

T 8: Eingeladene Vorträge 3

Zeit: Donnerstag 14:00–16:20

Raum: ZHG 011

Eingeladener Vortrag T 8.1 Do 14:00 ZHG 011
Baryon asymmetry of the Universe: a non-equilibrium QFT approach — ●ALEXANDER KARTAVTSEV — MPIK, Heidelberg

Today the observed universe almost entirely consists of matter, i.e. is baryonically asymmetric. A very attractive explanation of the observed asymmetry is provided by the baryogenesis via leptogenesis scenario. According to this scenario the excess of matter over antimatter has been generated by the CP-violating decay of heavy Majorana neutrinos.

CP-violation is an inherently quantum phenomenon. In the hot and expanding early Universe this as well as other quantum phenomena affecting the asymmetry generation can be studied using methods of non-equilibrium quantum field theory.

Applying these methods to the Standard Model supplemented by three right-handed neutrinos we find that the medium effects enhance the CP-violating parameter and, to a lesser extent, the total decay width. The medium effects also modify the scattering rates.

From theoretical and phenomenological point of view particularly interesting is the regime of resonant leptogenesis. It is realized for quasidegenerate mass spectrum of the Majorana neutrinos. In this regime we find considerable deviations from results of the canonical analysis. In the maximal resonant regime the usual Boltzmann picture breaks down and the oscillation effects start to play an important role.

Diskussion**Eingeladener Vortrag** T 8.2 Do 14:35 ZHG 011
CMS results of SUSY searches with leptons in the final state — ●MARTIN NIEGEL — Institut für Experimentelle Kernphysik, KIT, Karlsruhe

Supersymmetry (SUSY) is a favored candidate for physics beyond the Standard Model (SM), since it not only allows for gauge coupling unification with SUSY particles in the TeV range, but it also provides a candidate for the elusive dark matter in the form of the lightest neutralino. At the Large Hadron Collider, the CMS Collaboration searches for the production of SUSY particles in proton-proton collisions at a center-of-mass energy of 7 TeV. Many SUSY scenarios, including the Constrained Minimal Supersymmetric extension of the Standard Model (CMSSM), predict a substantial amount of SUSY events containing isolated leptons, while Standard Model background events are strongly reduced by requiring isolated leptons in the final state. This presentation gives an overview about recent results of the searches for Supersymmetry with leptons in the final state based on data collected in 2011 with the CMS detector.

Diskussion**Eingeladener Vortrag** T 8.3 Do 15:10 ZHG 011**Precision event generation for the LHC** — ●STEFAN HÖCHE — SLAC National Accelerator Laboratory, Menlo Park, USA

In order to maximize the discovery potential of the Large Hadron Collider, precise predictions are needed for a multitude of Standard Model reactions. Signals for new physics may be hidden in overwhelming backgrounds, which have to be controlled in order to find anomalies withstanding detailed scrutiny.

Tremendous progress was made in recent years to improve the theoretical description of these backgrounds using next-to-leading order (NLO) QCD. This talk reviews some of the essential aspects of modern multi-jet NLO calculations and presents results in comparison to recent LHC data.

The need for theoretical predictions at the particle level has spurred the development of so-called matching algorithms, which connect NLO parton-level results and parton showers as part of general-purpose Monte-Carlo event generators. The theoretical challenges of these methods for large jet multiplicity are discussed with particular emphasis on the correct treatment of subleading colour and soft gluon effects.

Diskussion**Eingeladener Vortrag** T 8.4 Do 15:45 ZHG 011
Das Upgrade des CMS Silizium-Trackers für den HL-LHC — ●ANDREAS MUSSGILLER — Deutsches Elektronen-Synchrotron DESY

Der innere Spurdetektor des CMS-Experiments am LHC ist für eine Luminosität von bis zu $10^{34} \text{ cm}^{-2} \text{ s}^{-1}$ ausgelegt. Mit der Erweiterung auf den HL-LHC, den High Luminosity-LHC, die für die Zeit nach 2020 geplant ist, ist ebenfalls eine Anpassung und Erweiterung des CMS Trackers nötig. Um die gesteigerte Teilchendichte zu bewältigen, soll die Granularität des Detektor deutlich erhöht und dennoch die Menge an passivem Material verringert werden. Die zu erwartende Strahlenbelastung erfordert auch den Einsatz von strahlenhärteren Sensoren und deren Kühlung auf unter -10 °C . Darüber hinaus ist geplant, Spurinformatoren des Trackers bereits im Level-1 Trigger von CMS zu verwenden. Hierfür wird jedes Detektor-Modul in der Lage sein, lokal den Transversalimpuls eines Teilchens zu bestimmen. Die laufenden Forschungs- und Entwicklungsarbeiten für das künftige Detektormodul beinhalten neben dem eigentlichen Design und den dazugehörigen thermischen und thermo-mechanischen Finite-Element-Modellierungen auch die Charakterisierung von Teststrukturen und neuartigen Materialien für z.B. das Wärmemanagement.

Der Vortrag gibt einen Überblick über die zahlreichen Tracker Upgrade Aktivitäten und einen detaillierten Einblick in die Entwicklung des Detektormoduls für den zukünftigen Spurdetektor von CMS.

Diskussion