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Tau identification using multivariate techniques in ATLAS

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Tau leptons will play an important role in the physics program at the LHC. They will be used in electroweak measurements and in detector related studies like the determination of the missing transverse energy scale, but also in searches for new phenomena like the Higgs boson or Supersymmetry.

Due to the huge background from QCD processes, efficient tau identification techniques with large fake rejection are essential. Tau object appear as collimated jets with low track multiplicity and single variable criteria are not enough to efficiently separate them from jets and electrons. This can be achieved using modern multivariate techniques which make optimal use of all the information available. They are particularly useful when the discriminating variables are not independent and no single variable provides good signal and background separation.

In ATLAS several advanced algorithms are applied to identify taus, in particular a projective likelihood estimator and boosted decision trees. All multivariate methods applied to the ATLAS simulated data perform better than the baseline cut analysis. Their performance is shown using high energy data collected at the ATLAS experiment. The strengths and weaknesses of each technique are also discussed.

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