

Towards a Vertex Detector Concept with a Microsecond Timestamping

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“Low power CMOS Pixel Sensors of the MIMOSA series are about to meet the specifications of the ILD vertex detector. This achievement relies on double-sided ladders where the sensors mounted on one face provide the necessary spatial resolution while faster sensors mounted on the other face offer the necessary time stamping. The established MIMOSA architecture allows to reach resolutions of 3 micrometres and 10 microseconds in this way.

A faster version of this concept is emerging, based on in-pixel discrimination and on enhanced parallelisation of the sensor read-out. The approach is being implemented with a new series of sensors, called AROM (standing for Accelerated Read-Out Mimosa sensor), aiming at a timestamp better than 2 microseconds.

Several advantages follow from this improvement, taking advantage of the mitigated sensitivity to the beam-related background. It should in particular reinforce standalone tracking capabilities, alleviate the necessity of a solenoid protecting the vertex detector from backscattered beam-related electrons and may allow facing the increased beamstrahlung rate expected at a collision energies well above 500 GeV.

The talk will overview the concept and translate it into global vertex detector performances including power consumption.

It will also suggest how the concept could be extended to the SIT sub-system.”

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