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Neutrinos in the far-forward region at the LHC

The production and prompt decays of D_s and B mesons to tau neutrinos and taus can produce a significant number of tau neutrinos in the high rapidity region at the LHC. Heavy flavor decays dominate tau neutrino production in the far-forward region. Using NLO QCD and heavy quark transverse momentum smearing guided by LHCb data on D_s production for rapidity $y = 2.0 - 4.5$, we present a new calculation of the spectrum of tau neutrinos, and for definiteness, the number of events for a 1.0 m radius, 1.0 m length lead detector, located 480 m from the LHC interaction point for pp collisions at $\sqrt{s} = 14$ TeV and $calL = 3000$ fb $^{-1}$. We illustrate how tau neutrino detection in this region could probe a 3+1 active-sterile neutrino mixing scenario, in the context of the theoretical uncertainties for heavy flavor production.

Mini-abstract

A new NLO QCD calculation shows large numbers of forward tau neutrinos from heavy flavor at the LHC.

Primary authors: Dr GARZELLI, Maria Vittoria (Universita degli Studi di Firenze & INFN, Firenze, Italy); Prof. RENO, Mary Hall (University of Iowa); Dr DIWAN, Milind (BNL); Dr BAI, Weidong (University of Iowa); Dr JEONG, Yu Seon (CERN)

Presenters: Prof. RENO, Mary Hall (University of Iowa); Dr JEONG, Yu Seon (CERN)

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