T 18: Beyond The Standard Model (Theorie) 2

Convenor: Tilman Plehn

Zeit: Donnerstag 16:45–18:15 Raum: M114

T 18.1 Do 16:45 M114

Higgs couplings in the MSSM at large $\tan\beta$ — Martin Beneke[1,2], Pedro Ruiz-Femenía[1], and •Martin Spinrath[3] — [1]Institut für Theoretische Physik E, RWTH Aachen University, D–52056 Aachen, Germany — [2]Institut für Theoretische Physik, Universität Zürich, CH – 8057 Zürich, Switzerland — [3]Max-Planck Institut für Physik, Föhringer Ring 6, D–80805 München, Germany

We consider $\tan\beta$-enhanced quantum effects in the minimal supersymmetric standard model (MSSM) including those from the Higgs sector. To this end, we match the MSSM to an effective two-Higgs doublet model (2HDM), assuming that all SUSY particles are heavy, and calculate the coefficients of the operators that vanish or are suppressed in the MSSM at tree-level. Our result clarifies the dependence of the large-$\tan\beta$ resummation on the renormalization convention for $\tan\beta$, and provides analytic expressions for the Yukawa and trilinear Higgs interactions. The numerical effect is analyzed by means of a parameter scan, and we find that the Higgs-sector effects, where present, are typically larger than those from the "wrong-Higgs" Yukawa couplings in the 2HDM.

T 18.2 Do 17:00 M114

Collider signals beyond minimal flavor violation in the MSSM — •Michael Rauch and Michael Spannowsky — ITP, Universität Karlsruhe, 76128 Karlsruhe, Deutschland

The assumption of Minimal Flavor Violation in the Minimal Supersymmetric Standard Model is imposed to account for the good agreement of Standard Model predictions with experimental data, but it is no first principal result. Although many of the parameters of the soft-breaking lagrangian are severely constrained by flavor observables and electroweak precision measurements, several parameters remain almost unconstrained. We consider non-minimal flavor violating effects in top and Higgs production processes.

T 18.3 Do 17:15 M114

Pinning down the Invisible Sneutrino — •Tania Robens[1], Jan Kalinowski[2], Wolfgang Kilian[3], Juergen Reuter[4], and Krzysztof Rolbiecki[5] — [1]RWTH Aachen, Inst. f. Theor. Physik E — [2]University of Warsaw, Inst. of Theor. Physics — [3]Universitaet Siegen, Fachbereich Physik — [4]Universitaet Freiburg, Physikalisches Institut — [5]Durham University, IPPP

For points in SUSY parameter space where the sneutrino is lighter than the lightest chargino and next-to-lightest neutralino, its direct mass determination from sneutrino pair production process at e+e- collider is impossible since it decays invisibly. In such a scenario the sneutrino can be discovered and its mass determined from measurements of two-body decays of charginos produced in pairs at the ILC. Using the event generator WHIZARD we study the prospects of measuring sneutrino properties in a realistic ILC environment. In our analysis we include beamstrahlung, initial state radiation, a complete account of reducible backgrounds from SM and SUSY processes, and a complete matrix-element calculation of the SUSY signal which encompasses all irreducible background and interference contributions. We also simulate photon induced background processes using exact matrix elements. Radiation effects and the cuts to reduce background strongly modify the edges of the lepton energy spectra from which the sneutrino and chargino mass are determined. We discuss possible approaches to measure the sneutrino mass with optimal precision.

T 18.4 Do 17:30 M114

Gluinonia - Spektren, Produktion und Zerfall — •Matthias Kauth, Johann H. Kühn, Matthias Steinhauser und Peter Marquard — Institut für Theoretische Teilchenphysik, Universität Karlsruhe (TH)

Supersymmetrie ist einer der vielversprechendsten Kandidaten für die Suche nach Physik jenseits des Standard Modells. Die Quantenzahlen der Gluinos, der fermionischen Superpartner der Austauschteilchen der starken Wechselwirkung, könnten am LHC durch die Untersuchung von Bindungszuständen zweier Gluinos, welche Gluinonia genannt werden, studiert werden. Diese Methode hätte gegenüber den Betrachtungen des Einzelzerfalls den Vorteil, daß man es bei erhaltener R-Parität vollständig mit hadronischen Zerfallsprodukten zu tun hat. Im Rahmen dieses Vortrags werden die Energiespektren sowie das Wechselwirkungspotential des Bindungszustands diskutiert. Ein weiterer, wesentlicher Punkt ist die Produktion des Gluinoniums am LHC sowie der Zerfall. Hierbei werden die QCD-Korrekturen zu den entsprechenden Prozessen vorgestellt.

T 18.5 Do 17:45 M114

Spin Analysis for Gluino Decay — •Lisa Edelhäuser, Werner Porod, and Ritesh Singh — Institut für Theoretische Physik und Astrophysik, Universität Würzburg

We look at gluino production at the LHC and its decay into two top quarks and a neutralino: $\widetilde{g} \to t\bar{t}\widetilde{\chi}$. Our aim is to identify observables for a measurement of the spin of this gluino. In this context, we investigate the analogue of the so called Michel parameters which are used to describe the structure of couplings in leptonic decays of charged leptons. We consider two limits: in the first case, the intermediate particle is taken onshell, while in the second case, this particle is very heavy.

T 18.6 Do 18:00 M114

Distinguishing spins in decay chains with photons at the Large Hadron Collider — Wolfgang Ehrenfeld[1], Ayres Freitas[2], •Ananda Landwehr[3], and Daniel Wyler[4] — [1]Deutsches Elektronen Synchrotron, Hamburg, Deutschland — [2]Department of Physics & Astronomy, University of Pittsburgh, USA — [3]Max-Planck-Institut für Physik, München, Deutschland — [4]Institut für Theoretische Physik, Universität Zürich, Schweiz

Several models for physics beyond the Standard Model predict new particles with a decay signature including hard photons and missing energy. Two well-motivated examples are supersymmetry with gauge-mediated breaking (GMSB) and the standard model with two universal extra dimensions. Both models lead to decay chains with similar collider signatures, including hard photon emission. The main discriminating feature are the spins of the new particles.

In this talk I will discusss how information about the spins of the particles can be extracted from lepton-photon or quark-photon invariant mass distributions at the Large Hadron Collider. The characteristic shapes of the distributions are studied in a realistic Monte-Carlo simulation. We find that for a typical GMSB mass spectrum with particle masses below 1 TeV, already 10 fb^{-1} integrated luminosity are sufficient to discriminate the two models with high significance.