

T 16: Beyond the Standard Model (Theorie) I

Convenor: Werner Porod

Zeit: Dienstag 16:45–18:45

Raum: 30.23: 6-1

T 16.1 Di 16:45 30.23: 6-1

Precise Prediction for the W-Boson mass in BSM — ●LISA ZEUNE^{1,2} and GEORG WEIGLEIN¹ — ¹DESY, Notkestraße 85, 22607 Hamburg, Germany — ²Universität Göttingen, II. Physikalisches Institut, 37077 Göttingen, Germany

Electroweak precision observables are of utmost importance for testing and constraining physics beyond the Standard Model (SM). The indirect constraints on new physics obtained from precision observables are complementary to the direct searches for new physics carried out at the LHC and elsewhere.

The $M_W - M_Z$ interdependence is highly sensitive to quantum effects from the entire particle spectrum of a given model. In order to fully exploit the improved experimental accuracy expected at the LHC, a precise theoretical prediction for the W boson mass in various models beyond the SM is desired.

We present results for the W boson mass in the MSSM with complex parameters, including all known higher-order corrections of SM- and SUSY-type. Within the same framework, facilitating a direct comparison of the predictions, also results for non-minimal SUSY models and other extensions of the SM are derived.

T 16.2 Di 17:00 30.23: 6-1

State-of-the-Art Predictions for the Light Higgs Boson Mass in the MSSM — ●PHILIPP KANT — Humboldt-Universität zu Berlin

The minimal supersymmetric extension of the Standard Model (MSSM) features a light Higgs boson, the mass M_h of which can be predicted from the theory. The expected accuracy with which the LHC will be able to measure M_h demands that the theoretical prediction should be as precise as possible. Consequently, a lot of effort has been put in the calculation of radiative corrections to this observable.

We present the computer program H3M that reconciles recent three-loop corrections with established results at the one- and two-loop level which are available in the literature. This task is not entirely trivial as it involves transcription between different renormalization schemes. Furthermore, the three-loop result is not available as a closed formula, but in terms of expansions in mass ratios that are valid in certain regions of the MSSM parameter space. Our program performs the choice of the appropriate expansion automatically. For convenience, it provides a SUSY Les Houches interface for integration with a spectrum generator.

T 16.3 Di 17:15 30.23: 6-1

Interferenzeffekte im MSSM — ●ELINA FUCHS^{1,2} und GEORG WEIGLEIN² — ¹Georg-August-Universität Göttingen — ²DESY Hamburg

Prozesse, die sich in Produktion und anschließenden Zerfall eines Teilchens mit einer im Vergleich zur Masse kleinen Zerfallsbreite faktorisieren lassen, werden häufig in der "Narrow-Width Approximation" berechnet. Diese ist jedoch nicht mehr anwendbar bei einer Interferenz zwischen Diagrammen mit demselben Anfangs- und Endzustand und resonanten Propagatoren.

Das vergrößerte Teilchenspektrum des MSSMs kann Teilchen enthalten, deren Massendifferenz in der Größenordnung der jeweiligen Zerfallsbreite liegt. Es wird eine Verallgemeinerung der "Narrow-Width Approximation" untersucht, die es erlaubt, Interferenzeffekte zwischen Diagrammen mit solchen quasi massen-entarteten Teilchen in konsistenter Weise zu berücksichtigen. Die phänomenologischen Auswirkungen der Interferenzeffekte werden an einigen Beispielen diskutiert.

T 16.4 Di 17:30 30.23: 6-1

MSSM parameter determination via Gaugino/Chargino processes at one-loop — ●AOIFE BHARUCHA — II. Institut für Theoretische Physik, Universität Hamburg, Luruper Chaussee 149, 22761 Hamburg

Supersymmetry is one of the best motivated extensions of the Standard Model, however in the unconstrained MSSM there are 105 parameters to be measured experimentally. A reasonable strategy would be to start with the gaugino/higgsino sector, as this is thought to con-

tain the lightest particles. Although the relevant masses will hopefully be measured via cascade decays at the LHC, the measurement of the fundamental MSSM parameters of this sector requires the clean environment which will only be provided by a future linear collider, e.g. the ILC. It is known that, at tree-level, the measurement of observables in gaugino/higgsino processes allows access to such parameters through concise relations, however, perturbative corrections to these relations have so far not been studied. We therefore investigate the one-loop contributions to gaugino/higgsino processes, and consider the implications for MSSM parameter determination at the ILC.

T 16.5 Di 17:45 30.23: 6-1

Full one-loop corrections to squark decays — WOLFGANG HOLLIK and ●ANANDA LANDWEHR — Max-Planck-Institut für Physik, München, Deutschland

In this talk the QCD and electroweak (EW) corrections to two-body decays of squarks within the minimal supersymmetric standard model (MSSM) are presented. The decay products considered are quark-gluino, quark-neutralino, quark-chargino, squark-W/Z-boson, and squark-higgs-boson. In particular we examine the third-generation squark decays where the decay channels to squark-W/Z-boson and squark-higgs-boson can become sizeable due to potentially large left-right mixing.

Special care has been taken concerning the renormalization of the Higgs and bottom/sbottom sectors. We combine the results for the various decay chains and present numerical analyses for the branching ratios.

T 16.6 Di 18:00 30.23: 6-1

The electroweak sector of the NMSSM at the one-loop level — ●FLORIAN STAUB — Universität Würzburg

We present the electroweak spectrum for the Next-to-Minimal Supersymmetric Standard Model at the one-loop level: we performed a complete one-loop calculation of the masses of Higgs bosons, sleptons, charginos and neutralinos in \overline{DR} -scheme. For the numerical evaluation we implemented the results in SPheno. We present a mSUGRA variant with non-universal Higgs mass parameters squared and discuss the scale dependence of the different masses as well as the implications of our results for the calculation of the relic density.

T 16.7 Di 18:15 30.23: 6-1

Electroweak corrections to neutralino and chargino decays — ●STEFAN LIEBLER — Universität Würzburg

We present the complete electroweak one-loop corrections to the partial widths for two-body decays of a chargino (neutralino) into a W-boson and a neutralino (chargino) using an on-shell method in models with and without R-parity. Particular attention is paid to the question of gauge invariance. Moreover we show correlations between the NLO widths of R-parity violating decays and the neutrino mixing angles, which can be tested at the LHC.

T 16.8 Di 18:30 30.23: 6-1

CP violation in the Higgsino/Gaugino sector of the NMSSM at linear colliders — ●PHILIPP LEVERMANN — 2. Institut für theoretische Physik, Luruper Chaussee 149, 22761 Hamburg

The next-to-minimal supersymmetric Standard Model (NMSSM) includes a Higgs singlet in addition to the two Higgs doublet superfields of the MSSM. Consequently the neutralino sector is also enlarged, such that there are five neutralinos. Hints of Supersymmetry are expected to be observed at the LHC. However, to clearly distinguish the NMSSM from the MSSM and precisely unravel the underlying structure of the neutralino sector a future Linear Collider, e.g. the ILC, is required. In this talk we study the Higgsino/Gaugino sector of the NMSSM including CP violating effects and discuss the relevant parameters and their mixing, as well as strategies for distinguishing the different models. In light of the sensitivity of such colliders to polarization, we are also interested in spin dependent observables, which turn out to be extremely useful in determining CP violating effects.