LHC Run1 Aftermath
 Where Theory meets Experiment

Report of Contributions

https://indico.desy.de/e/8388

Contribution ID: **0** Type: **not specified**

Higgs - Overview - Experiment

Monday 30 September 2013 09:00 (1 hour)

Presenter: KROSEBERG, Juergen (Physikalisches Institut, Universitaet Bonn)

Session Classification: Higgs - Overview talk - Experiment - J. Kroseberg

Contribution ID: **1** Type: **not specified**

Higgs - Overview - Theory

Monday 30 September 2013 10:45 (1 hour)

Presenter: Prof. DJOUADI, Abdel

Session Classification: Higgs - Overview Talk - Theory - A. Djouadi

Contribution ID: **2** Type: **not specified**

SUSY & Other BSM - Overview - Theory

Tuesday 1 October 2013 09:00 (1 hour)

Presenter: SANDER, Christian (University of Hamburg)

Session Classification: SUSY & Other BSM - Overview Talk - Experiment - C. Sander

Contribution ID: **3** Type: **not specified**

SUSY & Other BSM - Overview - Theory

Tuesday 1 October 2013 10:45 (1 hour)

Presenter: Prof. KRAEMER, Michael

Session Classification: SUSY & Other BSM - Overview Talk - Theory - M. Kraemer

Contribution ID: **4** Type: **not specified**

SM Precision Physics - Overview - Experiment

Wednesday 2 October 2013 09:00 (1 hour)

Presenter: GLAZOW, Sasha

Session Classification: SM Precision Physics - Overview Talk - Experiment - A. Glazow

Contribution ID: **5** Type: **not specified**

SM Precision Physics - Overview - Theory

Wednesday 2 October 2013 10:45 (1 hour)

Presenter: ZANDERIGHI, Giulia

Session Classification: SM Precision Physics - Overview Talk - Theory -G. Zanderighi

Contribution ID: **6** Type: **not specified**

Flavour Physics - Overview - Experiment

Thursday 3 October 2013 09:00 (1 hour)

Presenter: HANSMANN-MENZEMER, Stephanie (Univeristy of Heidelberg)

Session Classification: Flavour Physics - Overview Talk - Experiment - S. Menzemer

Contribution ID: **7** Type: **not specified**

Flavour Physics - Overview - Theory

Thursday 3 October 2013 10:45 (1 hour)

Presenter: Prof. NIERSTE, Ulrich (Karlsruhe Institute of Technology)

Session Classification: Flavour Physics - Overview Talk - Theory - U. Nierste

Contribution ID: **8** Type: **not specified**

NLO massive gauge boson pair production at the LHC

Wednesday 2 October 2013 13:30 (45 minutes)

In this talk a full NLO calculation of on-shell massive gauge boson pair production at the LHC will be presented, including both well known QCD corrections and new EW corections. Differential distributions as well as total cross sections predictions will be given, together with a detailed study of the theoretical uncertainties affecting the latter. A comparison with ATLAS and CMS experimental results will also be given.

Primary author: Dr BAGLIO, Julien (Karlsruhe Institute of Technology)

Presenter: Dr BAGLIO, Julien (Karlsruhe Institute of Technology)

Session Classification: SM Precision Physics & SUSY - Topical Talks 2/3

Contribution ID: **9** Type: **not specified**

New Physics and the Higgs

Monday 30 September 2013 13:30 (40 minutes)

After the discovery of a Higgs boson and the absence of other new physics at LHC8, the minimal Standard Model once again seems to prevail. However, there are strong indirect experimental and theoretical arguments for the existence of physics beyond the SM.
The crucial question is therefore whether the new physics scale will be within reach of the LHC14. The negative possibility was recently explored in the context of high scale SUSY models. However, if new physics is indeed present near the TeV scale, it can either be discovered in the form of new particles, or indirectly in modifications of SM interactions and masses. The interactions of the Higgs boson provide many new previously inaccessible observables in which new physics can leave its footprint. I discuss the different parametrizations of these effects using higher dimensional operators, and some of the challenges one faces when implementing a systematic analysis in this framework.

Primary author: Mr KNOCHEL, Alexander (RWTH Aachen)

Presenter: Mr KNOCHEL, Alexander (RWTH Aachen)

Session Classification: Higgs - Topical Talks 1

Contribution ID: **10** Type: **not specified**

The 2HDM of type III and the MSSM in the decoupling limit

Monday 30 September 2013 16:45 (45 minutes)

The decoupling limit of the MSSM is the 2HDM with generic flavour structure (of type III). After discussing the matching of the MSSM on 2HDM of type III including the resummation of all chirally enhanced effects and the newly calculated 2-loop corrections, I review the flavour phenomenology of the 2HDM of type III with focus on possible effects in tauonic B decays. This is interesting due the tensions with the SM in these decays observed by BABAR and explaining the tauonic B decays in the 2HDM III generates an enhancement of A0->tc testable at the LHC.

Primary author: Mr CRIVELLIN, Andreas (ITP Bern)

Presenter: Mr CRIVELLIN, Andreas (ITP Bern)

Session Classification: Higgs - Topical Talks 2

Contribution ID: **12** Type: **not specified**

Higgs Strahlung at the LHC in the 2-Higgs-Doublet Model

Monday 30 September 2013 16:00 (45 minutes)

In this talk the associated production of a (scalar or pseudoscalar) Higgs boson with a weak gauge boson (W or Z) in the 2-Higgs-Doublet Model (2HDM) at the LHC is considered. For the WH mode, a simple rescaling of the Standard Model cross section provides a resonable approximation. In the case of ZH however, due to the larger diversity of partonic contributions, the dependence on the 2HDM parameters is much more involved. Therefore we propose the ratio of the WH and ZH cross sections as a probe of New Physics. Using a new version of our program vh@nnlo, we study this ratio in exemplary 2HDM scenarios, where large deviations from the SM value show up in certain ranges of the parameter space.

Primary authors: HARLANDER, Robert (Wuppertal University); LIEBLER, Stefan (Wuppertal University); ZIRKE, Tom (Wuppertal University)

Presenter: ZIRKE, Tom (Wuppertal University)

Session Classification: Higgs - Topical Talks 2

Contribution ID: **13** Type: **not specified**

Where we do not want to go: avoiding charge- or color-breaking vacua

Wednesday 2 October 2013 16:15 (45 minutes)

Coupling scalars to the electroweak-symmetry-breaking sector is a dangerous game, if those scalars are not meant to acquire non-zero VEVs themselves. A prime example of this is the minimal supersymmetric standard model (MSSM), where scalar partners of top quarks and tau leptons couple to the Higgs fields, and parameter points that lead to VEVs for these scalars must be excluded. We present results within the oft-considered "constrained MSSM" showing that it is a very relevant concern, and indicate the kind of parameter combinations that lead to such problems. We also present new public software to address the difficult question of determining the global minimum of a complicated scalar potential, so that theoretical effort is not wasted on invalid parameter points.

Primary authors: Dr O'LEARY, Ben (Wuerzburg); Dr STAUB, Florian (Bonn); Mr CAMARGO MOLINA, José Eliel (Wuerzburg); Prof. POROD, Werner (Wuerzburg)

Presenter: Dr O'LEARY, Ben (Wuerzburg)

Session Classification: SUSY and other BSM - Topical Talks 2

Contribution ID: **14** Type: **not specified**

Constrained SUSY after the Higgs discovery

Tuesday 1 October 2013 14:50 (40 minutes)

The non-observation of SUSY at the LHC and the discovery of a Higgs-like particle at a mass of about 125 GeV together with results from low energy measurements and cosmology have put constrained supersymmetry under pressure. Performing global fits with the framework Fittino we find that the fit quality of the CMSSM is still in a well acceptable range, when Higgs mass and rate measurements at the LHC are taken into account.

Primary author: SARRAZIN, Bjoern (University of Bonn)

Presenter: SARRAZIN, Bjoern (University of Bonn)

Session Classification: SUSY & Other BSM - Topical Talks 1

Contribution ID: **15** Type: **not specified**

Checkmating your favourite BSM model

Wednesday 2 October 2013 17:00 (45 minutes)

The LHC is currently producing a wealth of new data and both ATLAS and CMS provide lots of analyses that theorists are eager to test their new models with. However, tuning detector simulations, understanding the analysis' details and interpreting the results can be a tedious (and boring) task. We therefore aim to simplify and automatise that procedure.

We present a new program, CheckMATE, that is simple to use and only requires simulated event files and cross sections as input. It will then automatically tell the user whether the particular model is allowed or excluded by comparing to current LHC data. If desired, the program can furthermore calculate confidence limits and provide detailed information about signal regions of interest. It also allows for an easy extension to upcoming LHC results in the future.

Primary authors: Mr SCHMEIER, Daniel (BCTP, University of Bonn); Dr TATTERSALL, Jamie (BCTP, University of Bonn); Dr KIM, Jong Soo (University of Adelaide, Australia / IFT Madrid, Spain); Prof. DREES, Manuel (BCTP, University of Bonn)

Presenter: Mr SCHMEIER, Daniel (BCTP, University of Bonn)

Session Classification: SUSY and other BSM - Topical Talks 2

Contribution ID: **16** Type: **not specified**

Probing the nature of the Higgs-gluon coupling

Monday 30 September 2013 14:10 (40 minutes)

One and two-jet observables of dimension-7 Higgs-gluon coupling operators are studied as probes of possible deviations from the top-loop induced gluon-Higgs coupling. We discuss the case of both a scalar as well as a pseudo-scalar Higgs boson and show that higher order operators can give visible deviations from Standard Model distribution shapes.

Primary authors: Mr HARLANDER, Robert (Bergische Universität Wuppertal); Mr NEUMANN, Tobias (Bergische Universität Wuppertal)

Presenter: Mr NEUMANN, Tobias (Bergische Universität Wuppertal)

Session Classification: Higgs - Topical Talks 1

Contribution ID: **17** Type: **not specified**

Status and prospects of the electroweak fit of the SM with Gfitter after the Higgs discovery

Tuesday 1 October 2013 16:00 (40 minutes)

With the discovery of a Higgs boson at the LHC and the precise measurement of its mass all fundamental Standard Model parameters are known and the global electroweak fit is overconstrained. This allows for the assessment of the validity of the Standard Model and to constrain scenarios for new physics. We present and discuss the influence of the known Higgs mass on the indirect determination of several key parameters of the Standard Model. These results are compatible with, and exceed in precision, the direct measurements.
Constraints from the electroweak fit on loop contributions from beyond-SM models are also obtained, through an analysis of the so-called oblique parameters.
We discuss the impact of the electroweak fit on Higgs coupling studies.
Future measurements at the LHC and the International Linear Collider promise to improve the experimental precision of key observables used in the fit. We present the prospects of the global electroweak fit in view of these improvements.

Primary author: KOGLER, Roman (University of Hamburg)

Presenter: KOGLER, Roman (University of Hamburg)

Session Classification: SM Precision - Topical Talks 1

Contribution ID: **18** Type: **not specified**

ILC: Status and Plans

Tuesday 1 October 2013 16:40 (1 hour)

The International Linear Collider (ILC) is planned as a linear e+e- collider with a centre-of-mass energy tunable between 200 and 500GeV, upgradeable to 1TeV, and a luminosity of 2E34 cm-2s-1. It is based on superconducting RF cavities operating at a mean gradient of 31.5MV/m. This year, the Technical Design Report of the ILC has been published, and activities are underway in the Japan in preparation for a possible bid to host it, with a possible start date in the mid 2020's. The ILC would complement the LHC's physics capabilities in an ideal fashion, allowing precision measurements of the Higgs boson and top quark properties, and searches for new physics, covering also scenarios that are unfavorable for LHC.

Primary author: Dr LIST, Benno (DESY)

Presenter: Dr LIST, Benno (DESY)

Session Classification: ILC: Status and Plans

Contribution ID: **19** Type: **not specified**

Testing models of new physics with HiggsSignals

Monday 30 September 2013 14:50 (40 minutes)

We present the public computer tool HiggsSignals, which performs a statistical compatibility test of arbitrary Higgs sectors against Higgs boson signal rate and mass measurements at hadron colliders. We discuss how the program can be used to derive constraints on the Higgs sector of new physics models, using all currently available Higgs signal measurements from ATLAS, CMS, and the Tevatron experiments. This will be demonstrated for examples of the Minimal Supersymmetric Standard Model (MSSM) as well as for a model-independent scale factor parametrization of the Higgs couplings. Finally, we discuss the prospects for the Higgs coupling determination with future data from the LHC and the ILC.

Primary author: STEFANIAK, Tim (Physikalisches Institut, Universität Bonn)

Presenter: STEFANIAK, Tim (Physikalisches Institut, Universität Bonn)

Session Classification: Higgs - Topical Talks 1

Contribution ID: **20** Type: **not specified**

Determination of the CMSSM Parameters with Neural Networks at the LHC

Tuesday 1 October 2013 14:10 (40 minutes)

In most extensions of the Standard Model the relation mapping the experimentally measurable quantities onto the parameter values is unknown. In this talk the ability of artificial neural networks to find this unknown relation is demonstrated, by determining the unknown parameters of the CMSSM from quantities that can be measured at the LHC. However, the method should also work for many other new physics models. Explicitly, four different benchmark points with each around 1,000 events after cuts for an integrated luminosity of 10/fb are analyzed, in the context of the LHC with a center of mass energy of 14 TeV. 84 observables are used, most of which are counting observables. The parameters m_0 and m_{1/2} can be determined reliably, with errors as small as 1 % in some cases. With 500/fb of data \tan\beta as well as A_0 can also be determined quite accurately.

Primary author: Mr BORNHAUSER, Nicki (Uni Bonn)

Presenter: Mr BORNHAUSER, Nicki (Uni Bonn)

Session Classification: SUSY & Other BSM - Topical Talks 1

Contribution ID: **21** Type: **not specified**

Hidden Susy from precision gauge unification

Tuesday 1 October 2013 13:30 (40 minutes)

TBD

Primary author: Prof. NILLES, Hans-Peter

Session Classification: SUSY & Other BSM - Topical Talks 1

Contribution ID: **22** Type: **not specified**

Phenomenology of light stops

Wednesday 2 October 2013 14:15 (45 minutes)

Naturalness arguments favor the stop squarks to be relatively light. Renormalization group running and left-right mixing reduce the mass of the lighter stop eigenstate. Even in the MSSM one stop can be very light, if the other one is sufficiently heavy. Light stops can reduce the LSP relic density through co-annihilation. The collider phenomenology of light stops can be quite different from that of the other squarks.

Primary author: Prof. DREES, Manuel

Session Classification: SM Precision Physics & SUSY - Topical Talks 2/3