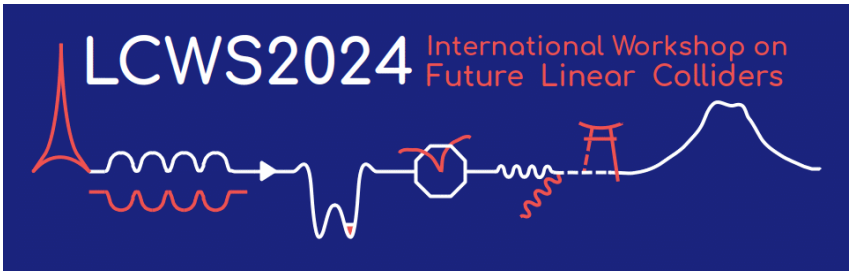

Contribution ID: **152** Type: **Oral presentation (in person)**

The SiD Digital ECal Based on Monolithic Active Pixel Sensors

Wednesday, 10 July 2024 16:20 (20 minutes)

Unprecedented precision is needed to address the Higgs physics with detectors at future e+e- colliders. Linear colliders offer low duty cycles and low backgrounds, that greatly assist achieving these goals. The SiD Collaboration is developing an application of Monolithic Active Pixel Sensor (MAPS) technology for tracking and electromagnetic calorimetry (ECal). This technology offers high granularity, thin sensors, fast responses (<nsec), and small dead areas. The low collider duty cycle enables gaseous cooling for tracking and passive heat removal for calorimetry.

A MAPS prototyping effort (NAPA-p1) is led by SLAC in collaboration with CERN. This is aimed at the linear collider tracking requirements, with complementary application to the ECal requirements. The device testing status is covered in an abstract submitted to the LCWS "Vertex, Tracking, Timing" track. This calorimetry talk will briefly summarize that work, and concentrate on the ECal design and system level considerations, as well as the ECal performance simulations.

Small pixels significantly improve shower separation in the ECal. Detailed simulation of ECal performance confirms previous results, indicating electromagnetic energy resolution based on digital hit cluster counting provides better performance than the 13 mm^2 pixels SiD TDR analog design. Furthermore, two particle separation in the ECal is excellent down to the millimeter scale. Geant4 simulation results with optimized analysis based on machine learning has been studied to optimize these expectations.

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