T 30: Elektroschwache Wechselwirkung 2

Zeit: Dienstag 11:00–12:30 Raum: JUR 372

T 30.1 Di 11:00 JUR 372

Messung des CKM-Winkels γ im Zerfall $B_s^0 \to D_s^+ K^- \pi^+ \pi^-$ mit dem LHCb Experiment — •Matthieu Kecke für die LHCb-Kollaboration — Physikalisches Institut Heidelberg

Mit der präzisen Bestimmung der CKM-Phasen lassen sich die Vorhersagen der schwachen Wechselwirkung im Standardmodell der Teilchenphysik überprüfen. Insbesondere erlaubt die genaue Vermessung des Unitaritätsdreiecks die Suche nach möglichen Effekten neuer Physik. Der CKM-Winkel γ ist dabei die bis heute am ungenauesten bestimmte Grösse des Unitaritätsdreiecks.

Für die vorgestellte Messung von γ wird ein Maximum-Likelihood-Fit an die Lebensdauerverteilung von B_s^0 Signal-Kandidaten durchgeführt. Der in der Lebensdauerverteilung auftretende Akzeptanzeffekt, welcher durch die Geometrie des LHCb Detektors und den Prozess der Ereignisrekonstruktion hervorgerufen wird, wird untersucht und korrigiert. Die zeitliche Auflösung des Detektors wird mithilfe prompter D_s^+ Kandidaten bestimmt und im Fit berücksichtigt. In der Analyse werden Daten benutzt, welche in den ersten beiden Läufen des LHC bei Schwerpunktsenergien von $\sqrt{s} = 7$, 8 und 13 TeV gesammelt worden sind.

T 30.2 Di 11:15 JUR 372

Die Suche nach den seltenen Zerfällen $\mathbf{B^0_{(s)} \to \mu^+\mu^-\mu^+\mu^-}$ mit Daten des LHCb-Experimentes — •Tobias Tekampe und Johannes Albrecht — TU Dortmund

Seltene Zerfälle von B-Mesonen bieten eine vielversprechende Möglichkeit für die Sucher nach Physik jenseits des Standardmodells (SM). Das für den Zerfall $B^0_{(s)} \to \mu^+\mu^-\mu^+\mu^-$ vom SM vorhergesagte Verzweigungsverhältnis ist von der Ordnung 10^{-11}. In Erweiterungen des SM, in denen der Zerfall über neue skalare und pseudoskalare Teilchen stattfinden kann, ist dieses Verzweigungsverhältnis stark erhöht. Das LHCb-Experiment hat den weltgrößten Datensatz an B-Mesonzerfällen aufgezeichnet, mit dem die präzise Messung dieser seltenen Zerfälle möglich ist. In diesem Vortrag wird die kürzlich veröffentlichte Messung des Verzweigungsverhältnisses des Zerfalls $B^0_{(s)} \to \mu^+\mu^-\mu^+\mu^-$ auf einem mit dem LHCb-Detektor aufgezeichneten Datensatz entsprechend einer integrierten Luminosität von $3\,\mathrm{fb}^{-1}$ vorgestellt.

T 30.3 Di 11:30 JUR 372

Search for rare $B \to (\pi^0, \eta, \eta')l^+l^-$ decays at Belle — •Maryam Salehi[1], Thomas Kuhr[2], and Martin Ritter[2] — [1]University of Malaya — [2]Ludwig Maximilians Universitaet

In the Standard Model (SM), the decay $B \to (\pi^0, \eta, \eta')l^+l^-$ proceeds through the flavor changing neutral current (FCNC) $b \to dl^+l^-$. These decays are forbidden at tree level and can only occur in higher orders. Therefore the predicted branching fractions in the SM are of the order of 10^{-8}. The $b \to dl^+l^-$ and $b \to sl^+l^-$ transitions provide a promising avenue to search for New Physics (NP). Amplitudes from these NP contributions can interfere with those from the SM, and significantly enhance the branching fractions from the SM predictions.

We will present a search for rare neutral current decays $B \to (\pi^0, \eta, \eta')l^+l^-$, $(l = e, \mu)$, using a sample of 772×10^6 $B\overline{B}$ pairs collected with the Belle detector at the e^+e^- asymmetric collider KEKB.

T 30.4 Di 11:45 JUR 372

Measurement of Tau Polarization in Z Boson Decays at ATLAS — •Benedict Winter, William Davey, and Jochen Dingfelder — Physikalisches Institut, Universität Bonn

Decays of the Z boson in the Standard Model violate parity, leading to a net polarization of the decay products. Z boson decays to pairs of tau leptons provide a unique opportunity to measure the tau polarization by using the kinematics of the subsequent tau decays, hence testing the Standard Model predictions. They also provide a unique opportunity to pioneer experimental techniques that assess the tau helicity and may be used in searches for new particles and to study the Higgs boson.

In this talk the status of a measurement of the tau polarization in $Z \to \tau\tau$ decays is presented. The analysis is based on the 20.3 fb^{-1} collected at a center of mass energy of $\sqrt{s} = 8$ TeV by the ATLAS experiment. The tau polarization is measured in events in which one tau decays leptonically and the other decays hadronically by using the kinematics of the hadronic decay.

T 30.5 Di 12:00 JUR 372

Polarization Measurement at the International Linear Collider (ILC) — •Robert Karl[1,2] and Jenny List[1] — [1]DESY Hamburg — [2]University of Hamburg

The ILC is a planned electron-positron collider with center-of-mass energies of up to 500 GeV, upgradeable to 1 TeV. Thereby, the electron beam will be polarized to 80% and the positron beam up to 60%. This allows a very precise measurement of the standard model parameters (e.g. for top quarks) and accurate searches for physics beyond the standard model.

To fully exploit the ILC potential, the precision of the polarization has to be known at the permille-level. This is roughly a factor 2 to 5 better than previously achieved at comparable accelerators. In addition to the direct measurement with Compton-polarimeters, the polarization can also be extracted from the long-term cross section measurement of very well known standard model processes.

In this contribution, a unified approach for measuring the luminosity-weighted average polarization will be presented combing the cross-section measurements from all suitable processes, as well as constraints from the polarimeters considering all statistical and systematical uncertainties including their correlations. In the context of the up to date ILC running scenario, the achievable precision will be presented for different center-of-mass energies. In that respect, the importance of a fast helicity reversal for both beams, which enables the cancellation of time-dependent systematic uncertainties, will be discussed.

T 30.6 Di 12:15 JUR 372

Building a Tracking Detector for the P2 Experiment — •Marco Zimmermann for the P2-Collaboration — Institute for Nuclear Physics, Johannes Gutenberg University, Mainz — PRISMA Cluster of Excellence

The P2 Experiment aims to measure the weak mixing angle at low Q^2 via the parity violating assymetry in elastic electron-proton scattering. It will be located at the new Mainz Energy Recovery Superconducting Accelerator (MESA), which will provide a 150 μA beam of alternatingly polarized 150 MeV electrons.

While the main asymmetry measurement is performed with integrating Cherenkov detectors, the tracking system is developed in order to determine the average momentum transfer of the electron and to reconstruct individual electron tracks for systematic studies. It will be built using the new technology of High Voltage Monolithic Active Pixel Sensors (HV-MAPS) made of silicon thinned to 50 μm. Each of the tracking layers is envisaged to have a disc-like geometry. They are arranged as two double layers.

The high signal and background particle rates are the main challenge for the tracking system. The expected rate of electrons that are scattered in the liquid hydrogen target and hit the tracking system is of the order $10^5 \mathrm{mm}^{-2}\mathrm{s}^{-1}$ and is overwhelmed by partly more than 10^7 $\mathrm{mm}^{-2}\mathrm{s}^{-1}$ bremsstrahlung photons. Background particle rates of photons and other secondary particles are analysed in a Geant4-based Monte-Carlo simulation. In addition, measurements of the sensor response to photons are presented and compared to the simulation.