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## Particle Identification at LHCb combining Neural Networks and evolutionary computation

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Particle identification (PID) in the LHCb experiment is performed by combining information from several subdetectors of the experiment, including RICH, calorimeter and muon systems. Information is acquired and processed in real time at the trigger level, where it is combined and used for particle identification. LHCb employs 2 methods for particle identification: a global likelihood approach which is the traditional method and a neural network based approach called probNN. For LHC Run 3, subdetectors has been upgraded to operate under higher luminosity conditions compared to Run 2. These differences require an update of many algorithms, including the probNN method. To address these updated and take advantage of it, a depth multivariate analysis combined with evolutionary algorithms is developed to optimize neural networks and variable selection. As result, architectures have been reduced by up to 80% of their original size, which directly improves model inference by a factor 4 compared to its predecessor used during Run 2 with an equivalent PID performance.

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