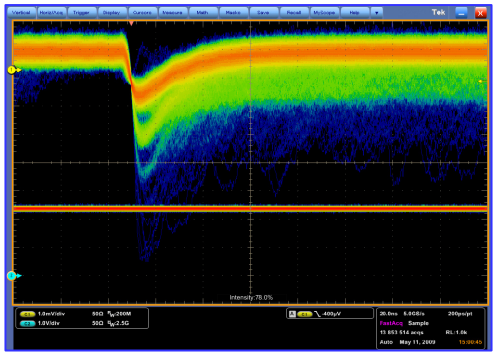
# *Measurement and test*



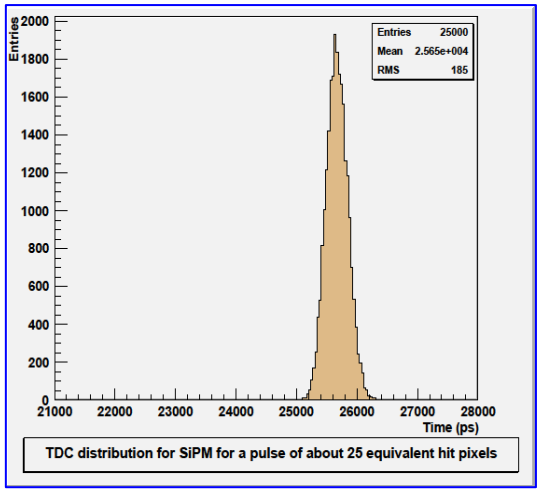

Dynamical range and linearity for thresholds regulation of the chip:
Simulation results vs measurements.



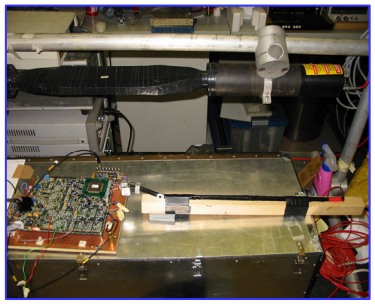

**Dark current:**
analog output shown on a DPO.
The structure of 1, 2 and 3 hit pixel is clearly visible in the screenshot.



**Timing results:**
Time distribution obtained with a fixed pulse amplitude corresponding to about 27 equivalent hit pixels.




**Cosmic ray test:**
with 1x1mm² Hamamatsu SiPM coupled with a small BC418 plastic scintillator.



**Cosmic ray test:**
Time spectrum obtained with a cosmic rays telescope made of two scintillators of the same type coupled with two PM.