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b- and c-Jet Energy Corrections in the Higgs Decay

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The proton-proton collisions, at the Large Hadron Collider (LHC), are confirming properties of the Higgs Boson predicted by Standard Model (SM) and providing tools for observation of all Higgs decay channels. The dibosonic decays, despite their low branching ratios, are well understood and have lead the Higgs discovery. In the Run 2 conditions many results have shown considerable agreement between the SM predictions and the experimental data. The measurement and observation of the Higgs decay in a b-quarks pair (branching ratio ⊠ 58%) is crucial to constrain the overall decay width of SM Higgs and establish coupling with fermions. Due to the QCD colour-confinement, the quarks and gluons are not observed directly, but the jet energy associated to them can be measured. The energy reconstruction and identification of b-jets in ATLAS has a crucial role to search the Higgs Boson by SM and in scenarios with new physics contributions.
At the LHC the large backgrounds arising from multi-jet produc- tion make an inclusive search for H → b $\bar{b}$/cc$\bar{}$ decays extremely chal- lenging. The most sensitive production modes for probing H → b$\bar{b}$/cc$\bar{}$ decays are those where the Higgs boson is produced in association with a W or Z boson, because their leptonic decay modes lead to clean sig- natures that can be efficiently triggered on, while rejecting most of the multi-jet backgrounds.
For the studies of the SM Higgs, the ATLAS collaboration applies decoupled b- and c-jet energy corrections to improve the Higgs mass resolution, the signal sensitivity and significance.

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