T 32: Suche nach Supersymmetrie 2

Zeit: Dienstag 11:00–12:30 Raum: JUR 498

T 32.1 Di 11:00 JUR 498

Estimating QCD backgrounds at CMS detector with Rebalance and Smear method — Sam Bein[1], Simon Kurz[1], •Marek Niedziela[1], Christian Sander[2], Peter Schleper[1], and Jory Sonneveld[1] — [1]Institut für Experimentalphysik Universität Hamburg — [2]DESY

Searches for new physics in the CMS and ATLAS experiments at the LHC rely on accurate predictions of backgrounds, especially from QCD processes.
A method for predicting this QCD background called "rebalance and smear" has been developed for a search of new physics in the CMS collaboration that is based on multijet events with large missing transverse momentum produced in 13 TeV proton-proton collisions. The performance of rebalance and smear technique is compared with an alternative QCD background estimation method.

T 32.2 Di 11:15 JUR 498

SUSY Searches with Jets and Missing Transverse Momentum: Lost Lepton Background and Results — Samuel Bein[1], •Simon Kurz[1], Marek Niedziela[1], Christian Sander[2], Peter Schleper[1], and Jory Sonneveld[1] — [1]Institut für Experimentalphysik, Universität Hamburg — [2]DESY

Supersymmetry (SUSY) is one of the most promising extensions of the Standard Model of particle physics (SM), since it provides solutions of various shortcomings of the Standard Model. In many SUSY models final states with jets, no electrons or muons and large amounts of missing transverse energy are expected.

An important part of the SM background arises from events where a neutrino is produced and the associated electron or muon is “lost”, i.e. out of acceptance, not reconstructed or not isolated. The talk focuses on a data-driven prediction of this background.

Furthermore, an overview of a search for SUSY is provided in which this background estimation method is used and its performance is illustrated.

T 32.3 Di 11:30 JUR 498

Natural SUSY with a R-(S)neutrino LSP — •Faber Thomas[1], Porod Werner[2], Jones Joel[3], and Velazco Nhell[4] — [1]Julius-Maximilians-Universität Würzburg — [2]Julius-Maximilians-Universität Würzburg — [3]Pontificia Universidad Católica del Perú — [4]Pontificia Universidad Católica del Perú

We added a light right-handed neutrino superfield to the minimal supersymmetric Standard Model (MSSM). In this case, we are able to explain neutrino data and having an alternativ dark matter candidate. Our goal is to find out how existing LHC data constraints slepton and sneutrino masses. For this we have implemented recent LHC analysis in CheckMATE and explore various parameter regions using Monte Carlo tools.

T 32.4 Di 11:45 JUR 498

SCYNET: Parametrizing the LHC Search results for SUSY using a Neural Net Regression — Philip Bechtle[1], Matthias Hamer[1], Tim Keller[2], •Abtin Narimani[1], Björn Sarrazin[1], Jan Schütte-Engel[2], and Jamie Tattersall[2] — [1]University of Bonn — [2]RWTH Aachen

The LHC has already excluded many signatures of New Physics based on searches for various topologies. Each of the individual searches for different topologies measures a background expectation and a measured number of events along with statistical and systematical uncertainties. These published results can be used to set limits on new models of New Physics. A possible tool for such a study is e.g. CheckMATE. For each model it tests against the LHC results, it generates events, uses a fast detector simulation, performs the selection, and then compares the selected number of signal events to the background and data. This is a very general approach, however, it is very slow.

In order to make this approach useful for global fits, the evaluation of each model point must take $O(< 1)\,s$. In SCYNET, this is realized by training an Artificial Neural Net regression on $O(800k)$ simulated SUSY model points using CheckMATE for 8 TeV and 13 TeV LHC SUSY searches. In a direct approach, the parameters of the pMSSM11 are trained against a χ^2 characterizing the agreement of signal and background with the data in all independent searches. In the indirect approach, pseudo-observables such as the number of partons are used to parametrize the net, such that any model of New Physics and not only a specific SUSY model can be used.

T 32.5 Di 12:00 JUR 498

SUSY parameters from measurements of light higgsinos at the International Linear Collider — •Suvi-Leena Lehtinen[1], Howard Baer[2], Mikael Berggren[1], Keisuke Fujii[3], Jenny List[1], Tomohiko Tanabe[4], and Jacqueline Yan[3] — [1]DESY, Hamburg, Germany — [2]University of Oklahoma, Norman, USA — [3]KEK, Tsukuba, Japan — [4]ICEPP, University of Tokyo, Tokyo, Japan

Natural SUSY with light, nearly mass-degenerate higgsinos is a theoretically well motivated scenario which would in general escape LHC searches. A high-energy electron-positron collider like the International Linear Collider with a centre-of-mass energy of 500 GeV would provide a clean environment where the higgsinos would be either discovered or excluded. Higgsino pair production has been studied with a detailed simulation of the International Large Detector. It is expected that higgsino masses and polarised cross sections can be measured to the percent-level accuracy. We show that these precise measurements, together with precise measurements of the Higgs, allow determining some of the underlying SUSY parameters with Fittino. In particular the weak scale gaugino mass parameters can be determined. We quantify the possibilities for running the gaugino mass parameters to the GUT scale and for distinguishing between different supersymmetry breaking scenarios. In addition, the properties of some heavy sparticles can be predicted, giving motivation for new high-energy colliders.

T 32.6 Di 12:15 JUR 498

Constraints on Higgsino-like Neutralinos from Dark Matter Constraints in the Constrained Next-to-Minimal Supersymmetry Scenarios — •Conny Beskidt[1], Wim de Boer[1], Dmitri Kazakov[1,2], and Stefan Wayand[1] — [1]Karlsruhe Institute of Technology (IEKP) — [2]JINR, ITEP, Moscow, Russia

The lightest neutralino in supersymmetric models is a perfect dark matter (DM) candidate since it is neutral, weakly interacting and can provide the right amount on dark matter but the nature of the neutralino is still unknown. However, no DM particle has been found so far in deep underground laboratories, where the recoil of a nuclei from a collision with a DM particle is searched for, which is either proportional to the spin (spin dependent SD) or mass of the nucleus (spin independent SI) of the target material. The resulting limits on the scattering cross section from direct DM searches can be used to restrict the allowed parameter space of SUSY models. In the constrained minimal supersymmetric standard model (CMSSM) where the lightest neutralino is almost a pure bino, the parameter space excluded by the SD searches is already excluded by limits on the SI cross section. In contrast, within the NMSSM the SD searches yield additional constraints. We provide a scan over the NMSSM parameter space for different specific NMSSM scenarios to show the impact of the DM constraints. We show that the natural scenarios which predict a singlino-like lightest neutralino are in agreement with the current DM data while neutralinos with a significant amount of Higgsino admixture are under pressure and will be tested in future direct DM experiments.