



Contribution ID: 49

Type: **Early Career (Eligible for Oral or Poster)**

## Smart pixels for single-silicon-layer tracking with ML

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Silicon pixel trackers are at the heart of all modern collider physics design, providing high-quality position measurements close to the beamline and forming the core of modern heavy-flavor tagging algorithms. Recent advances in both silicon pixel size and techniques for rendering machine learning algorithms into hardware allow detailed information about the ionization charge deposition to be used to reconstruct not only the track impact position but also its angles of incidence on the sensor. Including beamspot information allows the full track parameters and their errors to be determined from a cluster in a single sensor using an on-device Mixture Density Network. While this technology is focusing on the HL-LHC, it is also well suited for muon and electron-positron collider concepts where it can be used for cleaning hits from beam-induced backgrounds, and in the latter could help achieve tracking with a vanishing fake rate. We will discuss the various technologies used to achieve this qualitatively new functionality in silicon sensors, and performance in preliminary simulations.

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**Session Classification:** Physics and Detectors: Track 3

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