T 19: Beyond the Standard Model (Theorie) III

Convenor: Margarete Mühlleitner

Zeit: Mittwoch 14:00–16:00 Raum: HG XIV

T 19.1 Mi 14:00 HG XIV

Azimuthal correlation in decays to vector-boson pairs — •Kentarou Mawatari — ITP, Heidelberg

Contribution has been withdrawn.

T 19.2 Mi 14:15 HG XIV

Signals for New Spin-1 Resonances in Electroweak Gauge Boson Pair Production at the LHC — Alexandre Alves[1], Oscar J. P. Eboli[2], •Dorival Gonçalves Netto[3], Maria C. Gonzalez-Garcia[4], and José K. Mizukoshi[5] — [1]Instituto de Física Teórica, Universidade Estadual Paulista, São Paulo - Brazil — [2]Instituto de Física, University of São Paulo, São Paulo - Brazil — [3]Institute for Theoretical Physics, Ruprecht-Karls-Universität Heidelberg, Heidelberg - Germany — [4]C.N. Yang Institute for Theoretical Physics, SUNY at Stony Brook, Stony Brook, NY 11794-3840, USA — [5]Centro de Ciências Naturais e Humanas, Universidade Federal do ABC, Santo André, SP - Brazil

In this work we performed a phenomenological observation of new spin-1 bosons associated with the Electroweak Symmetry Breaking sector. As motivation for this analysis we have the special case of models based on the mechanism of Eletroweak Symmetry breaking via boundary conditions, which also have a tower of Kaluza-Klein vector bosons ensuring unitarity in scattering between gauge bosons.

In the phenomenological analysis we performed a model independent approach to analyze the potential of the Large Hadron Collider (LHC) in the detection of new vector bosons associated with the symmetry breaking sector. For this we studied the processes $pp \to l^{\pm} jj \not{E}_T$, $l^+ l'^- \not{E}_T$, $l'^{\pm} l^+ l^- \not{E}_T$ and $l^+ l^- jj$ ($l, l' = e, \mu$ and $j =$ jets) getting that the LHC has great potential for discovery or exclusion of this class of extensions to the Standard Model.

T 19.3 Mi 14:30 HG XIV

Collider phenomenology of split-UED — Chuan-Ren Chen[1], Mihoko M. Nojiri[1,2,3], Seong Chang Park[1], Jing Shu[1], and •Michihisa Takeuchi[2,4] — [1]Institute for the Physics and Mathematics of the Universe, The University of Tokyo, Kashiwa-no Ha, Kashiwa City, Chiba 277-8568, Japan — [2]Theory Group, KEK 1-1 Oho, Tsukuba, Ibaraki 305-0801, Japan — [3]The Graduate University for Advanced Studies (SOKENDAI), 1-1 Oho, Tsukuba, Ibaraki 305-0801, Japan — [4]Yukawa Institute for Theoretical Physics, Kyoto University, Kyoto 606-8502, Japan

Split-universal extra dimension (split-UED), a recently suggested modification of universal extra dimension (UED) model, can nicely explain recent anomalies in cosmic-ray positrons and electrons observed by PAMELA and Fermi. In this model, Kaluza-Klein (KK) dark matters mainly annihilate into leptons because the hadronic branching fraction is highly suppressed by large KK quark masses and the antiproton flux agrees very well with the observation where no excess is found. Collider signatures of the colored KK particles at the LHC, especially $q_1 q_1$ production, are studied in detail. Due to the large split in masses of KK quarks and other particles, hard p_T jets and missing E_T are generated, which make it possible to suppress the standard model background and to discover the signals.

T 19.4 Mi 14:45 HG XIV

Asymptotic Safety at the LHC — •Erik Gerwick[1], Tilman Plehn[2], and Daniel Litim[3] — [1]SUPA, School of Physics and Astronomy, University of Edinburgh, Scotland — [2]Institut fur Theoretische Physik, Universitat Heidelberg, Germany — [3]Department of Physics and Astronomy, University of Sussex, Brighton, UK

Kaluza-Klein states may be accessible at the LHC if Large Extra Dimensions are realized in nature. For processes involving virtual gravitons there are ambiguities when summing over the tower of massive states. We resolve this issue by implementing fixed point scaling behavior in the UV motivated by the asymptotic safety scenario. This talk will discuss this problem as well as possible collider signatures of the asymptotic safety scenario at the LHC.

T 19.5 Mi 15:00 HG XIV

The Randall Sundrum Model and the $t\bar{t}$ Forward-Backward Asymmetry — •Martin Bauer — Institut für Physik (WA THEP), Johannes Gutenberg-Universität D-55099 Mainz, Germany

The forward-backward asymmetry in $t\bar{t}$ production measured at the Tevatron shows a discrepancy of almost 3σ from the SM, while the cross section is in good agreement with SM predictions. In Randall-Sundrum models Kaluza-Klein gluons couple different to left- and right-handed SM fermions. I will talk about how these contributions could be responsible for the observed discrepancy.

T 19.6 Mi 15:15 HG XIV

Analysis of a Multi-Muon Signal at Collider and Fixed-Target Experiments — •Nicki Bornhauser — Universität Bonn

In October 2008 the CDF Collaboration published a study about multi-muon events produced in $p\bar{p}$ collisions at $\sqrt{s} = 1.96$ TeV [arXiv:0810.5357v2 [hep-ex]]. They claim that a significant number of events, in which at least one muon is produced outside of the beam pipe, cannot be explained by known SM QCD production. These are called ghost events. We ask the question: would you expect to have measured ghost events in already carried out collider and fixed-target experiments? The ghost events can be reproduced by a simple model including a low-GeV mass parent particle. Especially in certain fixed-target experiments you would expect a significant number of ghost events.

T 19.7 Mi 15:30 HG XIV

How much space is left for a new family? — •Otto Eberhardt and Alexander Lenz — Universität Regensburg

We analyse the contributions of a fourth quark family to flavor and electroweak observables.

First we have a look at the flavor constraints to a hypothetical 4×4 CKM matrix. In particular we investigate the allowed parameter space due to measurements of CKM elements in tree-level decays and due to measurements of loop induced FCNC processes. The resulting parameter ranges contain an expected small mixing with the fourth family, but also large effects are not yet excluded, for example a sizeable contribution to the CP violating B_s-mixing phase. Finally, we examine the influence of electroweak observables.

T 19.8 Mi 15:45 HG XIV

Extra Fermion Generations and Flavour Bounds — Markus Bobrowski[1], Alexander Lenz[1], Johann Riedl[1], and •Jürgen Rohrwild[2] — [1]Universität Regensburg — [2]RWTH Aachen

In a sense the simplest way to venture beyond the boundaries of the (current) Standard Model is the inclusion of an additional generation of fermions.

As precision measurements of flavour physics observables are known to provide a window to new physics, one needs to study the effects of a fourth fermion generation on these observables.

We show how flavour physics imposes severe bounds on the parameters associated with the four fermion generation CKM matrix. However, we also find that—counterintuitively—large mixing effects cannot be excluded. This phenomenon arises if contributions due to the additional fermions are cancelled by the effects of the modified CKM structure.