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Signal versus Background Interference in H+ -> tb Signals for MSSM Benchmark Scenarios

Saturday 14 Sep 2019 at 09:00 (00h15')

Content :

In this talk I will present an investigation into the sizeable interference effects between a heavy charged Higgs boson signal produced via $pp \to t\bar{b}H^−$ (+ c.c.) followed by the decay $H^- \to b\bar{t}$ (+ c.c.) and the irreducible background given by $pp\to t\bar{t}b\bar{b}$ topologies at the Large Hadron Collider (LHC). It is shown how such effects could spoil current $H^\pm$ searches where signal and background are normally treated separately. The reason for this is that a heavy charged Higgs boson can have a large total width, in turn enabling such interferences, altogether leading to very significant alterations, both at the inclusive and exclusive level, of the yield induced by the signal alone. This therefore implies that currently established LHC searches for such wide charged Higgs bosons require modifications. We show such effects quantitatively using two different benchmark configurations of the minimal realisation of Supersymmetry, wherein such $H^\pm$ states naturally exist.

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