T 407: BSM Theorie II

Zeit: Donnerstag 16:45–19:00   Raum: KIP SR 2.402

T 407.1 Do 16:45 KIP SR 2.402

EW Corrections to Pair Production of Top-Squarks within the MSSM — Wolfgang Hollik, Monika Kollar, and ●Maike Trenkel — Max-Planck-Institut für Physik, D-80805 München

Searches for potential physics beyond the Standard Model constitute an important part of the LHC discovery programme. In this context, pair production of top-squarks is of particular interest. Within the Minimal Supersymmetric Standard Model (MSSM), the top-squark being the superpartner of the top-quark is a candidate for the lightest squark owing to the large L-R squark mixing.

As the cross-section for the top-squark pair production depends essentially on the stop mass, it is possible to extract the top-squark mass directly from the cross-section measurement in case of a discovery.

Besides the already calculated SUSY-QCD radiative corrections, also the SUSY-EW contributions are required for a reliable prediction. We investigate the impact of SUSY-EW corrections on the top-squark pair production cross-section. The full set of one-loop contributions is UV and IR finite after including the real photon bremsstrahlung. The mass singularities which originate from the radiation of collinear photons off the initial-state light quarks are absorbed into the parton distribution functions (PDF) via factorization at the NLO QED level.

Presented are distributions of the hadronic cross-section as a function of the invariant mass of the top-squark pair and of the transverse momentum of one of the top-squarks. We also apply cuts on the final state particles to obtain experimentally realistic results.

T 407.2 Do 17:00 KIP SR 2.402

NLO Event Generation for Chargino Production at the ILC — ●Tania Robens — Institut fuer Theoretische Physik E, RWTH Aachen

In the chargino and neutralino sector of the MSSM, the electroweak SUSY parameters can be determined by a small number of measurements of masses and cross sections. At the ILC, these parameters can be determined with an experimental accuracy matching the precision of NLO and higher-order theoretical predictions. The higher order contributions therefore need to be included in the analysis of the pa rameters of the SUSY sector. We present a NLO Monte-Carlo event generator for simulating chargino pair-production at the ILC. We consider two approaches of including photon radiation. A strict fixed-order approach allows for comparison and consistency checks with published semianalytic results in the literature, but suffers from negative weights in certain points of phase space. A version with soft- and hard-collinear resummation of photon radiation, which combines photon resummation with the inclusion of the NLO matrix element for the production process, avoids negative event weights, so the program can simulate physical (unweighted) event samples. Photons are explicitly generated throughout the range where they can be experimentally resolved. We evaluate the systematic errors due to soft and collinear approximations. In the resummation approach, the residual uncertainty can be brought down to the per-mil level, coinciding with the expected statistical uncertainty at the ILC. We show results for cross sections and event generation for both approaches.

T 407.3 Do 17:15 KIP SR 2.402

CP violation in chargino production and decay into the tau at the ILC — ●Anja Marold — Physikalisches Institut der Universität Bonn

The only phase of the Kobayashi-Maskawa matrix within the Standard Model is not sufficient to account for the baryon asymmetry of the universe.

The Minimal Supersymmetric Standard Model offers additional sources for CP-violating phases.

We study CP violation in chargino production $e^+e^- \to \tilde{\chi}_i^+ \tilde{\chi}_j^-$ with longitudinally polarised beams and the ensuing two-body decay of one of the charginos into a tau $\tilde{\chi}_i^+ \to \tau^+ \tilde{\nu}_\tau$. The polarisation of the τ lepton can be analysed by measuring its decay distributions. The transverse polarisation of the tau is sensitive to the phase of the Higgs mixing parameter μ.

We therefore define CP asymmetries of triple products which involve the transverse tau polarisation. We present numerical results of the asymmetries which can be as large as 50% and discuss the importance of initial beam polarisations.

T 407.4 Do 17:30 KIP SR 2.402

Kaluza-Klein-Resonanzen in Vektorbosonfusionsprozessen — ●Christoph Englert und Dieter Zeppenfeld — Institut für Theoretische Physik, Universität Karlsruhe, Postfach 6980, D-76128 Karlsruhe

Die bisher erfolglose Suche nach dem Higgs-Boson hat zu einer Fülle an Alternativvorschlägen geführt. Besonders drastisch erscheinen dabei Modelle mit zusätzlichen Dimensionen, in denen das Higgs teilweise oder ganz aus dem Teilchenspektrum verschwindet und Unitarität in der TeV Region durch den Austausch von Kaluza-Klein-Anregungen garantiert wird. Die Auswirkungen dieser Modelle auf Vektorbosonfusionsprozesse wurden mit einem NLO-QCD Parton Level Monte Carlo Programm untersucht und werden vorgestellt.

T 407.5 Do 17:45 KIP SR 2.402

W-Pair-Production in the Noncommutative Standard Model at Hadron Colliders — Thorsten Ohl, Reinhold Rückl, and ●Christian Speckner — Institut für Theoretische Physik und Astrophysik, Universität Würzburg, Am Hubland, 97074 Würzburg

Using the Seiberg-Witten map expanded to first order in the parameter $\theta^{\mu\nu}$, we calculate the production cross section for polarized W^+W^--pairs in quark-antiquark-collisions in the noncommutative extension of the standard model. We construct observables and, using a Monte-Carlo eventgenerator, estimate the sensitivity of this channel at the LHC to a possible noncommutative structure of spacetime.

T 407.6 Do 18:00 KIP SR 2.402

MSSM Higgs-boson production in bottom-quark fusion: electroweak radiative corrections — Stefan Dittmaier[1], Michael Krämer[2], ●Alexander Mück[2], and Tobias Schlüter[1] — [1]Max-Planck-Institut für Physik (Werner-Heisenberg-Institut), München — [2]Institut für Theoretische Physik E, RWTH Aachen

Higgs-boson production in association with bottom quarks is an important discovery channel for supersymmetric Higgs particles at hadron colliders for large values of $\tan\beta$. We present the complete $\mathcal{O}(\alpha)$ electroweak and $\mathcal{O}(\alpha_{\rm s})$ strong corrections to associated bottom–Higgs production through $b\bar{b}$ fusion in the MSSM and improve this next-to-leading-order prediction by known two-loop contributions to the Higgs self-energies, as provided by the program `FeynHiggs`. Choosing proper renormalization and input-parameter schemes, the bulk of the corrections (in particular the leading terms for large $\tan\beta$) can be absorbed into an improved Born approximation. The remaining non-universal corrections are typically of the order of a few per cent. Numerical results are discussed for the benchmark scenarios SPS 1b and SPS 4.

T 407.7 Do 18:15 KIP SR 2.402

Zerfällt das Higgs dominant in Neutrinos? — ●Michael Kobel, Andreas Ludwig und Wolfgang Mader — Institut für Kern- und Teilchenphysik, TU Dresden, 01062 Dresden

Das Seesaw Szenario erklärt die relativ zu den anderen Dirac-Fermionen winzigen Massen der Neutrinos durch einen zusätzlichen Faktor m_D/M_R, der ihre Diracmasse m_D wie auf einer Wippe entweder stark vergrößert oder verkleinert. Die im Verhältnis zu m_D sehr große Massenskala M_R gehört dabei zu gemischten Massentermen von Teilchen und Antiteilchen, die nur für Neutrinos im Lagrangian auftauchen können.

Der Vortrag zeigt, dass in diesem Modell sehr große Kopplungen des Higgs Bosons an Neutrinos möglich sind, die in bestimmten Parameterbereichen dazu führen können, dass das Higgs dominant in Neutrinos zerfällt. Existierende Ausschlussgrenzen von LEP und experimentelle Konsequenzen für die Higgs Suche am LHC werden diskutiert.

T 407.8 Do 18:30 KIP SR 2.402

The Passage of Ultrarelativistic Neutralinos through Matter — ●Sascha Bornhauser and Manuel Drees — Physikalisches Institut, Universität Bonn, Nussallee 12, D53115 Bonn, Germany

The origin of the most energetic cosmic ray events, with $E \gsim 10^{20}$ eV, remains mysterious. One possibility is that they are produced in the decay of very massive, long–lived particles. It has been suggested that these so–called "top–down scenarios" can be tested by searching for ultrarelativistic neutralinos, which would be produced

copiously if superparticles exist at or near the TeV scale.

The talk gives attention to the interactions of such neutralinos with ordinary matter. The transport equations for bino- and higgsino-like neutralinos traversing the earth were solved with the aid of a straightforward numerical method. The resulting spectra were checked for flux conservation. The event rates corresponding to these neutralino fluxes, which may be detected by future satellite-experiments, were also calculated.

T 407.9   Do 18:45   KIP SR 2.402

SUSY Seesaw and Lepton Flavor Violation at the LHC and ILC — Simon Albino[1], •Frank Deppisch[2], Dilip Ghosh[3], and Reinhold Rückl[4] — [1]II. Institut fürTheoretische Physik, Univer-

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We study lepton flavor violating processes at the LHC and ILC in context of the seesaw mechanism in mSUGRA. The present knowledge in the neutrino sector as well as improved future measurements are taken into account. We investigate the correlations of these processes with the corresponding lepton flavor violating rare decays such as $\mu \to e\gamma$. It is shown that these correlations are relatively weakly affected by uncertainties in the neutrino data, but very sensitive to the mSUGRA parameters.