T 138: QCD Experiment III

Time: Thursday 17:30–18:45 Location: HSZ/0405

T 138.1 Thu 17:30 HSZ/0405

Triple differential cross-section measurement of Z($\mu\mu$)+jet events at 13 TeV — •Cedric Verstege, Robin Hofsaess, Maximilian Horzela, Günter Quast, and Klaus Rabbertz — Karlsruhe Institute of Technology, Karlsruhe, Germany

The differential cross-sections of Z($\mu\mu$)+jet events is presented using the data recorded at 13 TeV center-of-mass energy by the CMS experiment in the years 2016, 2017, and 2018. The cross-sections are measured as a function of the Z boson transverse momentum p_T^Z, the rapidity separation y^* of the Z boson and the leading jet, and the boost in rapidity y_b of their center-of-mass system in the lab frame. The observables y^* and y_b enhance the sensitivity to different parton initial-state and momentum contributions, and thus to the PDFs.

The measured cross-sections are unfolded for detector effects in all three dimensions simultaneously. The resulting cross-sections at stable particle level are compared to precise theory predictions calculated at next-to-next-to-leading order in perturbative QCD corrected for electroweak and non-perturbative effects.

T 138.2 Thu 17:45 HSZ/0405

Measurement of jet mass distribution of hadronic W and Z bosons — •Steffen Albrecht[1] and Andreas Hinzmann[2] — [1]Universität Hamburg — [2]DESY, Hamburg, previously Universität Hamburg

In this talk we introduce a new effort towards measuring the jet mass distribution of hadronically decaying W and Z bosons.
We study events in which the bosons have a large transverse momentum and thus produce strongly collimated decay products reconstructed as single fat jets. The substructure of such jets proves to be a useful handle in various procedures (e.g. jet calibration, jet tagging), but has room for improvement in its modelling. We aim to gain an in-depth understanding of the substructure by studying the unfolded jet mass distribution in dependence of the jet p_T and substructure tagger discriminants. While previous measurements of jet mass have been carried out for gluon, quark and top jets in dijet, Z(ll)+jet and $t\bar{t}$ samples, this is the first study of W and Z jet masses in the processes with $W(qq)$+jets, $Z(qq)$+jets as well as hadronic $t\bar{t}$ systems in the final states.
In addition the measurement of the difference $m_Z - m_W$ will be pursued, setting a first step towards a potential measurement of the W mass with jet substructure.

T 138.3 Thu 18:00 HSZ/0405

First results from inclusive jet measurement with Run2 data at CMS — •Valentina Guglielmi[1], Katerina Lipka[1], Simone Amoroso[1], Patrick Connor[2], and Roman Kogler[1] — [1]Deutsches Elektronen-Synchrotron DESY, Notkestraße 85, D-22607 Hamburg — [2]University Hamburg, Hamburg, Germany

We present preliminary results of the measurement and QCD analysis of double-differential inclusive jet cross sections in proton-proton collisions by using the full Run2 data collected by CMS experiment at a center of mass energy of s = 13 TeV. The higher accumulated luminosity, compared with the previous result, of full Run2 allows for an improved precision and opens up new corners of the phase space. This permits further testing of the Standard Model (SM) and facilitates indirect searches for physics beyond the SM. Our study addresses the high transverse momentum region, where possible contributions of new physics, e.g. different models of 4-quark contact interactions, are most significant. Furthermore, the precision of the parton distribution functions can be significantly improved and the strong coupling constant can be extracted. An overview of the current status of the measurement will be given, together with preliminary results of a simultaneous determination of alpha-s and PDFs at NNLO in QCD.

T 138.4 Thu 18:15 HSZ/0405

A novel method to measure the jet energy resolution from dijet events at CMS — •Yannick Fischer[1], Johannes Haller[1], Andrea Malara[2], Alexander Paasch[1], and Matthias Schröder[1] — [1]Universität Hamburg — [2]Université Libre de Bruxelles

The jet energy is a key observable for almost all analyses at the CMS experiment at the CERN LHC. A precise knowledge of the jet energy resolution (JER) is crucial for both measurements and searches. This talk will give a brief overview over JER measurements at CMS. A novel method based on the missing transverse momentum fraction (MPF) technique is introduced. The new approach provides a JER measurement complementary to existing methods and aims at avoiding several of their dominant uncertainties. In this talk, we will introduce the new method and show first results with the recent CMS data.

T 138.5 Thu 18:30 HSZ/0405

Production of interpolation grids for inclusive jet cross sections at ALICE — •Hector Pillot[1,2], Rachid Guernane[3], and Klaus Rabbertz[2] — [1]Grenoble Alpes University (UGA) — [2]Karlsruhe Institut of Technology (KIT) — [3]Laboratory of Subatomic Physics & Cosmology (LPSC)

The APPLfast project interfaces APPLgrid and fastNLO with the fixed-order cross section integrator NNLOJet. This produces interpolation grids that allow fast and accurate iterative computation of observables up to NNLO with different PDF sets or renormalization and factorization scales. This interface is employed in a workflow using the LAW and LUIGI packages for workflow management. As an example, differential cross sections of inclusive jet production from pp collisions at a center-of-mass energy of 5.02 TeV are computed within this workflow and are compared to experimental data from the ALICE collaboration. The cross sections are measured as a function of the jet p_T and jet size parameter R. The cross sections are also compared using different PDF sets including PDF uncertainties and renormalization and factorization scale variations.