T 14: Beyond the Standard Model (Theorie) 1

Convenor: Andreas Weiler

Zeit: Montag 11:00–13:00 Raum: WIL-A124

T 14.1 Mo 11:00 WIL-A124

Production of Diquarks at LHC — Wolfgang Kilian and •Marco Sekulla — Universität Siegen, Deutschland

Diquarks are part of various models of Physics Beyond the Standard Model, for instance in Grand Unified Theories. In this talk we present a model-independent calculation of the production cross section of scalar diquarks at the LHC for beam energies of $\sqrt{s} = 14$ TeV. The production of a single diquark is calculated up to next-to-leading order in the strong coupling constant α_s, and the diquark pair production up to leading order.

T 14.2 Mo 11:15 WIL-A124

Strong Signatures of Right-Handed Compositeness — Michele Redi[1,2], Veronica Sanz[2,3], •Maikel de Vries[4], and Andreas Weiler[4] — [1]INFN, 50019 Sesto F., Firenze, Italy — [2]CERN, Theory Division, CH-1211, Geneva 23, Switzerland — [3]Department of Physics and Astronomy, York University, Toronto, Canada — [4]DESY, Notkestrasse 85, D-22607 Hamburg, Germany

Right-handed light quarks can be significantly composite and still be compatible with experimental searches at the LHC and precision tests on Standard Model couplings. In these scenarios, which are also motivated by flavor physics, one expects large cross sections for the production of new resonances coupled to the light quarks. We study possible experimental strong signatures of right- handed compositeness at the LHC and constrain the parameter space of these scenarios with recent results by ATLAS and CMS. We show that the LHC sensitivity could be significantly improved if dedicated searches were performed in particular in multi jet signals.

T 14.3 Mo 11:30 WIL-A124

Simplified Models and the Interpretation of Supersymmetry Searches — Michael Krämer[1], Lennart Oymanns[1], •Jory Sonneveld[1], and Wolfgang Waltenberger[2] — [1]Institute for Theoretical Particle Physics and Cosmology, RWTH Aachen, Germany — [2]Institut für Hochenergiephysik, Vienna, Austria

With new results and limits on constrained models of supersymmetry (SUSY) from the ATLAS and CMS collaborations at the LHC, questions arise what these limits imply for more general models of SUSY or other models for physics beyond the Standard Model. Since SUSY has a vast array of parameters, both collaborations also quantify their search results in terms of simplified models, augmenting the particle spectrum of the standard model with only a very limited set of new, hypothetical particles.

In our work presented here, we focus on "all-hadronic" (multijet plus missing transverse energy) searches at the LHC and set limits on simplified models parametrized by the squark, gluino and lightest SUSY particle (LSP) masses. This is a more general and complex parametrization than the one usually adopted by the LHC experiments, where a squark or gluino is decoupled from the simplified model. The limits we set will then be compared with limits which are directly deduced for specific SUSY and other new physics models to test the usability and possible interpretations of the simplified model results.

T 14.4 Mo 11:45 WIL-A124

Search for stop pair production at the LHC with sneutrino LSP — •Lukas Mitzka and Werner Porod — Institut für Theoretische Physik und Astrophysik, Universität Würzburg, Würzburg, Germany

We investigate scenarios in which the stop decays through a three body decay into a sneutrino LSP, as predicted by theories with extended gauge groups. We study how much the data from the 7 TeV and 8 TeV runs can possibly constrain such scenarios. For this we perform a Monte Carlo study of stop pair production including all irreducible and reducible backgrounds and a detector simulation.

T 14.5 Mo 12:00 WIL-A124

Determining the stau yield from LHC data — •Jan Heisig[1], Joern Kersten[1], Boris Panes[1], and Tania Robens[2] — [1]II. Institute for Theoretical Physics, University of Hamburg, Germany — [2]IKTP, TU Dresden, Germany

One solution to the cosmological gravitino problem appearing in R-parity conserving SUSY is to make the gravitino the lightest supersymmetric particle (LSP) and thus stable. In such a scenario the next-to-LSP (NLSP) tends to be long-lived and a similar cosmological problem appears – the decays of the NLSP in the early universe might endanger the success of big bang nucleosynthesis (BBN). The preservation of BBN translates into a bound on two parameters: the stau lifetime and the stau yield after freeze-out. In this talk we will present the phenomenology of a stau NLSP scenario in the light of the LHC results obtained so far and we will discuss the question of whether we are able to determine the stau yield from the measurements at the LHC in the case of a respective discovery.

T 14.6 Mo 12:15 WIL-A124

Improved predictions for interference effects of new physics — •Elina Fuchs, Silja C. Thewes, and Georg Weiglein — DESY Hamburg, Germany

The "narrow-width approximation" (NWA) is a convenient tool for the factorisation of a more complicated process into production and subsequent decay of a particle with a small width compared to its mass.

However, this approximation cannot be applied in the case of sizable interferences between propagator contributions of different particles that are close to their mass shell. For such cases, a generalisation of the usual NWA is analysed which allows for a consistent treatment of interference effects between nearly mass-degenerate particles. This can be useful for the application to processes for which the factorisation into different sub-processes is essential to enable the computation of higher-order contributions.

Phenomenological consequences with interference effects between neutral MSSM Higgs bosons will be presented for the example process of Higgs boson production and its subsequent decay from the decay of a heavy neutralino. Vertex corrections are included at the one-loop level, for which stable on-shell renormalisation schemes of the neutralino sector will be discussed. As a validation of the interference- and higher-order-improved NWA, the factorised approximation will be compared to the calculation of the full process at the one-loop level.

T 14.7 Mo 12:30 WIL-A124

LHC phenomenology of a Z' decaying into supersymmetric particles — •Manuel E. Krauss[1], Ben O'Leary[1], Werner Porod[1], and Florian Staub[2] — [1]Universität Würzburg, Germany — [2]Universität Bonn, Germany

We consider a supersymmetric version of the standard model extended by an additional $U(1)_{B-L}$. We point out that a proper treatment of gauge kinetic mixing is necessary in this model as it severely affects the production and decays of the Z' and also reduces its current collider bounds significantly. We further show that Z' decays into sleptons may be an important discovery channel for sleptons with masses up to several hundred GeV at the LHC in the 14 TeV phase.

T 14.8 Mo 12:45 WIL-A124

Comparison of the CE$_6$SSM with results from the LHC — •Philip Diessner — IKTP, TU Dresden

The Constrained Exceptional Supersymmetric Standard Model (CE$_6$SSM) is an extension of the MSSM and provides further predictions like a Z' and exotic strongly-interacting particles. Results of the LHC experiments for exclusion limits on supersymmetry are often presented in the framework of the CMSSM in the m_0-$M_{1/2}$-plane. In this talk, I will show how results at $\sqrt{s} = 7$ TeV and $\int L = 4.7$ fb^{-1} are extended to the CE$_6$SSM using public tools and what can be learned from LHC data on the CE$_6$SSM mass spectrum.