

Smart Pixel Sensors for the HL-LHC

Tuesday, 9 July 2024 16:45 (15 minutes)

Large-scale particle physics experiments produce tens of terabytes of data every second. Innovative methods to manage the data rate at the HL-LHC, which expects to operate at 10x the luminosity of what the LHC was initially designed for, are needed. AI-on the chip provides a way to intelligently filter out low momentum clusters in the pixel detector. This will open up an opportunity to use the pixel detector for the first time in the CMS Level-1 trigger, and lead to increased sensitivity to new physics measurements and searches. We have taped out our first chip, which incorporates a p_T filtering algorithm on an ASIC chip. Our initial p_T filtering algorithm considers clusters that are tracked by CMS. We will report on ongoing studies seeking to enhance the performance of our filter by utilizing unsupervised learning on untracked clusters, thus increasing background rejection.

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Session Classification: Closing Session