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Electron Reconstruction in the CMS Phase-2 High Granularity Calorimeter

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The high-luminosity era of the LHC will pose unprecedented challenges to the detectors. To meet these challenges, the CMS detector will undergo several upgrades, including the replacement the current endcap calorimeters with a novel High-Granularity Calorimeter (HGCAL). To make optimal use of this innovative detector, new and original algorithms are being devised. A machine-learning based electron superclustering algorithm is presented, designed to recover bremsstrahlung photons to collect the entire electron energy whilst limiting pile-up contamination. The granularity of HGCAL allows for many cluster variables to be computed, fed into a Deep Neural Network to determine whether two clusters should be linked. Groups of clusters thus formed, known as superclusters, are used to seed electron track reconstruction. The superclustering is developed within The Iterative Clustering Framework (TICL).

The new neural-network based superclustering shows improved performance over the current geometrical algorithm used in Phase-1, by collecting less pile-up induced clusters.

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