High Energy Physics - Experiment

The Matrix Element Method and its Application in Measurements of the Top Quark Mass

Frank Fiedler, Alexander Grohsjean, Petra Haefner, Philipp Schieferdecker

(Submitted on 5 Mar 2010)

The most precise measurements of the top quark mass are based on the Matrix Element method, which is designed to minimize the statistical uncertainty. We present a detailed description of this analysis method, taking the measurements of the top quark mass in final states with one and two charged leptons as concrete examples. In addition, we show how the Matrix Element method is suitable to reduce the dominant systematic uncertainties related to detector effects, by treating the absolute energy scales for b-quark and light-quark jets independently as free parameters in a simultaneous fit together with the top quark mass. While the determination of the light-quark jet energy scale has already been applied in several recent measurements, the separate determination of the absolute b-quark jet energy scale is a novel technique with the prospect of reducing the overall uncertainty on the top quark mass in the final measurements at the Tevatron and in analyses at the LHC experiments. The procedure is tested on Monte Carlo generated events with a realistic detector resolution.

Comments:	25 pages, 14 figures
Subjects:	**High Energy Physics - Experiment (hep-ex)**
Cite as:	**arXiv:1003.1316v1 [hep-ex]**

Submission history

From: Frank Fiedler [view email]
[v1] Fri, 5 Mar 2010 17:24:21 GMT (945kb)

Which authors of this paper are endorsers?