T 70: QCD (Experiment)

Zeit: Mittwoch 16:00–17:45   Raum: H10

T 70.1   Mi 16:00   H10

Prospects for a precise determination of PDFs from measurements of the dijet cross section at $\sqrt{s} = 13$ TeV with the CMS detector — Günter Quast, Klaus Rabbertz, and ●Daniel Savoiu — Institut für Experimentelle Teilchenphysik, Karlsruher Institut für Technologie (KIT)

Precision studies at hadron colliders play an increasingly important role in the search for new or rare physics phenomena. An essential prerequisite for these studies is the precise knowledge of the Parton Distribution Functions (PDFs) of the proton, which are not predicted by theory and must therefore be determined experimentally.

Dijet production is particularly well-suited for this purpose. Not only are pairs of jets produced in abundance at the LHC, maximizing the statistical precision, but the different topologies of dijet events can be exploited in a triple-differential cross section measurement for a more precise determination of PDFs.

In the presented analysis of data taken with the CMS detector at an energy of 13 TeV, the dijet phase space is divided in terms of the boost of the dijet system, the rapidity separation of the two jets, and the average jet transverse momentum.

T 70.2   Mi 16:15   H10

Measurements of the total charm cross section with the CMS detector — ●Nur Zulaiha Jomhari and Achim Geiser — DESY, Hamburg, Germany

The main objective of this project is to measure the total cross section for inclusive charm production at different proton-proton center of mass energies (0.9, 2.7, 5, 7, 8, and 13 TeV). The measurement of charmed meson production is one of the ways to verify the corresponding Standard Model prediction. In previous LHC analyses, the CMS, ATLAS and ALICE experiments covered only small fractions of the available phase space while the LHCb experiment fully covered the forward region, $0 < p_T < 15$ GeV and $2.0 < y < 4.5$.

For this project, we measure the charm cross section through the decays $D^* \rightarrow D^0 \pi_s$ and $D^0 \rightarrow K^- \pi^+$ in the full rapidity range not covered by LHCb and down to $p_T \sim 1$ GeV. The challenge is the acceptance of the D mesons at this low p_T. Combining with the LHCb measurements, essentially the full phase space will be covered. In this talk, the ongoing analysis on this project will be presented.

T 70.3   Mi 16:30   H10

Measurement of the triple differential inclusive Z ($\rightarrow \mu\mu$) + 1 jet cross section at $\sqrt{s} = 13$ TeV with the CMS detector and constraints on the proton structure — ●Thomas Berger, Klaus Rabbertz, and Günter Quast — Karlsruher Institut für Technologie

This talk presents a measurement of the triple differential inclusive Z($\rightarrow \mu\mu$) + 1 jet cross section in proton-proton collisions at the LHC at $\sqrt{s} = 13$ TeV. The data represent an integrated luminosity of 35.8 fb^{-1} collected with the CMS detector in 2016. The cross section is measured as a function of the Z boson's transverse momentum p_T^Z, the rapidity separation y^* of the Z boson and the leading jet, and the boost y_b of their center-of-mass system. The analysis is performed simultaneously with a variable Φ_η^* determined from muon angular information. Cross section predictions have been derived at next-to-next-to-leading order. The measured cross sections are corrected for detector effects and compared with the predictions to obtain constraints on the parton distribution functions of the proton.

T 70.4   Mi 16:45   H10

Amplitude analysis of the $\Lambda_b^0 \rightarrow \Lambda_c^+ \overline{D}^0 K^-$ decay at the LHCb experiment — ●Alessio Piucci, Stephanie Hansmann-Menzemer, Sebastian Neubert, Marian Stahl, and Nicola Skidmore — Physikalisches Institut, Heidelberg, Germany

Pentaquark-like candidates have been observed in 2015 by the LHCb

experiment in the $\Lambda_b^0 \rightarrow J/\psi pK^-$ decay. Since then a variety of theoretical models and predictions have been proposed to describe their nature. One of the most prevalent ones interprets the two pentaquark states as $\overline{D}\Sigma_c^*$ and $\overline{D}^*\Sigma_c$ hadronic molecules, predominantly decaying into $\overline{D}^{0*}\Lambda_c^+$. This talk will focus on the amplitude analysis of the $\Lambda_b^0 \rightarrow \Lambda_c^+ \overline{D}^0 K^-$ decay using the full LHCb dataset; this decay is a golden channel for testing the validity of the above-mentioned molecular model. In addition to the two already-observed pentaquark candidates, possible extra hidden-charm pentaquark states are predicted to lie in the mass range investigated by the analysis.

T 70.5   Mi 17:00   H10

Tuning studies of the `Pythia8` generator using LEP and LHC data — ●Thea Engler, Andrea Knue, and Gregor Herten — University of Freiburg, Institute of Physics

For the simulation of particle physics processes in high energy physics, Monte Carlo (MC) generators are heavily used. The different parton shower and hadronisation models have parameters which cannot be deduced from first principles, but which can be varied in a well-defined range in order to find the best values to describe the data distributions well (MC tuning). The tuning step is done by varying several parameters, performing an interpolation for each bin of the distribution and comparing the simulated distributions to data. This is done with the `Professor` framework. In this talk a tune of the `Pythia8` generator using data from both the LEP and the LHC experiments is presented. The focus lies on the tuning of the hadronisation model.

T 70.6   Mi 17:15   H10

Pileup mitigation in CMS with PileUp Per Particle Identification (PUPPI) — ●Anna Benecke and Andreas Hinzmann — Universität Hamburg

Every bunch crossing at the LHC has not only one proton-proton interaction but several. These additional proton-proton interactions are called pileup interactions. With the increasing luminosity of the LHC also the number of pileup interactions per bunch crossing increased in the past years and it will reach up to 140 pileup interaction during high-luminosity LHC operation. Removing the pileup from an event is essential, because pileup does not only affect the jet energy but also other event observables as for example the missing transverse energy, the jet substructure, jet counting and the lepton isolation. To account for these pileup effects various techniques like charged hadron subtraction, pileup jet ID, delta-beta correction for lepton isolation are used within CMS, but meanwhile a new technique, PUPPI, has been introduced and extensively tested on 2016 data. This talk will explain the algorithm behind PUPPI and shows the first Data to MC comparison plots of the variables of PUPPI.

T 70.7   Mi 17:30   H10

ρ^0 Photoproduktion in HERA — ●Arthur Bolz — Physikalisches Institut, Heidelberg

Exklusive Photoproduktion von ρ^0 Mesonen in HERA wird mit dem H1 Detektor studiert. Ein Datensatz mit c.a. 700000 $\rho^0 \rightarrow \pi^+\pi^-$ Zerfällen wird verwendet, um Wirkungsquerschnitte als Funktion der invarianten Dipion-Masse $m_{\pi^+\pi^-}$, der Photon-Proton Kollisionsenergie $W_{\gamma p}$ und des quadratischen Impulsübertrags am Proton-Vertex t zu messen. Der zugängliche Phasenraum ist $0.4 < m_{\pi^+\pi^-}$ [GeV] < 2.2, $20 < W_{\gamma p}$ [GeV] < 80 und $-1.5 < t$ [GeV^2] < 0. Ereignisse mit elastisch gestreuten Protonen werden statistisch von solchen getrennt, in denen das Proton in ein hadronisches System mit kleiner invarianter Masse dissoziiert. Die gemessenen Wirkungsquerschnitte und kinematischen Abhängigkeiten werden mittels Fits parametrisiert und mit phänomenologischen Modellen verglichen. Der Datensatz wurde in den Jahren 2006-2007 mit dem H1 Fast Track Trigger aufgezeichnet. Er entspricht einer integrierten Luminosität von 1.3 pb^{-1}.