

T 16: Beyond the Standard Model (Theorie) 3

Convenor: Andreas Weiler

Zeit: Dienstag 16:45–18:45

Raum: WIL-A124

T 16.1 Di 16:45 WIL-A124

Introduction to the Randall Sundrum Model — ●KRISTIANE NOVOTNY, RAOUL MALM, MATTHIAS NEUBERT, and CHRISTOPH SCHMELL — Institut für Physik, JGU

While SUSY offers a solution for the hierarchy problem, there exists another elegant approach, the so called warped extra dimensions (WED). WED were introduced by Randall and Sundrum (RS) by extending the 4-dimensional spacetime with a compact and strongly curved extra dimension of anti-de Sitter space. The RS model offers an elegant approach for solving the gauge and the Yukawa hierarchy problem.

In this talk the setup of the RS model and an overview of two implementations, focussing on the minimal and the custodial RS model is given.

T 16.2 Di 17:00 WIL-A124

Higgs Production via $gg \rightarrow h$ in a Warped Extra Dimension: Part I — ●RAOUL MALM, KRISTIANE NOVOTNY, CHRISTOPH SCHMELL, and MATTHIAS NEUBERT — Institut für Physik, JGU Mainz

Precise measurements of the Higgs-like boson production and decay properties allow to test the Standard Model description of electroweak symmetry breaking and to search for indirect hints of new physics. Being loop-suppressed the Higgs production cross section via gluon-gluon fusion can be significantly affected by new heavy particles running inside the triangle.

This talk will discuss the calculation of the leading-order contribution from a 5D perspective within the Minimal Randall-Sundrum Model, that belongs to the class of warped extra-dimensional theories with a TeV-brane localized Higgs boson, being capable of addressing the gauge and Yukawa hierarchy problems. Special focus will be placed on the regularization prescription of the Higgs profile and its relation to the cutoff leading to the distinction between a brane and a narrow-bulk Higgs scenario.

T 16.3 Di 17:15 WIL-A124

Higgs Production via $gg \rightarrow h$ in Warped Extra Dimensions: Part II — ●CHRISTOPH SCHMELL, RAOUL MALM, KRISTIANE NOVOTNY, and MATTHIAS NEUBERT — Institut für Physik, JGU Mainz

Since the discovery of the Higgs-like boson at the LHC the demand for a solution to the gauge hierarchy problem (HP) is more pressing than ever. One promising New Physics model that gives an explanation for the HP is the so-called Randall-Sundrum (RS) model. Based on a (warped) extra dimension this model contains among other things an infinite number of Kaluza-Klein (KK) excitations for all SM fermions and gauge bosons. In loop processes this KK tower could give rise to significant effects on many observables.

In my talk I will discuss the Higgs production via gluon-gluon fusion in the RS model which is a loop-induced process just as in the Standard Model. I will focus on the phenomenological consequences of our analytical results where my analysis will not only include the minimal but also an extended version of the RS model.

T 16.4 Di 17:30 WIL-A124

The muon anomalous magnetic moment in the Randall-Sundrum model — MARTIN BENEKE, PARAMITA DEY, and ●JÜRGEN ROHRWILD — TU München, Physik Department T31, Garching, Deutschland

We present the complete calculation of the gauge contribution to the anomalous magnetic moment of the muon in the minimal Randall-Sundrum model with standard model fields in five-dimensional (5D) warped space and a brane-localized Higgs. We use a fully 5D framework to compute the one-loop matching coefficients of the effective theory at the electroweak scale. The extra contribution to the anomalous magnetic moment is

$$\Delta a_\mu \approx 8.8 \cdot 10^{-11} \times (1 \text{ TeV}/T)^2,$$

where $1/T$ denotes the location of the TeV brane in conformal coordinates, and is related to the mass of the lowest gauge boson KK excitation by $M_{\text{KK}} \approx 2.5 T$. The result is robust against the variation of the bulk fermion masses and 5D Yukawa coupling.

T 16.5 Di 17:45 WIL-A124

Particle spectrum prediction in non-minimal supersymmetric models — ●ALEXANDER VOIGT — TU Dresden

In this talk current efforts are presented to improve the predicted particle spectra of non-minimal supersymmetric models such as the NMSSM, USSM, CE₆SSM etc. A general spectrum generator framework for non-minimal supersymmetric models is put forward, which is based partly on SARAH and SOFTSUSY.

T 16.6 Di 18:00 WIL-A124

The stability of R-parity in supersymmetric models extended by $U(1)_{B-L}$ — ●JOSÉ ELIEL CAMARGO-MOLINA¹, BEN O'LEARY¹, WERNER POROD¹, and FLORIAN STAUB² — ¹Institut für Theoretische Physik und Astronomie, Universität Würzburg, Würzburg, Germany — ²Bethe Center for Theoretical Physics & Physikalisches Institut der Universität Bonn, Bonn, Germany

We perform a study of the stability of R-parity-conserving vacua of a constrained version of the minimal supersymmetric standard model with a gauged $U(1)_{B-L}$ which can conserve R-parity. Using the homotopy continuation method we find all the extrema of the tree-level potential, which are then used as starting point for the analysis of the loop-corrected potential. While we find that a majority of the points in the parameter space preserve R-parity, we also find that a significant portion of points which naïvely have phenomenologically acceptable vacua which conserve R-parity, actually have deeper vacua which break R-parity through sneutrino VEVs. We investigate under what conditions the deeper R-parity-violating vacua appear. We find that while previous exploratory work was broadly correct in some of its qualitative conclusions, we disagree in detail.

T 16.7 Di 18:15 WIL-A124

On $B_{s,d}^0 \rightarrow \bar{l}l$ decays in R-parity violating supersymmetric models with SARAH and SPheno — ●KILIAN NICKEL — Universität Bonn

The rare flavor changing neutral current decays $B_s^0 \rightarrow \bar{l}l$ and $B_d^0 \rightarrow \bar{l}l$ can be calculated with the public tools SARAH and SPheno for a variety of supersymmetric models. Recently, the first candidates of $B_s^0 \rightarrow \bar{l}l$ decays were discovered at the LHC. These measurements give tight constraints on SUSY models, like the MSSM with explicit R-parity violating terms. I present updated bounds on RpV couplings derived from $B_{s,d}^0$ decays.

T 16.8 Di 18:30 WIL-A124

Effect of CP violation in bilinear R-parity violation on baryogenesis — ●ASMA CHÉRIGUÈNE¹, ULRICH LANGENFELD¹, STEFAN LIEBLER², and WERNER POROD¹ — ¹Universität Würzburg — ²Universität Wuppertal

Supersymmetric models where R-parity is broken via lepton number violation provides an intrinsically supersymmetric explanation for the observed neutrino. The complex phases of the corresponding parameters are constrained by the observed matter anti-matter asymmetry of the universe. Taking bilinear R-parity violation as framework in combination with the assumption of a large lepton asymmetry generated via the Affleck-Dine mechanism at the end of inflation we investigate these constraints in the parameter range compatible with neutrino data.