

# Top mass shift from recalibration of flavor-dependent jet energy corrections in the D0 lepton+jets top mass measurement

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**Abstract:**

We investigate a possible explanation for the 2.4 GeV (2.7 sigma) difference in the top quark mass as measured by D0 and CMS, ATLAS and CDF. Our earlier investigation of the flavor-dependent Jet Energy Scale (flavor-JES) calibration suggested that the flavor-JES used by D0 for Run IIb may have converged to a non-global, unphysical minimum. The

study was based on internal documents released into the public domain after a 5-year moratorium. Furthermore, Run IIb makes up a majority of the full Run II dataset. In addition, the flavor-JES was found to be very sensitive to the parton shower model in Pythia 6 versus Herwig7, only former of which was used in the original flavor-JES study.

In this work we propagate the difference between the re-derived and the original flavor-JES into the top quark mass in the lepton+jet channel. This is done utilising publicly available information and published papers. We find that the flavor-JES is enough to fully explain the observed mass shift, with the Pythia6 and Herwig7 results differing by 1.32 GeV. A crude average of the shifts given by the two generators results into a re-interpreted mass of 172.50 GeV. As a caveat, this work has been performed entirely outside of D0 collaboration, and only utilising documents (both published and internal) released to the public domain.

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