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Machine learning methods in the analysis of low-mass dielectrons in ALICE

Results from non-perturbative QCD indicate that chiral symmetry may be restored in the hot and dense matter produced in relativistic heavy ion collisions. This restoration would affect the vector meson mass spectrum and could be examined with the ALICE detector at the LHC. One of the most promising probes to study these effects are dileptons ($^{+-}$ and e^+e^-) from ρ meson decays since they reach the detector without significant final state interactions.
In order to precisely measure the low-mass dielectron spectrum a high purity sample of e^+e^- pairs will be required. Whilst traditional cut-based methods can provide high purity samples, they suffer from low efficiency. Multivariate particle identification could in future be used to alleviate this drawback.

The main background in the analysis of dielectrons are combinatoric e^+e^- pairs (S/B ˜ 10^{-3} for 0.3<M_{ee}<1 GeV/c^2). This background contribution can be suppressed by rejecting e^+ and e^- tracks that originate from photon conversion processes. Numerous observables allow to discriminate background from signal dielectrons which motivates a multivariate approach in the classification of e^+e^- pairs.

The employed machine learning methods and performance based on Monte-Carlo data will be presented as well as their application in the analysis of LHC Run 2 data.

Preferred Track

Electromagnetic Probes

Collaboration

ALICE

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