Description of master's project
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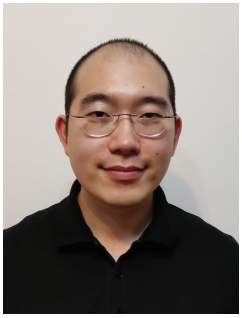
Top Quark Mass Calibration for Monte Carlo Event Generators



In my master thesis, under the supervision of Univ.-Prof. Dr. André Hoang and Dr. Vicent Mateu, I work on extending a previously presented calibration procedure, which was used to determine the relation between the top quark mass parameter of a Monte Carlo (MC) event generator and a field theoretic mass.
The relation was obtained by fitting a hadron level QCD computation for the observable 2-Jettiness τ_2, which is closely related to thrust, for boosted top-antitop quark pair production in e^+e^- annihilation to MC predictions.
In order to provide precise QCD predictions one has to use Soft-Collinear-Effective theory and boosted heavy quark effective theory to resum large logarithms to all orders, that appear due to large separations of scales in the peak region of the distribution.
Non-perturbative hadronization effects from wide-angle soft gluon radiation are accounted for by a shape function, whose moments Ω_i provide hadronic parameters that are fit together with the mass in the event shape analysis.
The field theoretic mass schemes that we use for the fit are the pole mass and the MSR mass. The advantage of the MSR mass is that it doesn't suffer from a renormalon ambiguity of order Λ_{QCD}, that is present in the definition of the pole mass.
Another important aspect is the use of so-called profile functions, which define τ_2 dependent scales, to ensure proper resummation of large logarithms in all regions and also to provide an estimate of theoretical uncertainties in perturbation theory by varying the parameters that appear in these profiles.
My contribution to this project will be to repeat the analysis for different MC event generators to provide insight on how the different models used in these event generators might affect the interpretation of their mass parameters in terms of the MSR and pole mass. I will also work on improvements to the fitting code and on implementing theoretical improvements. Another goal will be the inclusion of another observable to this framework to show the robustness of this procedure.