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Machine Learning Photons Separation in the LHCb Calorimeter

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Reconstruction and identification in calorimeters of modern High Energy Physics experiments is a complicated task. Solutions are usually driven by a priori knowledge about expected properties of reconstructed objects. Such an approach is also used to distinguish single photons in the electromagnetic calorimeter of the LHCb detector on LHC from overlapping photons produced from high momentum pi0 decays. We studied an alternative solution based on applying machine learning techniques to primary calorimeter information, that are energies collected in individual cells around the energy cluster.
Constructing such a discriminator from “first principles” allowed improve separation performance from 80% to 93%, that means reducing primary photons fake rate by factor of two.
In presentation we discuss different approaches to the problem, architecture of the classifier, its optimization, and compare performance of the ML approach with classical one.

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