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End-to-end particle and event identification at the Large Hadron Collider with CMS Open Data(15'+5')

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We present an innovative end-to-end deep learning approach for jet identification at the LHC. The method combines deep neural networks with low-level detector information, such as calorimeter energy deposits and tracking information, to build a discriminator to identify different particles. Using two physics examples as references: electron and photon discrimination and quark and gluon discrimination, we demonstrate the performance of the end-to-end approach using simulated events with full detector geometry available as CMS Open Data. We also offer insights into the importance of the information extracted from various sub-detectors and describe how end-to-end techniques can be extended to event-level classification using information from the whole detector.

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