## A CMOS Front-End for MPPC-based detectors aimed to TOF applications with

## fast discriminator, adjustable arming threshold and constant-fraction





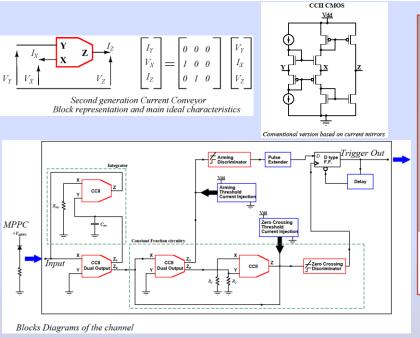
Davide Badoni<sup>(a)</sup> (davide.badoni@roma2.infn.it), Francesco Gonnella<sup>(b)</sup> (francesco.gonnella@lnf.infn.it), Roberto Messi<sup>(a,c)</sup> (roberto.messi@roma2.infn.it), Dario Moricciani<sup>(a)</sup> (dario.moricciani@roma2.infn.it)

(a) I.N.F.N. Roma Tor Vergata Section, Rome, Italy -- (b) I.N.F.N. L.N.F. - Frascati National Laboratory, Rome, Italy -- (c) Physics Department, University of Roma Tor Vergata

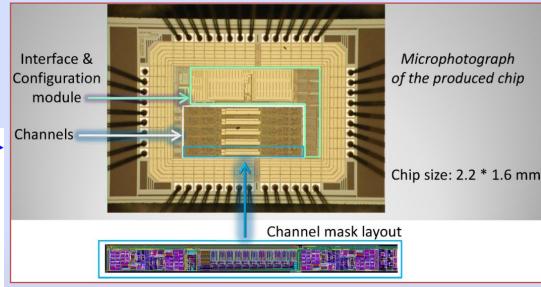
## Front-End chip for MPPC in standard CMOS 0.35 µm technology:

independent thresholds constant fraction discriminator featuring:

- <u>Low input impedance</u> in order to reduce recovery time as much as possible
- All signals and thresholds processed in the <u>current-mode domain</u> using fast current comparators and a modified version of the current-mirror-based second generation <u>Current Conveyors</u> (CCII) as building blocks for amplifiers
- A current feedback in the first stage to reduce pile-up effect

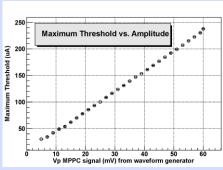


**functionality** 

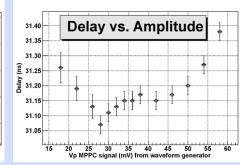


## Simulation and preliminary test results

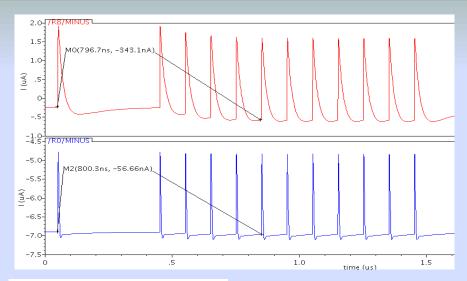
Simulation results show the effect of the current feedback filter. The signal flowing out from the first stage with feedback (bottom) reveals a strong reduction of the level shift caused by the high rate repetition events, with respect to the signal output of the same stage without this feature (top).

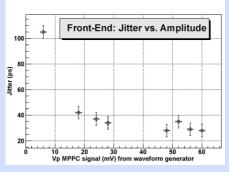


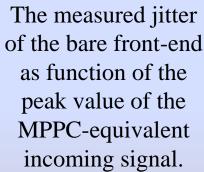
Good linearity between the value of the arming threshold and the peak value of the MPPCequivalent incoming signal.

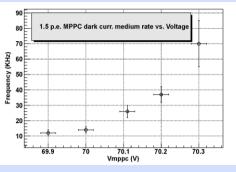


Time-walk is contained within 200 ps in a large range of MPPC-equivalent incoming signal amplitude.









Dark current rate as a function of the operating voltage of the MPPC device.