First observation of the decay of the Higgs boson to b-quarks at the LHC

Last week the CMS and ATLAS collaborations at the LHC reported the first observation of the decay of the Higgs boson to a pair of bottom quarks.

After the discovery of the Higgs boson in 2012, its decay channels to fermions have been probed to test the hypothesis that the Higgs boson is responsible for the mass generation of the fermions in the Standard Model. With the first observation of the decay of the Higgs boson to a pair of bottom quarks, it has been confirmed that the Higgs boson gives mass to the second-heaviest quark.

The bottom quark is the heaviest quark that the Higgs can decay to. The mass of the heaviest fermion, the top quark, exceeds the Higgs mass which forbids this decay channel. Though the decay to bottom quarks is the most common decay channel of the Higgs boson, its observation is difficult due to the high background.

To resolve the Higgs decay to bottom quarks, CMS and ATLAS combined the data sample from the 7, 8 and 13 TeV runs and achieved a detection which exceeds 5 sigma. Furthermore, the decay rate is consistent with the expectation from the Standard Model within the precision of the measurement.

With more data other Higgs decay channels will be probed, and more precise results will be obtained to either confirm the Standard Model or to point to new physics.

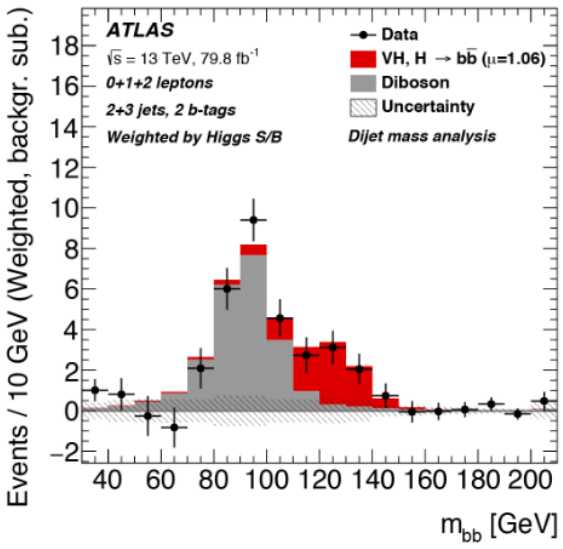

Figure 1: Number of observed bottom quark pairs over the mass of the bottom quark pair.