**LHCb and Belle confirm tension with SM evidenced by earlier *BABAR* measurements.**

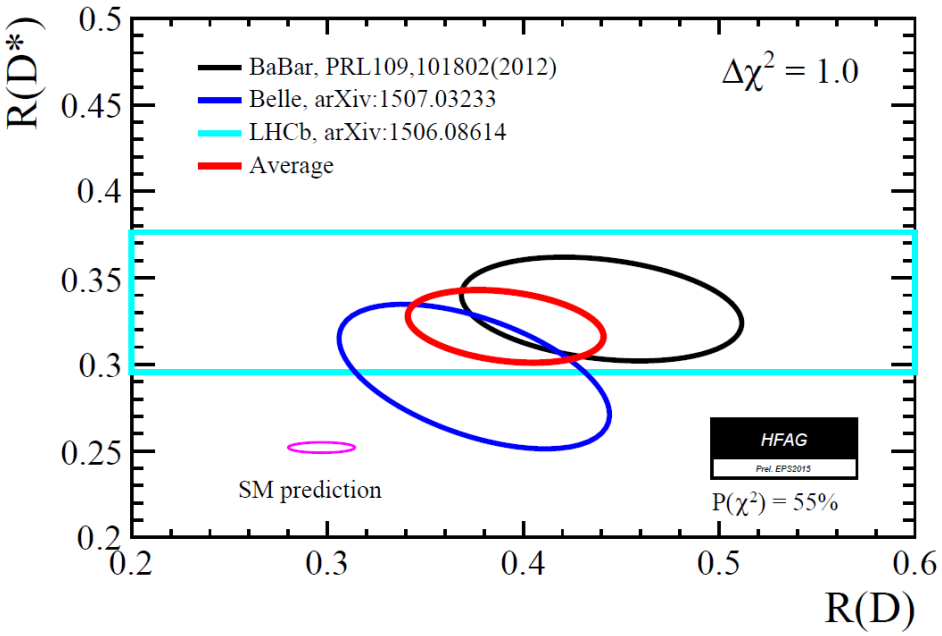
After the discovery of CP violation in B meson transitions, B meson decays are mainly studied to look for possible deviations from expectations of the Standard Model (SM) of particle physics.

Very recently two collaborations, LHCb at the LHC and Belle at the KEKB, have reported an excess of the decay probability in the processes $B \rightarrow D\ \tau\ \nu$, and $B \rightarrow D^*\ \tau\ \nu$ with respect to SM predictions. These results are in very good agreement with an earlier observation from the *BABAR* Collaboration for the same decay channels. The decay rates measured by *BABAR* in 2012 exceeded the SM predictions by about 3.4 standard deviations. When combined with the new results from LHCb and Belle, the significance of the discrepancy rises to about 4 standard deviations, making it one of the largest departures from the SM seen so far.

The interest in B meson decays to tau leptons lies in the heavy mass of the tau, which implies a higher affinity to Higgs bosons with respect to the lighter electron and muon. Indeed, the Higgs boson is related to the mechanism by which elementary particles acquire mass, and at the same time the interaction (or coupling) of the Higgs boson is stronger with heavier particles.

Within the SM only one neutral Higgs boson is present, and it cannot play a role in $B \rightarrow D^{(*)}\ \tau\ \nu$ decays, but if we imagine a world with an enlarged family of Higgs bosons, as for example predicted by several extensions of the SM, where also electrically charged Higgs might exist, these can mediate such processes increasing the decay rates.

It should be also noted that the high decay rates measured cannot be easily accommodated into the most popular theoretical models beyond the SM, resulting in a fascinating challenge for theorists.



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http://scitation.aip.org/content/aip/magazine/physicstoday/news/10.1063/PT.5.7203?utm_source=Physics%20Today&utm_medium=email&utm_campaign=6176846_Physics%20Today%3A%20The%20week%20in%20Physics%2014-18%20September&dm_i=1Y69,3OE32,J2XOTK,D86N5,1

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