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# A data parallel digitizer for a time-based simulation of CMOS Monolithic Active Pixel Sensors with FairRoot

*Monday, 14 October 2013 15:00 (45 minutes)*

CMOS Monolithic Active Pixel Sensors (MAPS) have demonstrated excellent performances as tracking detectors for charged particles. Their outstanding spatial resolution (few µm), ultra-light material budget (50 µm) and advanced radiation tolerance (> 1Mrad, >1e13 neq/cm²). They were therefore chosen for the vertex detectors of STAR and CBM and are foreseen to equip the upgraded ALICE-ITS. They also constitute a valuable option for tracking devices at future e+e- colliders.

MAPS were initially developed as sensors for photographic devices and the data is readout with a rolling shutter. The readout time of an individual frame lasts typically 10-100µs. In high rate experiments like CBM, the pixels matrix may sum particle signals generated by several particle collisions during this integration time. Powerful tracking codes are needed to disentangle those collisions based on the data obtained from the faster tracking detectors located more downstream the collision point. Developing this code requires a realistic and fast digitizer software, which represents the properties of the sensors within GEANT-based simulation frameworks like FairRoot.

We introduce the challenges related to representing collision pile-up in an event based simulation environment and discuss our simulation strategy. Moreover, we introduce our concept for data parallelism, which aims to allow for a parallel code execution in a near future.

## Summary

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