

# **2023 Belle II Physics Week**

## **Report of Contributions**

Contribution ID: 1

Type: **not specified**

## Opening remarks

*Monday, 30 October 2023 13:45 (10 minutes)*

**Presenter:** DORIGO, Mirco (INFN Trieste)

**Session Classification:** Workshop

Contribution ID: 2

Type: **not specified**

## The role of $|V_{cb}|$

*Monday, 30 October 2023 13:55 (20 minutes)*

The role of  $V_{cb}$  in the global picture: impact of the  $V_{cb}$  puzzle on UT and NP searches

**Presenter:** VALE SILVA, Luiz (IFIC)

**Session Classification:** Workshop

Contribution ID: 3

Type: **not specified**

## Experimental challenges in exclusive measurements

*Monday, 30 October 2023 14:20 (30 minutes)*

Review recent measurements with focus on current limitations: are we already systematically limited? how to circumvent this? Is there a  $V_{cb}$  dependence on parametrisation (recent measurements do not indicate so)? Dependence on truncation on BGL expansion, how to choose (eg. nested hypothesis tests)? New ideas, eg down-feed  $D^*$  in  $D$  categories to measure the  $w$  spectrum

**Presenter:** KOWALEWSKI, Robert (University of Victoria)

**Session Classification:** Workshop:  $V_{cb}$  exclusive

Contribution ID: 5

Type: **not specified**

## Theoretical challenges in the exclusive determinations

*Monday, 30 October 2023 15:20 (30 minutes)*

Developments in FF model independent approaches. How to assess potential biases from various models or sum rule-based approaches? How do we systematically decide on the truncation order of a parametrization (Akaike IC, Nested Hyp. test, ...). Can we develop a benchmark test to compare different methods? For HQET-based parametrizations of  $B \rightarrow D/D^*$ , how do we assess the role of and incorporate second-order power corrections?

**Presenter:** LIGETI, Zoltan (Berkley)

**Session Classification:** Workshop: Vcb exclusive

Contribution ID: 7

Type: **not specified**

## Beyond unfolded distributions

*Monday, 30 October 2023 16:45 (30 minutes)*

Which measurements can we provide to improve knowledge on form factors? What are the shortcomings of unfolded distributions? ☒What can we provide beyond/along-with them? ☒What can angular analyses add?

**Presenter:** PRIM, Markus (BELLE (BELLE II Experiment))

**Session Classification:** Workshop: Vcb exclusive

Contribution ID: 8

Type: **not specified**

## Lattice tensions

*Monday, 30 October 2023 17:45 (30 minutes)*

What are the tension: review/comparison of recent calculations by Fermilab/MILC,HPQCD,JLQCD.  
☒What are the key differences among the 3 calculations and possible origin of the tension? ☒What's  
needed to identify the origin of the tension: what short-term future results/calculations are planned?

**Presenter:** VAQUERO, Alejandro (UNIZAR)

**Session Classification:** Workshop: Vcb exclusive

Contribution ID: 9

Type: **not specified**

## SL gap: knowns and unknowns

*Tuesday, 31 October 2023 14:15 (30 minutes)*

What is the current knowledge of  $D^{(*)} \rightarrow \pi l \nu$  decays? What do we do to fill the gap? Are our assumptions and uncertainties (not only for  $V_{cb}$ ) reliable? Can we do better and what recent measurements brought?

**Presenter:** BERNLOCHNER, Florian (Belle (SuperKEKB Experiment))

**Session Classification:** Workshop: SL gap and inputs from other sectors



Contribution ID: **10**

Type: **not specified**

## Can B hadronic help?

*Tuesday, 31 October 2023 15:10 (20 minutes)*

Can hadronic B decays (eg.  $B \rightarrow D^* \eta \pi$ ) supplement info on SL-gap modes? Under which assumptions/limitations? Would like to stimulate a discussion on what measurements are possible and pressing on Bhad

**Presenter:** DORIGO, Mirco (INFN Trieste)

**Session Classification:** Workshop: SL gap and inputs from other sectors

Contribution ID: 11

Type: **not specified**

## Ways to improve $f_{+/-}/f_0$

*Tuesday, 31 October 2023 16:45 (20 minutes)*

To overcome the current used value affected by large isospin-breaking uncertainty, and to account for any c.m.-energy dependence

**Presenter:** LIBBY, James Frederick (BELLE (BELLE II Experiment))

**Session Classification:** Workshop: experimental challenges

Contribution ID: 12

Type: **not specified**

## **Loops in inclusive determination**

*Thursday, 2 November 2023 13:45 (20 minutes)*

**Presenter:** FAEL, Matteo (CERN)

**Session Classification:** Workshop: Vcb inclusive

Contribution ID: 13

Type: **not specified**

## **FF, polarisation and asymmetries in $D^* \text{Inu}$**

*Tuesday, 31 October 2023 13:45 (20 minutes)*

Discuss <https://arxiv.org/abs/2305.15457> and DM

**Presenter:** FEDELE, Marco (KIT)

**Session Classification:** Workshop: Vcb exclusive

Contribution ID: 14

Type: **not specified**

## **Vub/Vcb from lattice**

*Wednesday, 1 November 2023 14:50 (20 minutes)*

Lattice calculation of relevant form factors and future prospects

**Presenter:** HARRISON, Judd (Glasgow)

**Session Classification:** Workshop: Vcb inclusive

Contribution ID: **16**

Type: **not specified**

## Inputs from Charm

*Tuesday, 31 October 2023 15:45 (20 minutes)*

This talk will explore the successful endeavors of the BES-III experiment in simulating the decay processes of charmed mesons. Advanced decay models for multibody charm decays based on dedicated partial wave amplitude measurements will be introduced.

**Presenter:** SHAN, Xinyu (USTC)

**Session Classification:** Workshop: SL gap and inputs from other sectors

Contribution ID: 17

Type: **not specified**

## Slow-pion efficiency

*Tuesday, 31 October 2023 17:15 (20 minutes)*

The slow-pion efficiency and its associated systematic uncertainty is currently the major limitation of the exclusive measurement with  $B \rightarrow D^*(D_0 \pi_s) l \nu$  decays. Can we improve the slow-pion efficiency? Can we reduce its systematic uncertainty?

**Presenter:** DORNER, Daniel (BELLE (BELLE II Experiment))

**Session Classification:** Workshop: experimental challenges

Contribution ID: **18**

Type: **not specified**

## Lepton ID challenges

*Tuesday, 31 October 2023 17:45 (20 minutes)*

A key ingredient of SL measurements are LID efficiencies, their corrections and systematic uncertainties. The talk review on this topic with particular focus on current limitations and modelling of LID uncertainty correlations.

**Presenter:** UNO, Kenta (KEK)

**Session Classification:** Workshop: experimental challenges



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

## Experimental developments of inclusive inputs

*Wednesday, 1 November 2023 13:45 (20 minutes)*

Review of Belle/Belle II most recent measurements ( $q^2$  moments).  $\boxtimes$ Measurement of  $BR(B \rightarrow Xc l \nu)$  and other going/planned activities on Belle II:  $M_x$ ,  $E_l$  moments from previous measurements can be updated using Belle II data; angular moments measurement is ongoing. Status, issues and needs for a new determination of the inclusive measurements (e.g. w/  $q^2$  thresholds, approach for handling syst.).

**Presenter:** CAO, Lu (BELLE (BELLE Gruppe))

**Session Classification:** Workshop: Vcb inclusive

Contribution ID: 20

Type: **not specified**

## Vub/Vcb inclusive measurement

*Wednesday, 1 November 2023 14:15 (20 minutes)*

Recent Belle result (first BRs ratio measurement from inclusive decays) and prospects for the decay-width-ratio calculation (a part of th. error can be cancelled in ratio)

**Presenters:** HOHMANN, Marcel (BELLE (BELLE II Experiment)); Dr URQUIJO, Phillip (The University of Melbourne)

**Session Classification:** Workshop: Vcb inclusive

Contribution ID: 21

Type: **not specified**

## Theory progress for Vcb inclusive

*Wednesday, 1 November 2023 15:20 (30 minutes)*

$|V_{cb}|$  from  $q^2$  moments [JHEP 10, 068 (2022)],  $BR(B \rightarrow X_c l \nu)$  is needed. Recent theoretical results on kin. moments including NP impacts [JHEP 02, 086 (2023)].

Exp wish-list from th. experts:

- recommended phase space region, kinematic threshold
- further needed exp. inputs
- what's beyond moments?

**Presenter:** VOS, Keri

**Session Classification:** Workshop: Vcb inclusive

Contribution ID: 22

Type: **not specified**

## Challenges for a global inclusive analysis

*Thursday, 2 November 2023 14:20 (30 minutes)*

Status (only  $M_x$  and  $E_I$  moments used), pros/cons of leptonic and hadronic moments. Would a global analysis ever be possible (and useful)? Guidance towards a global analysis -> fit OPE parameters, quark masses, BR

**Presenter:** BORDONE, Marzia (CERN)

**Session Classification:** Workshop: Vcb inclusive

Contribution ID: 23

Type: **not specified**

## New EvtGen models for $D^* \lnu$

*Thursday, 2 November 2023 15:45 (15 minutes)*

Discuss <https://arxiv.org/abs/2203.07189>

**Presenter:** MUKHERJEE, Lopamudra

**Session Classification:** Tools

Contribution ID: 24

Type: **not specified**

## HAMMER and eFFORT

*Thursday, 2 November 2023 15:15 (15 minutes)*

Discuss any recent or foreseen developments and needs from analyst (can also collect inputs in advance from Belle 2 people if needed)

**Presenter:** PAPUCCI, Michele (CALTECH)

**Session Classification:** Tools

Contribution ID: 25

Type: **not specified**

## Vcb in 3 years and beyond

*Thursday, 2 November 2023 17:30 (30 minutes)*

Prospecst for Vcb and what we would like to have in 3 years (possibly taking also inputs from the discussion during the workshop)

**Presenter:** GAMBINO, Paolo (Torino)

**Session Classification:** Workshop

Contribution ID: 26

Type: **not specified**

## Closing

*Thursday, 2 November 2023 18:15 (10 minutes)*

**Presenter:** TRABELSI, Karim (IJCLab (Orsay))

**Session Classification:** Workshop



Contribution ID: 27

Type: **not specified**

# Flavour physics - 1

*Monday, 30 October 2023 08:30 (1h 15m)*

**Presenter:** Dr MANDAL, Rusa (IIT Gandhinagar)

**Session Classification:** School

Contribution ID: 28

Type: **not specified**

## The anatomy of a semileptonic analysis

*Monday, 30 October 2023 09:45 (1h 15m)*

**Presenter:** BERNLOCHNER, Florian (Belle (SuperKEKB Experiment))

**Session Classification:** School

Contribution ID: 29

Type: **not specified**

## **Performance: what we do and what you can do for us?**

*Monday, 30 October 2023 11:30 (1h 15m)*

**Presenter:** GAZ, Alessandro (University of Padova & INFN)

**Session Classification:** School

Contribution ID: **30**

Type: **not specified**

## **Systematics uncertainties: an introduction**

*Thursday, 2 November 2023 08:30 (1h 15m)*

**Presenter:** YABSLEY, Bruce (BELLE (BELLE II Experiment))

**Session Classification:** School

Contribution ID: 31

Type: **not specified**

## **Lepton identification: an overview**

*Thursday, 2 November 2023 09:45 (1h 15m)*

**Presenter:** UNO, Kenta (KEK)

**Session Classification:** School

Contribution ID: 32

Type: **not specified**

## **A view from the otherside: semileptonics at LHCb**

*Thursday, 2 November 2023 11:30 (1h 15m)*

**Presenter:** POWEN, Patrick Owen (UZH)

**Session Classification:** School

Contribution ID: 33

Type: **not specified**

## Flavour physics 2

*Tuesday, 31 October 2023 08:30 (1h 15m)*

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

**Session Classification:** School

Contribution ID: **34**

Type: **not specified**

## **ECL: an overview**

*Tuesday, 31 October 2023 09:45 (1h 15m)*

**Presenter:** Prof. HEARTY, Christopher (University of British Columbia / IPP)

**Session Classification:** School



Contribution ID: 35

Type: **not specified**

## Tracking: basics

*Tuesday, 31 October 2023 11:30 (1h 15m)*

**Presenter:** HAN, Yubo (BELLE (BELLE Gruppe))

**Session Classification:** School

Contribution ID: **36**

Type: **not specified**

## **Flavour physics 3**

*Wednesday, 1 November 2023 08:30 (1h 15m)*

**Presenter:** Dr MANDAL, Rusa (IIT Gandhinagar)

**Session Classification:** School

Contribution ID: 37

Type: **not specified**

## **FEI: from top-to-bottom**

*Wednesday, 1 November 2023 09:45 (1h 15m)*

**Presenter:** ROUT, Niharika (INFN Trieste)

**Session Classification:** School

Contribution ID: **38**

Type: **not specified**

## **Belle + Belle II analyses: a how to guide?**

*Wednesday, 1 November 2023 11:30 (1h 15m)*

**Presenter:** SHI, Xiaodong (BELLE (BELLE II Experiment))

**Session Classification:** School

Contribution ID: 39

Type: **not specified**

## **E\_ECL: what it is and how to use it**

*Friday, 3 November 2023 09:00 (1h 15m)*

**Presenter:** DE MARINO, Gaetano (Jožef Stefan Institute)

**Session Classification:** School

Contribution ID: 40

Type: **not specified**

## **Hands-on reports 1 - E\_ECL pi0 veto**

*Friday, 3 November 2023 10:15 (10 minutes)*

**Presenter:** ROUT, Niharika (INFN Trieste)

**Session Classification:** School

Contribution ID: 41

Type: **not specified**

## **Hands-on 4 -flavour tagger**

*Friday, 3 November 2023 10:45 (10 minutes)*

**Presenter:** RAIZ, Sebastiano (BELLE (BELLE II Experiment))

**Session Classification:** School

Contribution ID: 42

Type: **not specified**

## Discussion items

*Wednesday, 1 November 2023 16:45 (1 hour)*

**Presenters:** BERNLOCHNER, Florian (Belle (SuperKEKB Experiment)); GAMBINO, Paolo (Torino)

**Session Classification:** Workshop discussion



Contribution ID: 43

Type: **not specified**

## Discussion items

*Thursday, 2 November 2023 16:45 (20 minutes)*

**Presenter:** LIBBY, James Frederick (BELLE (BELLE II Experiment))

**Session Classification:** Workshop discussion

Contribution ID: 44

Type: **not specified**

## **Hands on report 2 - rhorho interference**

*Friday, 3 November 2023 10:25 (10 minutes)*

**Presenter:** MANFREDI, Riccardo (BELLE (BELLE II Experiment))

**Session Classification:** School

Contribution ID: 45

Type: **not specified**

## **Hands on three - fragmentation**

*Friday, 3 November 2023 10:35 (10 minutes)*

**Presenter:** PARK, Junewoo (University of Tokyo (BELLE II Experiment))

**Session Classification:** School

Contribution ID: 46

Type: **not specified**

## Hands on 5 - statistics

*Friday, 3 November 2023 10:55 (10 minutes)*

**Presenter:** SHI, Xiaodong (BELLE (BELLE II Experiment))

**Session Classification:** School