

## T 14: Elektroschwache Physik (Theorie)

Convenor: Alexander Mück

Zeit: Freitag 14:00–15:45

Raum: HG XVI

T 14.1 Fr 14:00 HG XVI

**Rotating Sphaleron-Antisphaleron Systems** — RUSTAM IBADOV<sup>1</sup>, BURKHARD KLEIHAUS<sup>2</sup>, JUTTA KUNZ<sup>2</sup>, and MICHAEL LEISSNER<sup>2</sup> — <sup>1</sup>Department of Theoretical Physics and Computer Science, Samarkand State University, Samarkand, Uzbekistan — <sup>2</sup>Institut für Physik, Universität Oldenburg, D-26111 Oldenburg, Germany

The configuration space of the bosonic sector of Yang-Mills-Higgs theory possesses non-trivial topology, giving rise to unstable classical solutions such as the Klinkhamer-Manton sphaleron. Representing a saddlepoint of the energy functional between two topologically inequivalent vacua, its existence permits baryon number changing processes.

In Weinberg-Salam theory, the coupling to the abelian gauge field allows elektroweak sphalerons to carry a nonvanishing angular momentum, being proportional to their electric charge. We here present new classical solutions, representing rotating sphaleron-antisphaleron pairs, chains and vortex rings. In these stationary axially symmetric solutions, the Higgs field vanishes on isolated points on the symmetry axis, or on rings centered around the symmetry axis.

T 14.2 Fr 14:15 HG XVI

**Electroweak contributions to  $e^+e^- \rightarrow W^+W^-b\bar{b}$  in the  $t\bar{t}$  resonance region** — MARTIN BENEKE, BERND JANTZEN, and PEDRO RUIZ-FEMENIA — Institut für Theoretische Physik E, RWTH Aachen University, 52056 Aachen

We analyse subleading electroweak effects in the top-antitop resonance production region in  $e^+e^-$  collisions which arise due to the decay of top quarks into  $Wb$ . These are NLO corrections adopting the non-relativistic power counting  $v \sim \alpha_s \sim \sqrt{\alpha}$ . In contrast to the QCD corrections which have been calculated (almost) up to N<sup>3</sup>LO, the NLO electroweak contributions have not been fully known so far, but are mandatory for the required accuracy at a future linear collider. We also present results with cuts on the invariant masses of the  $W^+b$  and  $W^-b$  pairs that enhance the top-quark signal.

T 14.3 Fr 14:30 HG XVI

**Electroweak corrections to tri-boson production at the ILC** — FAWZI BOUDJEMA<sup>1</sup>, DUC NINH LE<sup>2</sup>, HAO SUN<sup>1</sup>, and MARCUS WEBER<sup>2</sup> — <sup>1</sup>LAPTH, Universite de Savoie, CNRS, Annecy-le-Vieux, France — <sup>2</sup>Max-planck-institut fuer Physik (Werner-Heisenberg-Institut), Munich, Germany

We calculate the full one-loop electroweak corrections to tri-boson production ( $ZZZ$  and  $WWZ$ ) at the ILC. This is important to understand the Standard Model gauge quartic couplings which can be a window on the mechanism of spontaneous symmetry breaking. We find that even after subtracting some large QED corrections, the electroweak corrections can still be large especially as the energy increases.

T 14.4 Fr 14:45 HG XVI

**Anomalous Quartic Couplings in Triple Weak Boson Production at the LHC** — BASTIAN FEIGL and DIETER ZEPPENFELD — Institut für Theoretische Physik, Karlsruher Institut für Technologie, Deutschland

A modification of the four vector boson vertex is a possible candidate for BSM physics. Within a linear realization of the electroweak symmetry breaking, anomalous couplings arising from dimension-8-operators can be used to parameterize effects in the quartic coupling, without altering other vertices at tree level. A production process that is sensitive

to these quartic couplings is triple vector boson production.

Feynman rules for a set of dimension-8-operators have been implemented into the Monte Carlo program VBFNLO in the triple vector boson production processes. VBFNLO can perform cross section calculations for these processes with leptonic decay in NLO QCD.

Possible deviations from the standard model four-vertex were studied with the VBFNLO package. Changes in differential cross sections and sensitivity limits for these operators at the LHC were established within constraints from unitarity restrictions.

T 14.5 Fr 15:00 HG XVI

**Z+jet production at the LHC: Electroweak radiative corrections** — ANSGAR DENNER<sup>1</sup>, STEFAN DITTMAYER<sup>2</sup>, TOBIAS KASPRZIK<sup>3</sup>, and ALEXANDER MÜCK<sup>4</sup> — <sup>1</sup>Paul Scherrer Institut, Villigen, Schweiz — <sup>2</sup>Albert-Ludwigs-Universität Freiburg — <sup>3</sup>Institut für Theoretische Teilchenphysik (TTP), Karlsruhe Institute of Technology (KIT) — <sup>4</sup>RWTH Aachen

The investigation of weak bosons produced with associated hard QCD jets will be of great phenomenological interest at the LHC, since such processes constitute an important background to a large variety of BSM-physics signatures. Moreover—owing to their large production cross sections and the clear leptonic decay signatures of the vector bosons—they can be used to monitor and calibrate the luminosity of the collider, constrain the PDFs, or for detector calibration.

To match the excellent experimental accuracy expected at the LHC, we have worked out a theoretical NLO analysis of V+jet production ( $V = W^\pm, Z^0$ ) at hadron colliders, where all off-shell effects due to the leptonic decay of V are consistently accounted for to reach the aspired theoretical precision.

The focus of this talk will be on the electroweak corrections to Z+jet production at the LHC. We present some details of the calculation, and discuss the phenomenological implications of our results.

T 14.6 Fr 15:15 HG XVI

**Elektroschwache Sudakov-Logarithmen und reelle Abstrahlung bei TeV Energien** — JÖRG RITTINGER — Institut für Theoretische Teilchenphysik, Karlsruher Institut für Technologie

Durch das Auftreten von Sudakov-Logarithmen an der TeV Skala werden elektroschwache Korrekturen groß. Während die Struktur der Sudakov-Logarithmen für die virtuelle Korrektur eingehend untersucht wurde, vernachlässigte man die reelle Korrektur, da die Abstrahlung eines W- oder Z-Bosons zu einem unterschiedlichen Endzustand führt.

Wir vergleichen die virtuelle und die reelle Korrektur für die Vierfermionstreuung und stellen verschiedene Szenarien vor, unter denen reelle Abstrahlung unbeobachtet bleiben kann.

T 14.7 Fr 15:30 HG XVI

**Higgs-Produktion durch Gluonfusion auf NLO in der Supersymmetrie** — HENDRIK MANTLER, ROBERT HARLANDER, FRANZISKA HOFMANN und KEMAL OZEREN — Bergische Universität Wuppertal, Deutschland

Präsentiert werden die Ergebnisse der Berechnung des NLO-Wirkungsquerschnitts für die Higgs-Produktion durch Gluonfusion. Dabei werden die kompletten Abhängigkeiten von der Higgs- und den Quarkmassen berücksichtigt. Neben der Berechnung im Rahmen des Standardmodells werden auch supersymmetrische Modelle betrachtet, wobei eine Entwicklung für große SUSY-Massen durchgeführt wurde.