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Electrons in Dense environment in ATLAS

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The standard electron and jet reconstruction process using information from energy deposits in the electromagnetic (EM) and hadronic calorimeters are carried out independently. This results in an ambiguity in the reconstruction of these objects. to avoid such ambiguity, an overlap removal procedure is applied during electron and jet reconstruction since every reconstructed electron will have a close-by jet associated with it, that needs to be removed to avoid double counting of these objects. Also if the electron has many more real jets close to it, the electron is discarded. This implies that the standard electron reconstruction process requires some level of isolation from close-by hadronic activity and as a result, it becomes inadequate for a boosted topology, where electron is close to a real jet, such as the boosted heavy neutrino analysis. This is because, in a boosted regime, the electron can end up inside a real jet. This becomes a problem if we want to keep both the electron and the jet because the standard electron reconstruction procedure results in a severe drop in the identification efficiencies making the standard efficiency scale factors inadequate for such topology. The ID variables for an isolated electron and an electron in jet are presented. These are the variables used in electron identification in the different likelihoods. The variables that were found to be robust against nearby hadronic activity are shown. These are the variables that can be used to reconstruct an electron close to a jet.

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