

Future Collider Forum: 1st Workshop

Wednesday, 6 October 2021 - Friday, 8 October 2021

Book of Abstracts

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Machine Session: Future Accelerators / 2

Introduction

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High field magnets

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FCC-ee: Merits and Challenges

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Muon Collider

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Physics Session / 8

Introduction to the physics case

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Tools for Physics studies

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Detector Session / 10

Detector concepts for Linear Colliders: Status and New Technologies

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Detector Session / 11**Detector Development for Linear and Circular Colliders****Corresponding Author:** felix.sefkow@desy.de**Physics Session / 12****A Study of Top Anomalous Couplings at the FCC-ee****Author:** Julie Torndal¹¹ DESY / University of Copenhagen (NBI)**Corresponding Author:** julie@torndal.com

The FCC-ee as one of the proposed future e^+e^- colliders offers indirect sensitivity to new physics at an unprecedented precision. The couplings of the top quark are of particular interest as it is the heaviest particle in the entire Standard Model suggesting it might couple more strongly to BSM fields. In this study, the expected sensitivity to top anomalous couplings at the FCC-ee is determined. The sensitivity is gauged in the semileptonic channel for top pair produced events in simulated datasets generated with FCCSW in the experimental environment of the IDEA detector at $\sqrt{s} = 365$ GeV. Jet performance studies consider various jet definitions with work flowing back into FCCAnalyses to reevaluate jet tools in future works. Event reconstruction is performed, an event selection developed, and a kinematic fit is applied using a software package written in connection with the analysis. The 1sigma confidence intervals are determined for a minimal set of top anomalous couplings. The intervals are found from the observables of angular distributions and total cross sections for each coupling separately.

Physics Session / 13**Status of electroweak computations wrt numerical treatment of Feynman integrals****Author:** Johann Usovitsch¹**Co-authors:** Janusz Gluza²; Ayres Freitas³; Martijn Hidding⁴; Krysztof Grzanka²; Ievgen Dubovyk²¹ CERN² Katowice³ Pittsburgh⁴ Uppsala**Corresponding Author:** johann.usovitsch@cern.ch

We are working on a computational set up to perform electroweak corrections at the three-loop level. The goal is to cover the computation of three-loop corrections contributing to the pseudo observables which are well defined at the Z-boson resonance.

We would like to present the actual blueprint for the numerical evaluation of Feynman integrals and we are confident, that these ideas can be transferred to other projects dealing with radiative corrections.

Physics Session / 14**Di-Higgs with missing transverse momentum at FCC-hh****Authors:** Birgit Stapf¹; Elisabetta Gallo-Voss²; Kerstin Tackmann³¹ *ATLAS (LHC Experiment ATLAS)*² *CMS (CMS-Experiment)*³ *BELLE (BELLE Gruppe)***Corresponding Author:** birgit.stapf@desy.de

The determination of the Higgs self-coupling from di-Higgs events is one of the clearest benchmarks for the FCC-hh. Its potential has been well established already in several final states. In this talk studies into final states of the di-Higgs system which involve neutrinos are presented. The inclusion of additional final states will help to improve the precision of the self-coupling measurement even further, and specifically neutrino channels will help to shed light on an experimental aspect for the FCC-hh which has not been well investigated yet: a robust reconstruction of the missing transverse momentum (ETMiss) is crucial for such analyses. It is clear that ETMiss reconstruction at the FCC-hh will be extremely challenging due to the high pile-up environment, with the average interactions per bunch crossing expected to be of the order of 1000. First investigations into possible final states, their event selections and potential are presented, which in future can then be used to derive benchmark scenarios for the ETMiss reconstruction performance.

Machine Session: Future Accelerators / 15**EuPRAXIA - The European ESFRI Plasma Accelerator Facility****Corresponding Author:** ralph.assmann@desy.de**Machine Session: Future Accelerators / 16****ILC Positron Source and Plasma Lenses****Corresponding Author:** gudrid.moortgat-pick@desy.de**Detector Session / 17****Open Discussion**