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Model Independent Measurement of Top Quark Mass using B-Hadron Decay Lengths (Part II)

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We discuss the implementation of the newly proposed method to measure top quark mass using B hadron decay lengths. This method is based on the energy peak idea, and implemented by CMS [CMS PAS TOP-15-002]. Instead of using b jet energies, the new method uses B-hadron decay lengths, and hence not festered by JES uncertainty. The proposed method also improves upon previous technique to measure top quark mass using transverse B-hadron decay lengths in $t\bar{t}$ events [CMS PAS TOP-12-030] by being insensitive to the details of top quark production mechanism. This leads to a significant reduction in uncertainty associated with modeling of top quark transverse momentum spectrum, which is the largest source of uncertainty in measurement using transverse lengths. We verify this claim on Monte Carlo data generated using MadGraph5 and Pythia8.

Author: AIREN, Sagar

Co-authors: SATHYAN, Deepak; AGASHE, Kaustubh; FRANCESCHINI, Roberto (Rome 3 U.); KIM, Doojin (Texas A & M University (US))

Presenter: AIREN, Sagar

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