

T 103: Suche nach Supersymmetrie 5

Zeit: Donnerstag 16:45–19:00

Raum: JUR 498

T 103.1 Do 16:45 JUR 498

Search for resonant slepton production in R-parity violating SUSY scenarios with CMS — ●PHILIPP MILLET, THOMAS HEBBEKER, ARND MEYER, and SEBASTIAN THÜER — III. Physikalisches Institut A, RWTH Aachen University

Supersymmetric models with R-parity violation can allow the resonant production of sleptons in proton proton collisions. These processes violate lepton number conservation and are not present in conventional SUSY scenarios, where R-parity is conserved.

A search for resonant production of second generation sleptons ($\tilde{\mu}$, $\tilde{\nu}_\mu$) with two same-sign muons and at least two jets in the final state is presented. One muon is expected to be produced directly in the decay of the slepton, while the other muon and at least two jets are produced in the subsequent decay of a neutralino or chargino originating from the resonantly produced slepton.

The analysis is based on the 2016 dataset of proton proton collisions recorded with the CMS detector at a centre-of-mass energy of 13 TeV.

T 103.2 Do 17:00 JUR 498

Search for supersymmetry in dileptonic final states with jets with the JZB method at CMS using Run II data — ●MARIUS TEROERDE, LUTZ FELD, and CHRISTIAN SCHOMAKERS — 1. Physikalisches Institut B, RWTH Aachen University

Supersymmetry (SUSY) is a popular extension of the standard model of particle physics, as it would solve a variety of problems in particle physics. In the model considered in the presented analysis, a possible final state contains jets as well as the stable lightest supersymmetric particle (LSP), which is produced together with a leptonically decaying Z boson. Thus, the signal is characterized by two same-flavor opposite-sign leptons, missing transverse energy (MET) and the presence of two or more jets. An important background for this search is the Drell-Yan process with additional jets, as it has a similar event topology. In contrast to SUSY events, Drell-Yan events only contain instrumental MET. Therefore, the variable "jet-Z balance" (JZB), which takes the transverse momentum of the Z boson and the hadronic recoil into account, is distributed differently for Drell-Yan and SUSY events. This allows the definition of a signal depleted control region which is used to predict the Drell-Yan background. The JZB method was successfully used in several analyses at $\sqrt{s} = 7 - 8$ TeV.

This talk shows the application of the method on data taken in 2015 and 2016 in two separate searches for supersymmetry.

T 103.3 Do 17:15 JUR 498

Suche nach Supersymmetrie mit versetzten Leptonpaaren beim ATLAS-Experiment am LHC — ●DOMINIK KRAUSS, ZINONAS ZINONOS und HUBERT KROHA — Max-Planck-Institut für Physik, München

Supersymmetrie nahe der TeV-Skala ist eine elegante Möglichkeit, um das Hierarchieproblem zu lösen und die geringe Masse des Higgs-Bosons zu erklären. Die meisten Suchen nach Supersymmetrie am LHC konzentrieren sich auf den Fall, dass das leichteste supersymmetrische Teilchen (LSP) stabil und die anderen supersymmetrischen Teilchen kurzlebig sind. In dieser Analyse werden beide Annahmen fallen gelassen und der Fall betrachtet, bei dem das LSP rein leptonisch zerfällt und seine Lebensdauer im Bereich von Pikosekunden bis Nanosekunden liegt, so dass der Zerfall als sekundärer Vertex im Innerdetektor rekonstruiert werden kann. In diesem Vortrag wird die Strategie zur Abschätzung des Untergrunds behandelt sowie die zu erwartende Sensitivität des ATLAS-Experiments auf ausgewählte Signalmodelle.

T 103.4 Do 17:30 JUR 498

Data-driven background estimates in searches for supersymmetry in final states with two same-sign leptons or three leptons, jets and E_T^{miss} with the ATLAS detector — ●PETER TORNAMBÉ and FABIO CARDILLO — Albert-Ludwigs Universität Freiburg

A search for supersymmetric phenomena in final states with two leptons with the same electric charge or three leptons, jets and missing transverse energy E_T^{miss} is presented. The production of same-sign lepton pairs or three leptons is only induced by rare Standard Model processes with very small cross-sections. The search thus profits from little background and has a good exclusion potential in compressed SUSY spectra and in scenarios where the R-parity is violated, and no stable

SUSY particles are produced. Except from the prompt production of same-sign lepton pairs, the main sources for SM processes contaminating the signal regions are fake-leptons and leptons with a charge mis-identification. While background originating from prompt same-sign lepton sources is estimated with simulated Monte Carlo events, the non-prompt sources are addressed with data-driven techniques. Within this talk, the current analysis strategy in Run-II will be presented focusing on the methods used for the background estimation and sensitivity optimisation. But also the latest results obtained during the 2015 and 2016 data-taking will be shown.

T 103.5 Do 17:45 JUR 498

A search for supersymmetry at 13 TeV with two same-sign leptons or three leptons at the ATLAS detector - Latest analysis results and statistical interpretations — ●FABIO CARDILLO and PETER TORNAMBÉ — Albert-Ludwigs Universität Freiburg

Supersymmetry (SUSY) is one of the most studied theories to extend the Standard Model. In R-Parity conserving (RPC) models, the lightest supersymmetric particle (LSP), which is typically the lightest neutralino $\tilde{\chi}_1^0$, is stable. In scenarios which allow a violation of the R-Parity (RPV), no stable SUSY particles are produced.

In this talk a search for supersymmetry in final states with two leptons of the same electric charge or three leptons, jets and E_T^{miss} is presented. While the same-sign signature is present in many SUSY scenarios, Standard Model processes leading to such events have very small cross-sections. Therefore, this analysis benefits from a small background in the signal regions leading to a good sensitivity especially in SUSY scenarios with compressed mass spectra.

This search was performed with the data recorded with the ATLAS detector during the years 2015 and 2016 corresponding to a total integrated luminosity of 13.2 fb^{-1} . The sensitivity to a big variety of supersymmetric models is illustrated by the interpretation of the results in the context of several SUSY benchmark scenarios. No significant excess above the Standard Model prediction is observed. The results can be used to set model-independent limits to new physics signals as well as deriving limits on the masses of the superpartners in different SUSY scenarios.

T 103.6 Do 18:00 JUR 498

Search for Supersymmetry in final states with two opposite-sign same-flavor leptons, jets, and p_T^{miss} in pp collisions at $\sqrt{s} = 13$ TeV with the CMS experiment — ●CHRISTIAN SCHOMAKERS, CHRISTIAN AUTERMANN, LUTZ FELD, and MARIUS TEROERDE — 1. Physikalisches Institut B, RWTH Aachen University

One of the main purposes of the LHC is the search for new physics which is predicted by theories such as Supersymmetry (SUSY) and is necessary to solve several problems of the standard model. Cascade decays of SUSY particles often yield final states with hadronic activity and missing transverse energy. Signatures including leptons are of particular interest since standard model background processes are suppressed by this selection and can be predicted with good accuracy.

The invariant dilepton mass distribution can provide further information on possible decays of SUSY particles e.g. the mass difference between particles in the decay chain.

This talk covers the CMS SUSY dilepton edge search on the full dataset of 2016. Improvements with respect to previous searches have been made to cope with the large background statistics and the sensitivity to certain SUSY models was increased significantly.

T 103.7 Do 18:15 JUR 498

Datenorientierte Untergrundbestimmung für die Suche nach Supersymmetrie in multileptonischen Endzuständen mit dem ATLAS-Detektor — ●STEFAN MASCHKE, MICHAEL FLOWERDEW und HUBERT KROHA — Max-Planck-Institut für Physik, München, Deutschland

Supersymmetrie ist eine der beliebtesten Erweiterungen des Standardmodells welche unter anderem das Hierarchieproblem lösen kann. Sie sagt zu allen Standardmodellteilchen supersymmetrische Partner vorher, von denen bislang jedoch keines bei Collider-Experimenten nachgewiesen werden konnte. 2015 ist der LHC mit Proton-Proton Kollisionen bei einer Schwerpunktsenergie von $\sqrt{s} = 13$ TeV wieder in Betrieb gegangen, und die Suche nach supersymmetrischen Teilchen

wurde fortgesetzt.

Supersymmetrische Modelle mit Verletzung der R-Parität erlauben den Zerfall der leichtesten supersymmetrischen Teilchen in Leptonen. Die Signatur von vier oder mehr Leptonen im Endzustand hat einen besonders geringen Untergrund und eignet sich daher sehr gut zum Nachweis oder Ausschluss R-paritätsverletzender supersymmetrischer Modelle.

In diesem Vortrag wird die datenorientierte Bestimmung reduzierbarer Untergründe in dem vier-Lepton-Endzustand vorgestellt.

T 103.8 Do 18:30 JUR 498

Search for gluino-pair decays into multileptonic final states with the ATLAS detector — •MARIAN RENDEL, HUBERT KROHA, ZINONAS ZINONOS, and JOHANNES JUNGGEBURTH — Max Planck Institut für Physik

The search for supersymmetry (SUSY) is an important goal of the ATLAS physics program. If R-parity is conserved, the lightest supersymmetric particle is stable, leading to signatures with large missing transverse momentum. The high cross-section for strong production modes in proton-proton collisions at the Large Hadron Collider and the low background contributions in events with four or more leptons and

high jet multiplicity makes the search of such final SUSY states very interesting. This talk presents the optimization of the event selection of models involving four-lepton signatures from gluino-pair decays.

T 103.9 Do 18:45 JUR 498

Searches for R-parity violating Supersymmetry in multileptonic final states — •JOHANNES JUNGGEBURTH, ZINONAS ZINONOS, and HUBERT KROHA — Max-Planck-Institut für Physik

Supersymmetry is one of the most extensively tested theories in the physics programme of the Large Hadron Collider (LHC). If the discrete R-parity symmetry is conserved, the lightest supersymmetric particle (LSP) is stable, thus providing a dark-matter candidate. However, R-parity may be violated allowing the LSP to decay into Standard Model (SM) particles. Multileptonic final states provide an excellent signature to probe such supersymmetric scenarios due to the low SM background. In this talk, a search for events with at least four isolated charged leptons is presented which uses LHC proton-proton collision data collected by the ATLAS detector. The results are interpreted in terms of the visible cross-section for such new physics final states and in terms of various supersymmetric models with R-parity violation.