Contribution ID: **687** Type: **Invited Plenary**

Hybrid pixel detectors with on-chip event selection

Friday, May 28, 2021 6:10 AM (20 minutes)

Hybrid pixel detectors offer unrivalled performance in very high rate particle tracking. Moreover, as the sensor material can be freely chosen or replaced by a gas detector or a Micro Channel Plate the same readout ASIC may find uses in multiple applications. The Timepix4 chip tags particle arrival times to within 200ps and is capable of digesting ˜700 Mhits/cm2/sec. This, however, comes at the expense of a very high readout bandwidth. As we approach the next ASIC generation we must ask ourselves how can we benefit from the added speed and power while limiting the readout bandwidth. In this contribution we propose adding computational power to the periphery of the readout chip enabling data selection and compression prior to off-chip readout. For example, in a sensor material with a high thickness to pixel pitch ratio it is possible to reconstruct particle trajectories sending off-chip only hit information of the particles of interest e.g. high Pt tracks, single photons, electrons, etc

TIPP2020 abstract resubmission?

No, this is an entirely new submission.

Funding information

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Session Classification: Plenary

Track Classification: Readout and Data Processing: Readout: Front-end electronics