

T 4: Supersymmetrie 1

Zeit: Montag 11:00–12:15

Raum: P4

T 4.1 Mo 11:00 P4

Particle Flow from First Principles to Gaugino Property Determination at the ILC — •MADALINA CHERA^{1,2}, MIKAEL BERGGREN¹, and JENNY LIST¹ — ¹DESY, Notkestraße 85, 22607 Hamburg, Germany — ²Universität Hamburg, Inst. f. Exp.-Physik, 22761 Hamburg

The physics programme of the planned International Linear Collider (ILC) comprises very high precision measurements of phenomena beyond the Standard Model. The detector designs for the ILC have been particularly optimised for the concept of particle flow, using a GEANT4 based detector simulation of the International Large Detector (ILD). In order to benchmark the detector and reconstruction performance, a study case which challenges the particle flow algorithm has been chosen. The gaugino pair production, in a scenario where the $\tilde{\chi}_1^\pm$ and $\tilde{\chi}_2^0$ are mass degenerate and decay almost exclusively into $W^\pm \tilde{\chi}_1^0$ and $Z^0 \tilde{\chi}_1^0$, respectively, is dominated by the hadronic decays of the gauge bosons. The four jet + missing four-momenta signature has to be separated into contributions from $\tilde{\chi}_1^\pm$, $\tilde{\chi}_2^0$ and standard model background. The energy distribution of the reconstructed gauge bosons is then used to measure the gaugino masses. Two different methods for extracting the gaugino masses will be compared. Furthermore, the obtained resolutions on the gaugino masses and polarised cross-sections will be presented for different levels of realism in the ILD simulation.

T 4.2 Mo 11:15 P4

Search for direct stop production in final states with jets, b-jets and missing transverse momentum with the ATLAS detector — •CLAUDIA GIULIANI and FRANCESCA C. UNGARO — Albert-Ludwigs-Universität, Freiburg, Deutschland

Supersymmetry is one of the most promising extensions of the Standard Model of particle physics. It solves the hierarchy problem for the Higgs boson mass and gives a good candidate for the dark matter in the universe. Following naturalness arguments, the gluino should not be heavier than about 2 TeV and the supersymmetric partner of the top quark, the stop, should have a mass below about 1 TeV. To date, no supersymmetric signal has been found and tight limits have been placed on gluino masses. Searches for third generation squarks were already able to exclude large areas of the parameter space. In the hope to find the partners of the top and bottom quarks below the naturalness threshold of 1 TeV, many efforts are ongoing to explore thoroughly the available phase space for different decay channels.

The focus of this presentation is on the search for direct stop production in final states with jets, b-tagged jets and and large missing transverse momentum.

The 2012 ATLAS dataset is analysed, which corresponds to an integrated luminosity of 20.3 fb^{-1} of LHC pp -collisions at 8 TeV.

In particular, the top background estimate and the signal selection optimisation, done to increase the sensitivity in a simplified model where the stop decays to top plus neutralino with a branching ratio of 100%, are discussed.

T 4.3 Mo 11:30 P4

Analyse multivariater Methoden zur Trennung von Signal und Untergrund in Zerfällen des supersymmetrischen Stop-

Squarks bei ATLAS — •DANIELA BÖRNER, PETER MÄTTIG und SEBASTIAN FLEISCHMANN — Bergische Universität Wuppertal

Supersymmetrie (SUSY) ist eine Erweiterung des Standardmodells der Teilchenphysik (SM), welche das Naturalness-Problem lösen könnte. Dazu muss zumindest das Stop-Squark relativ leicht sein. Im Rahmen des ATLAS-Experiments wird der Zerfall des Stop-Squarks in ein Top-Quark und ein Neutralino untersucht, welches als das leichteste supersymmetrische Teilchen angenommen wird. Stop-Squarks werden in dem untersuchten Modell nur paarweise erzeugt, daher ist der Hauptuntergrund für diesen Prozess der SM $t\bar{t}$ -Zerfall. Beiden Prozesse weisen die gleichen sichtbaren Endzustände auf.

Um die Sensitivität des bisherigen, auf einfachen Schnitten basierenden Ansatzes zu erhöhen, wird eine auf multivariaten Techniken beruhende Analyse vorgestellt. Zusätzlich werden neue, auf der Kinematik des Zerfalls beruhende Observablen genutzt, um die Trennkraft weiter zu erhöhen.

T 4.4 Mo 11:45 P4

Suche nach stop-Quarks mittels Spinkorrelationsmessungen mit dem ATLAS-Detektor am LHC — •NICOLAS KÖHLER, OLIVER KORTNER und HUBERT KROHA — Max-Planck-Institut für Physik, Werner-Heisenberg-Institut, München

Die Suche nach Paarproduktion von stop-Quarks am LHC wird durch den enormen Untergrund von $t\bar{t}$ -Paarproduktion erschwert, der nur schwer von einem potentiellen stop-Quark-Signal getrennt werden kann. Die Unterschiede in den Korrelationen der Spins der Zerfallsleptonen im Signalprozess und im $t\bar{t}$ -Untergrund könnten eine bessere Trennung zwischen Signal und Untergrund ermöglichen. Die Unterschiede rühren daher, dass Paare skalarer stop-Quarks anders als Paare fermionischer top-Quarks keine Spinkorrelation aufweisen. Im Vortrag wird besprochen, inwieweit Spinkorrelationsmessungen die Empfindlichkeit auf leichte stop-Quarks erhöhen.

T 4.5 Mo 12:00 P4

Limits on Simplified Models — •LENNART OYMANNS¹, JORY SONNEVELD¹, MICHAEL KRÄMER¹, WOLFGANG WALTENBERGER², JAN HEISIG¹, and LISA EDELHÄUSER¹ — ¹RWTH Aachen — ²HEPHY Vienna

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 test the usability of simplified models parametrized by the squark, gluino and lightest SUSY particle (LSP) masses. By comparing results of different variants of these simplified models we wish to point out the possibilities and limitations of using simplified models to estimate limits on SUSY and other BSM models.