**COMETH: a CMOS pixel sensor for a highly miniaturized high-flux radiation monitor**

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The need for miniaturized and versatile real-time radiation monitors has become a general trend for spacecraft applications. It requires a highly integrated detection system with the ability to identify ion species in a high flux mixed environment. We have proposed [1] a new strategy to meet these requirements with a single CMOS pixel chip.

This sensor is based on a matrix of 50×50 $\mu m^2$ pixels, read out in rolling-shutter mode, and features columns ended by 3-bit ADCs with tunable threshold. An embedded digital algorithm extracts the particle properties from the hit information to provide the radiation flux on–line.

A reduced scale prototype with 32×32 pixels and 32 column ADCs has been designed and fabricated in a 0.35 µm process. The layout of the identifying and counting algorithm, downstream the pixel matrix, was developed in the same process. A full simulation of this layout for a subset of columns was used to check the algorithm output against many inputs.

Test results obtained with X-rays, ß$^-$ particles and laser illumination, confirm previous simulations addressing gain and linearity. Column ADCs also show expected features. Those measurements validate the possibility to monitor proton and electron fluxes up to $10^7$ particles·$cm^{-2}$·$s^{-1}$ and distinguish proton from electron for energies lower than 50 MeV.

[1] Y.Zhou *et al.*, JINST 7 (2012) C12003.

*COMETH: Counter for Monitoring the Energy and Type of charged particles in High flux