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Front-end neural network filtering implemented in a silicon pixel detector

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Next-generation silicon pixel detectors with fine granularity will allow for precise measurements of particle tracks in both space and time. This will result in unprecedented data rates which will exceed those anticipated at the HL-LHC. A reduction in the size of pixel data must be applied at the collision rate of 40MHz in order to fully exploit the pixel detector information of every proton-proton interaction for physics analysis. Using the shape of charge clusters deposited in arrays of small pixels, the transverse momentum (p_T) of the traversing particle can be extracted by on-ASIC locally customized neural networks. This talk will discuss both deep neural network (DNN) and spiking neural network (SNN) algorithms for filtering pixel data based on p_T , as well as the relative benefits for physics and for efficient implementation within the strict power and area constraints of a readout ASIC.

Early Career

No

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