Annual Meeting of the CRC TRR 257

Report of Contributions

https://indico.kit.edu/e/2365

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

Welcome

Wednesday, May 26, 2021 1:00 PM (30 minutes)

Presenters: MELNIKOV, Kirill (TTP KIT); KRÄMER, Michael (RWTH Aachen University)

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

Project reports: SM flavour physics

Wednesday, May 26, 2021 1:30 PM (1 hour)

Presenter: HUBER, Tobias (Siegen U)

Session Classification: CRC reports

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

Project reports: BSM flavour physics

Wednesday, May 26, 2021 2:30 PM (1 hour)

Presenter: NIERSTE, Ulrich (Institut fuer Theoretische Teilchenphysik, KIT CS)

Session Classification: CRC reports

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

Effective field theories

Wednesday, May 26, 2021 4:00 PM (1 hour)

Presenter: NEUBERT, Matthias (Johannes Gutenberg-Universität Mainz)

Session Classification: Invited talks

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

Young scientists forum

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

Meeting of the principal investigators

Wednesday, May 26, 2021 6:00 PM (1 hour)

Presenter: MELNIKOV, Kirill (TTP KIT)

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

Meeting of the young scientists

Wednesday, May 26, 2021 6:00 PM (1 hour)

Presenters: BERNREUTHER, Elias (RWTH Aachen University); GABELMANN, Martin (KIT); CATA, Oscar

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

Project reports: BSM and dark matter at colliders

Thursday, May 27, 2021 9:00 AM (1 hour)

Presenter: PLEHN, Tilman (Heidelberg University)

Session Classification: CRC reports

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

Project reports: Tools and methods for precision physics

Thursday, May 27, 2021 10:00 AM (1 hour)

Presenter: MELNIKOV, Kirill (TTP KIT)

Session Classification: CRC reports

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

Physics at future colliders

Thursday, May 27, 2021 11:30 AM (1 hour)

Presenter: MANGANO, Michelangelo (CERN)

Session Classification: Invited talks

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

Young scientist forum

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

General assembly

Thursday, May 27, 2021 4:00 PM (1 hour)

Presenter: MELNIKOV, Kirill (TTP KIT)

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

Project reports: Collider phenomenology

Friday, May 28, 2021 9:00 AM (1 hour)

Presenter: WOREK, Malgorzata (RWTH Aachen University)

Session Classification: CRC reports

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

Project reports: Precision Higgs physics

Friday, May 28, 2021 10:00 AM (1 hour)

Presenter: HARLANDER, Robert (RWTH Aachen University)

Session Classification: CRC reports

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

Cosmology and Particle Physics

Friday, May 28, 2021 11:30 AM (1 hour)

Presenter: SERVANT, Geraldine (DESY)

Session Classification: Invited talks

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

Young scientists forum

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

Implicit bias in physics

Friday, May 28, 2021 3:00 PM (1 hour)

Presenter: TAYLOR, Marika (University of Southampton)

Session Classification: Invited talks

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

Concluding remarks

Friday, May 28, 2021 4:00 PM (30 minutes)

Presenter: MELNIKOV, Kirill (TTP KIT)

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

NLO QCD corrections for off-shell ttbb

Wednesday, May 26, 2021 5:00 PM (20 minutes)

I will present next-to-leading order QCD predictions for the process of top quark pair production in association with a b-jet pair at the LHC with center of mass energy of 13 TeV. In the calculation we concentrated on the di-leptonic decay channel of the top quark pair and we considered full off-shell effects. This study is particularly relevant for the measurements of the Higgs properties, because it represents a background to the Higgs production in association with a top quark pair. In addition, our predictions might be used for precise measurements of the top quark fiducial cross sections and to improve top quark decay modeling at the LHC.

Presenter: LUPATTELLI, Michele (Aachen)

Session Classification: Young Scientists Forum

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

ttW: Correlations and Asymmetries

Wednesday, May 26, 2021 5:20 PM (20 minutes)

The ttW^{+/-} process in the multi-lepton plus b-jet final state has shown discrepancies between experiment and theory as reported by the ATLAS collaboration. To this end, we employ NLO QCD off-shell results for this process to investigate the cross section ratio between ttW^+ and ttW^- which is a precision observable. Using these results we obtain theoretical errors of order 1%-2%, depending of the transverse momentum cut on the b-jet. Furthermore, motivated by this discrepancy we analyse the charge asymmetry of the top quark and it's decay products for this process. These are quite sensitive to the chiral nature of possible new physics in this channel. The theoretical uncertainty, modelling and reconstruction issues are addressed and discussed and finally we reach theoretical uncertainties of below 15% for this observable.

Presenter: NASUFI, Jasmina (Aachen)

Session Classification: Young Scientists Forum

Contribution ID: **23** Type: **not specified**

NNLO QCD corrections to the B-meson mixing

Wednesday, May 26, 2021 5:40 PM (20 minutes)

In this talk I will discuss selected aspects of our calculation of the previously unknown NNLO QCD corrections to the $B_s - \bar{B}_s$ mixing process. These contributions are required to reduce the existing theory uncertainty on $\Delta\Gamma_{12}^s$, the flavor mixing parameter governing lifetime differences of neutral B_s mesons.

Presenter: SHTABOVENKO, Vladyslav (Karlsruhe)

Session Classification: Young Scientists Forum

Contribution ID: **24** Type: **not specified**

Cornering the Two-Higgs-Doublet II Model

Thursday, May 27, 2021 2:00 PM (20 minutes)

We perform a comprehensive study of the allowed parameter space of the Two-Higgs doublet model (2HDM) of type II. Using the theoretical framework flavio, we combine the most recent flavour, collider and electro-weak precision observables with theoretical constraints to obtain bounds on the mass spectrum of the theory. In particular we find that the wrong-sign limit is excluded and potential deviations from the alignment limit can only be small. Finally we test the consequences of our allowed parameter space on electro-weak baryo genesis via the programme package BSMPT.

Presenter: BLACK, Matthew (Siegen)

Session Classification: Young Scientists Forum

Contribution ID: **25** Type: **not specified**

Top-quark fragmentation into a Higgs boson with next-to-leading order accuracy

Thursday, May 27, 2021 2:20 PM (20 minutes)

We computed the tth fragmentation function at order O(yt2 αs). Real and virtual corrections have been computed by using modern loop computation techniques. In particular, we combined the unitary cut method with the differential equation approach. Moreover, we found a strategy for calculating the master integrals analytically, order by order in the dimensional regulator ε, in canonical basis.

Presenter: BRANCACCIO, Colomba (Aachen)

Session Classification: Young Scientists Forum

Contribution ID: **26** Type: **not specified**

Top-Pair Events with B-hadrons at the LHC

Thursday, May 27, 2021 2:40 PM (20 minutes)

In this talk, I will present NNLO QCD predictions for several differential distributions of B-hadrons in top-pair events at the LHC. Among other things, these predictions allow for a precise determination of the top-quark mass. The results also offer positive prospects for extracting heavy-flavour fragmentation functions from LHC data. On the technical side, I will demonstrate how to incorporate fragmentation in a subtraction scheme at NNLO.

Presenter: GENERET, Terry (Aachen)

Session Classification: Young Scientists Forum

Contribution ID: **27** Type: **not specified**

(g-2)☒, B anomalies and DM: a loop model tale

Thursday, May 27, 2021 3:00 PM (20 minutes)

In this talk I will review how the anomalous magnetic moment of the muon and the B anomalies can be addressed by a combined explaination, by means of loop models characterized by minimal field content. Moreover, I will show how some of these model can also provide a viable DM candidate, accounting for the measured relic density while evading direct and indirect DM constraints.

Presenter: FEDELE, Marco (Karlsruhe)

Session Classification: Young Scientists Forum

Contribution ID: **28** Type: **not specified**

Exact top-quark mass dependence in hadronic Higgs production

Friday, May 28, 2021 2:00 PM (20 minutes)

The impact of the finite top-quark mass on the inclusive Higgs production cross section at higher perturbative orders has been an open question for almost three decades. I will report on the computation of this effect at NNLO QCD. This result eliminates one of the main theoretical uncertainties to inclusive Higgs production cross section at the LHC.

Presenter: NIGGETIEDT, Marco (Aachen)

Session Classification: Young Scientists Forum

Contribution ID: **29** Type: **not specified**

Third order corrections to the semi-leptonic $b \to c$ and the muon decays

Friday, May 28, 2021 2:20 PM (20 minutes)

In this talk we present our recent calculation of order α_s^3 corrections to the semi-leptonic $b \to c$ and the muon decays. The calculation has been performed in an expansion around the heavy-daughter limit $m_c \sim m_b$, but also shows decent convergence for $m_c = 0$ from which the contribution to the muon decay can be extracted.

Presenter: SCHOENWALD, Kay (Karlsruhe)

Session Classification: Young Scientists Forum

Contribution ID: **30** Type: **not specified**

Automated calculation of beam functions in SCET

Friday, May 28, 2021 2:40 PM (20 minutes)

Over the last decades, factorization theorems became an important method to tackle problems in perturbative QCD, especially within the framework of effective field theories. In Soft-Collinear Effective Theory, these factorization theorems include beam functions accounting for the initial-state collinear interactions. While these functions have been calculated case by case for different observables until now, we are investigating an automated approach for a general class of observables. For this, we study a general phase-space parameterization which factorizes the singularities of the beam function in an universal way. This approach has been implemented in the public code "pySecDec" in order to calculate the next-to-leading order and part of the next-to-next-to leading order beam function.

Presenter: WALD, Marcel (Siegen)

Session Classification: Young Scientists Forum