

**Annual Meeting of the SFB  
TRR 257**

**Report of Contributions**

Contribution ID : 1

Type : **not specified**

## Arrival and Welcome

Contribution ID : 2

Type : **not specified**

## **Welcome: K. Melnikov (KIT), T. Mannel (Siegen)**

*Tuesday, 6 October 2020 11:30 (10)*

**Presenter(s)** : MELNIKOV, Kirill (TTP KIT); MANNEL, Thomas (Siegen University)

Contribution ID : 3

Type : **not specified**

## **Invited Talk: Alexander Lenz Siegen)**

*Tuesday, 6 October 2020 12:30 (50)*

**Presenter(s)** : LENZ, Alexander

Contribution ID : 4

Type : **not specified**

## **Project A1a: R. Harlander (Aachen)**

*Tuesday, 6 October 2020 14:00 (30)*

**Presenter(s)** : HARLANDER, Robert (RWTH Aachen University)

Contribution ID : 5

Type : **not specified**

## **Project A1b: K. Melnikov (KIT)**

*Tuesday, 6 October 2020 14:30 (30)*

**Presenter(s)** : MELNIKOV, Kirill (TTP KIT)

Contribution ID : 6

Type : **not specified**

## **Project A1c: K. Melnikov (KIT)**

*Tuesday, 6 October 2020 15:00 (30)*

**Presenter(s)** : MELNIKOV, Kirill (TTP KIT)

Contribution ID : 7

Type : **not specified**

## **Project B1a: M. Czakon (Aachen)**

*Tuesday, 6 October 2020 15:30 (30)*

**Presenter(s)** : CZAKON, Michal



Contribution ID : 8

Type : **not specified**

## **Project B1b: M. Worek (Aachen)**

*Tuesday, 6 October 2020 17:20 (30)*

**Presenter(s)** : WOREK, Malgorzata (RWTH Aachen University)

Contribution ID : 9

Type : **not specified**

## **Project B1c: T. Jezo (KIT)**

*Tuesday, 6 October 2020 17:50 (30)*

**Presenter(s)** : JEZO, Tomas (KIT ITP)

Contribution ID : **10**

Type : **not specified**

## **Invited Talk: Claude Duhr (CERN)**

*Wednesday, 7 October 2020 08:30 (50)*

**Presenter(s)** : DUHR, Claude

Contribution ID : 11

Type : **not specified**

## **Invited talk: Julia Harz (TU München)**

*Wednesday, 7 October 2020 09:20 (50)*

**Presenter(s)** : HARZ, Julia

Contribution ID : 12

Type : **not specified**

## **Project B2a: G. Bell (Siegen)**

*Wednesday, 7 October 2020 10:40 (30)*

**Presenter(s)** : BELL, Guido (University of Siegen)

Contribution ID : 13

Type : **not specified**

## **Project C1a: T. Huber (Siegen)**

*Wednesday, 7 October 2020 13:45 (30)*

**Presenter(s)** : HUBER, Tobias

Contribution ID : 14

Type : **not specified**

## **Project C1b: U. Nierste (KIT)**

*Wednesday, 7 October 2020 14:15 (30)*

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

Contribution ID : 15

Type : **not specified**

## **Project A2a: T. Plehn (Heidelberg)**

*Wednesday, 7 October 2020 14:45 (30)*

**Presenter(s)** : PLEHN, Tilman



Contribution ID : 16

Type : **not specified**

## **Project B3a: F. Kahlhöfer (Aachen)**

*Wednesday, 7 October 2020 15:15 (30)*

**Presenter(s)** : KAHLHOEFER, Felix

Contribution ID : 17

Type : **not specified**

## **Project C2a: T. Mannel (Siegen)**

*Thursday, 8 October 2020 08:30 (30)*

**Presenter(s)** : MANNEL, Thomas (Siegen University)

Contribution ID : **18**

Type : **not specified**

## **Project C2b: T. Feldmann (Siegen)**

*Thursday, 8 October 2020 09:00 (30)*

**Presenter(s)** : FELDMANN, Thorsten

Contribution ID : 19

Type : **not specified**

## **Project A3a: M. Mühleitner (KIT)**

*Thursday, 8 October 2020 09:30 (30)*

**Presenter(s)** : MUHLLEITNER, Milada Margarete (KIT)

Contribution ID : 20

Type : **not specified**

## **Project A3b: M. Mühleitner (KIT) / M. Steinhauser (KIT)**

*Thursday, 8 October 2020 10:30 (30)*

**Presenter(s)** : MUHLLEITNER, Milada Margarete (KIT); STEINHAUSER, Matthias

Contribution ID : 21

Type : **not specified**

## **Project A2b: W. Kilian (Siegen) / H. Schäfer-Siebert (KIT)**

*Thursday, 8 October 2020 11:00 (30)*

**Presenter(s)** : SCHÄFER-SIEBERT, Heiko; KILIAN, Wolfgang

Contribution ID : **22**

Type : **not specified**

## **Project B3b**

Contribution ID : 23

Type : **not specified**

## **Project C3a: M. Blanke (KIT)**

*Thursday, 8 October 2020 13:40 (30)*

**Presenter(s)** : BLANKE, Monika (KIT)



Contribution ID : 24

Type : **not specified**

## **Project C3b: R. Ziegler (KIT)**

*Thursday, 8 October 2020 14:10 (30)*

**Presenter(s)** : ZIEGLER, Robert

Contribution ID : 25

Type : **not specified**

## **Project C3b**

Contribution ID : 26

Type : **not specified**

## **Invited talk: (Fabio Maltoni)**

*Thursday, 8 October 2020 15:10 (50)*

**Presenter(s)** : MALTONI, Fabio

Contribution ID : 27

Type : **not specified**

## Closing Remarks

*Thursday, 8 October 2020 16:00 (15)*

Contribution ID : 28

Type : **not specified**

## **Invited Talk: Gudrun Heinrich (KIT)**

*Tuesday, 6 October 2020 11:40 (50)*

**Presenter(s)** : HEINRICH, Gudrun (Max Planck Institute for Physics)

Contribution ID : 29

Type : **not specified**

## **Invited talk: Jure Zupan (Cincinnati)**

*Tuesday, 6 October 2020 16:30 (50)*

**Presenter(s)** : ZUPAN, Jure

Contribution ID : **30**

Type : **not specified**

## **Project B1d: M. Löschner (KIT)**

*Wednesday, 7 October 2020 15:45 (30)*

**Presenter(s)** : LÖSCHNER, Maximilian (KIT/ ITP)

Contribution ID : 31

Type : **not specified**

## **Project B2b: S. Bruggisser (Heidelberg)**

*Wednesday, 7 October 2020 16:15 (30)*

**Presenter(s)** : BRUGGISSER, Sebastian (Heidelberg)



Contribution ID : **32**

Type : **not specified**

## **Implicit Bias: C. Schuster (DFG)**

*Wednesday, 7 October 2020 17:15 (40)*

**Presenter(s)** : SCHUSTER, Cosima

**Session Classification** : Gender Awareness / Soft Skills

Contribution ID : 33

Type : **not specified**

## **How to write a successful application: F. Kahlhoefer (Aachen)**

*Thursday, 8 October 2020 12:00 (30)*

**Presenter(s)** : KAHLHOEFER, Felix

**Session Classification** : Soft Skills Training

Contribution ID : 34

Type : **not specified**

## **What kind of grants are available to young scientists? T. Mannel (Siegen)**

*Thursday, 8 October 2020 11:30 (30)*

**Presenter(s)** : MANNEL, Thomas (Siegen University)

**Session Classification** : Soft Skills Training

Contribution ID : 35

Type : **not specified**

## **How are applications evaluated? M. Krämer (Aachen)**

*Thursday, 8 October 2020 12:30 (30)*

**Presenter(s)** : KRÄMER, Michael (RWTH Aachen University)

**Session Classification** : Soft Skills Training

Contribution ID : 36

Type : **not specified**

## The full angle-dependence of the four-loop cusp anomalous dimension in QED

*Wednesday, 7 October 2020 11:10 (18)*

The cusp anomalous dimension is a ubiquitous quantity in gauge theories such as QCD and QED. It governs the infrared behaviour of scattering amplitudes and is a universal ingredient in heavy quark effective theory and soft collinear effective theory. In this talk I present new results for the full angle-dependence of the fermionic quartic Casimir contributions at four loops. These are the first truly non-planar matter dependent contributions and the last missing pieces to obtain the full cusp anomalous dimension in QED.

**Presenter(s)** : BRÜSER, Robin (University Siegen)

**Session Classification** : Young Scientists Session

Contribution ID : 37

Type : **not specified**

## NLO QCD-EW corrections to Higgs boson gluon fusion

*Wednesday, 7 October 2020 11:28 (18)*

The study of the Higgs boson properties is one of the main tasks of contemporary high-energy physics. Among Higgs properties, its interaction with gluons is interesting since it can be facilitated by yet unknown elementary particles. At present, one of the major sources of uncertainty in the theoretical description of  $ggH$  coupling originates from mixed QCD-electroweak contributions. I will present the analytic results for the NLO mixed QCD-EW corrections to  $gg \rightarrow H(g)$ .

**Presenter(s)** : BONETTI, Marco (RWTH)**Session Classification** : Young Scientists Session

Contribution ID : 38

Type : **not specified**

## The Kinetic Heavy Quark Mass to Three Loop

*Wednesday, 7 October 2020 11:46 (18)*

We compute three-loop corrections to the relation between the heavy quark masses defined in the pole and kinetic schemes. Using known relations between the pole and  $\overline{\text{MS}}$  quark masses we can establish precise relations between the kinetic and  $\overline{\text{MS}}$  charm and bottom masses. As compared to two loops, the precision is improved by a factor two to three. Our results constitute important ingredients for the precise determination of the Cabibbo-Kobayashi-Maskawa matrix element  $V_{cb}$  at Belle-II.

**Presenter(s)** : SCHOENWALD, Kay (KIT)**Session Classification** : Young Scientists Session

Contribution ID : 39

Type : **not specified**

## Automating the calculation of jet functions in SCET

*Wednesday, 7 October 2020 12:22 (18)*

In perturbative QCD large logarithms can arise in the computation of collider observables. These logarithms can be resummed via factorization theorems within Soft-Collinear Effective Theory(SCET). The

factorization theorems contain jet functions, which describe collinear interactions.

In this talk I present a systematic framework for the computation of jet functions for generic observables. For this purpose we introduce a phase space parametrization which allows the factorization of universal singularities of jet functions. We have implemented this framework for different observables, by using the public code “pySecDec” to compute the next-to-leading order and part of the next-to-next-to-leading order jet function.

**Presenter(s)** : BRUNE, Kevin (University of Siegen)

**Session Classification** : Young Scientists Session



Contribution ID : 40

Type : **not specified**

## On the status of the heavy quark expansion for charmed hadrons

*Wednesday, 7 October 2020 12:04 (18)*

The heavy quark expansion (HQE), which provides a perturbative expansion in the inverse heavy quark mass, has proven to be very successful for describing bottomed hadrons. However, its applicability has often been questioned for charmed hadrons due to the charm quark is actually not so heavy. In this talk we revisit the status of the HQE for charm. In particular, we study pseudoscalar  $D$ -meson semileptonic and nonleptonic decay widths including available NLO QCD and subleading  $1/m_c$  corrections. We find good agreement with experimental data up to large uncertainties due to hadronic matrix elements and the charm quark mass definition. We also study the behavior of the HQE for observables specially designed for charm, where the free quark decay contribution cancels to a large extent.

**Presenter(s)** : MORENO, Daniel (University of Siegen)

**Session Classification** : Young Scientists Session

Contribution ID : 41

Type : **not specified**

## **On inverse moment of $B_s$ meson distribution amplitude**

*Wednesday, 7 October 2020 12:40 (18)*

**Presenter(s)** : MANDAL, Rusa

**Session Classification** : Young Scientists Session

Contribution ID : 42

Type : **not specified**

## Contribution of the Darwin operator to non-leptonic decays of heavy quarks

*Wednesday, 7 October 2020 18:13 (17)*

The total decay width of heavy hadrons can be systematically computed using the Heavy Quark Expansion (HQE) framework, as a series in inverse powers of the heavy quark mass  $m_Q$ . Computation of higher corrections is crucial both to test the consistency of HQE itself and to constrain the size of possible new physics effects. In this talk I will present the result of our recent paper on the determination of the two-loop  $1/m_b^3$  correction (Darwin term) to the non-leptonic decays of B mesons.

**Presenter(s)** : PISCOPO, Maria**Session Classification** : Young Scientists Session

Contribution ID : 43

Type : **not specified**

## Probing New Physics in $b \rightarrow d$ Transitions

*Wednesday, 7 October 2020 17:55 (18)*

Recent experimental data on several observables in semileptonic  $B$ -meson decays are found to be in tension with the corresponding Standard Model predictions. Most of these deviations are related to  $b \rightarrow c$  and  $b \rightarrow s$  flavour changing transitions. In this talk, I plan to discuss possible New Physics effects in  $b \rightarrow d\mu^+\mu^-$  flavour changing neutral currents.

These NP contributions are parameterised in a model independent way and the  $1\sigma$  ranges of corresponding Wilson coefficients are determined from the data on the exclusive  $B^\pm \rightarrow \pi^\pm\mu^+\mu^-$  decays measured recently by the LHCb collaboration.

Afterwards, I will briefly discuss the impact of these results on other  $b \rightarrow d$  processes such as the leptonic  $B^0 \rightarrow \mu^+\mu^-$  decays and  $B^0 - \bar{B}^0$  mixing.

As an example, I will consider a simplified  $Z'$  model that is found to be consistent with the current  $b \rightarrow d$  data in the certain regions of the NP parameters space.

In the final part of the talk, I will briefly mention other  $b \rightarrow d\ell^+\ell^-$  modes to be measured in the future

**Presenter(s)** : RUSOV, Aleksey (University of Siegen)

**Session Classification** : Young Scientists Session