

# ML based algorithm for primary vertex identification

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The CMS detector at the High-Luminosity Large Hadron Collider (HL-LHC) will operate in challenging conditions with expected pile-up of up to 200 collisions per bunch crossing, necessitating the development of a more resilient primary vertex (PV) reconstruction method to ensure the integrity of data analysis and the efficiency of the CMS triggering system. This contribution describes preliminary studies on a new ML based PV-Finder method for PV identification. The method is based on a model trained using Kernel Density Estimations (KDEs) derived from the positions of reconstructed tracks at the beamline, incorporating uncertainties from track parameters. It also utilizes target histograms, modeled as Gaussian distributions centered on the actual ground truth values of specific primary vertices.

**Primary author:** MAZURETS, Tetiana (University of Puerto Rico)

**Presenter:** MAZURETS, Tetiana (University of Puerto Rico)

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