3r^{d} OPEN Belle II Physics Week

Organizers :
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Belle II Physics Week 2020

- Welcome to the 3rd OPEN Belle II Physics Week!
- This event continues along the path of the "B2TiP meetings", open meetings bringing together Belle II members, physicists from other experiments, and theorists;
- The fruit of this work has been The Belle II Physics Book;

arXiv: 1808.10567
DOI: 10.1093/ptep/ptz106

500+ citations

KEK Preprint 2018-27
BELLE2-PAPER-2018-001
FERMILAB-PUB-18-398-T
JLAB-THY-18-2780
INT-PUB-18-047
UWThPh 2018-26

The Belle II Physics Book

E. Kou[74,¶,†], P. Urquijo[143,§,†], W. Altmannshofer[133,¶], F. Beaujean[78,¶], G. Bell[120,¶], M. Beneke[112,¶], I. I. Bigi[146,¶], F. Bishara[148,16,¶], M. Blanke[49,50,¶], C. Bobeth[111,112,¶], M. Bona[150,¶], N. Brambilla[112,¶], V. M. Braun[43,¶], J. Brod[110,133,¶], A. J. Buras[113,¶], H. Y. Cheng[44,¶], C. W. Chiang[91,¶], M. Ciuchini[58,¶], G. Colangelo[126,¶], H. Czyz[154,29,¶], A. Datta[144,¶], F. De Fazio[52,¶], T. Deppisch[50,¶], M. J. Dolan[143,¶], J. Evans[133,¶], S. Fajfer[107,139,¶], T. Feldmann[120,¶], S. Godfrey[7,¶], M. Gronau[61,¶], Y. Grossman[15,¶], F. K. Guo[41,132,¶], U. Haisch[148,11,¶], C. Hanhart[21,¶], S. Hashimoto[30,26,¶], S. Hirose[88,¶], J. Hisano[88,89,¶], L. Hofer[125,¶], M. Hoferichter[166,¶], W. S. Hou[91,¶], T. Huber[120,¶], S. Jaeger[157,¶], S. Jahn[82,¶], M. Jamin[124,¶], J. Jones[102,¶], M. Jung[111,¶], A. L. Kagan[133,¶], F. Kahlhoefer[1,¶], J. F. Kamenik[107,139,¶], T. Kaneko[30,26,¶], Y. Kiyo[63,¶], A. Kokulu[112,138,¶], N. Kosnik[107,139,¶], A. S. Kronfeld[20,¶], Z. Ligeti[19,¶], H. Logan[7,¶], C. D. Lu[41,¶], V. Lubicz[151,¶], F. Mahmoudi[140,¶], K. Maltman[171,¶], S. Mishima[30,¶], M. Misiak[164,¶],

- This was a milestone for us, but we are by no means done:
  - most of the data is yet to be collected;
  - other experiments are producing results, and anomalies possibly pointing towards New Physics are being uncovered;
  - our collaboration is growing, more people (and ideas!) are coming;
  - we are preparing the white papers for the Snowmass process.

see Tom's talk Tuesday, 8:30 CET

Belle II Status

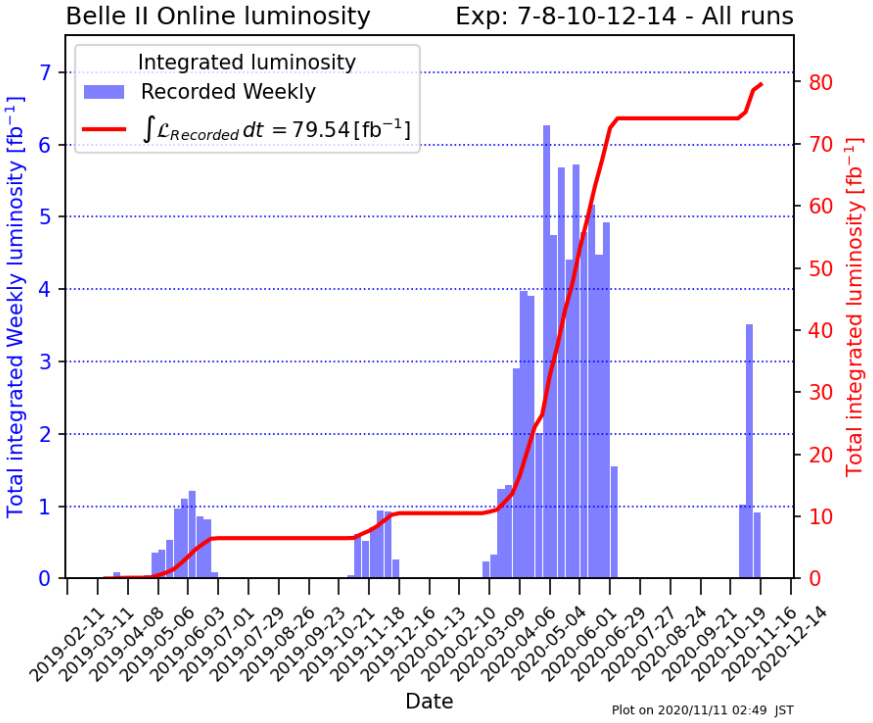
- Data taking is in progress, going towards the 100 fb^{-1} milestone in the next ~3 weeks;

  a SuperKEKB update report will be given by Shibata-san on Thursday, 11:15 CET

- For the next round of publications, we will use everything we collected until last Summer:

  (62.8 fb^{-1} on-resonance + 9.2 fb^{-1} off-resonance)

- This is quite smaller than what Belle and BaBar had at their disposal. Still, there are many opportunities for original and important publications, and we want to make sure that we don't miss any.



Belle II Physics Results

2 Dark Sector PRL publications on Phase2 data:

- Search for an Invisibly Decaying Z′ Boson at Belle II in $e^+e^- \to \mu^+\mu^-(e^\pm\mu^\mp)$ Plus Missing Energy Final States, PRL 124, 141801 (2020);
- Search for Axionlike Particles Produced in e^+e^- Collisions at Belle II, PRL 125, 161806 (2020);

12 conference papers based on up to ~38 fb^{-1} of data:

Spring

- Charmless B decay reconstruction, arXiv:2005.13559 [hep-ex];
- Measurement of the branching fraction B(anti-$B^0 \to D^{*+} l^- \nu_l$), arXiv:2004.09066 [hep-ex];
- Measurement of the B^0 lifetime using fully reconstructed hadronic decays, arXiv:2005.07507 [hep-ex];

Summer

- Measurement of the branching ratios of $B^0 \to D^{(*)-} l^+ \nu$ (untagged analysis), arXiv:2008.07198 [hep-ex];
- Calibration of the Belle II hadronic Full Event Interpretation (FEI), arXiv:2008.06096 [hep-ex];
- Measurement of the hadronic mass moments of $B \to X_c l^+ \nu$ decays, arXiv:2009.04493 [hep-ex];
- Measurement of the branching ratios of $B^0 \to D^{*-} l^+ \nu$ (using the hadronic FEI), arXiv:2008.10299 [hep-ex];
- Rediscovery of $B^0 \to \pi^- l^+ \nu$ (using the hadronic FEI), arXiv:2008.08819 [hep-ex];
- Calibration of the Belle II B FlavorTagger, arXiv:2008.02707 [hep-ex];
- Rediscovery of $B \to \phi K^{(*)}$ decays, and measurement of the longitudinal polarization fraction of $B \to \phi K^*$, arXiv:2008.03873 [hep-ex];
- Branching ratios and direct CP asymmetries of $B \to$ Charmless decays, arXiv:2009.09452 [hep-ex];
- Measurement of the τ lepton mass, arXiv:2008.04665 [hep-ex];

… plus many other public physics results, see our public confluence page.

This year's Physics Week

Topic: ***Belle II first publications and amplitude analyses***

Upcoming Belle II papers:

Analysis
Dark Higgsstrahlung
Inclusive V_{cb}
$B^+ \rightarrow K^+ \nu \nu$
τ mass
(Belle + Belle II) ϕ_3

Invited lecturers:

Speaker	**Topic**
Tim Gershon	Experimental considerations
Christoph Hanhart	Amplitude analysis theory
Emilie Passemar	Amplitude analyses of τ decays
Jonas Rademacker	How to build an amplitude model
Keri Vos	Selected topics in semileptonic B decays

Markus Roerken had a sudden and serious issue, so he will not be able to give his two lectures. Jonas has kindly agreed (on a very short time scale) to give an introductory lecture to amplitude analyses today.

Informal sessions and feedback

- Contrary to the previous two years, this time we received only 3 requests for “informal” presentations;

  (I suppose that not having the live sessions with beer played a role, here)

- Please let us know if you are willing to share your work on a short (~10 minutes) presentation, on any physics/detector/computing topic. It does not have to be relevant to this year’s theme;

- Feedback:
  - please ask questions and contribute to the discussion;
  - you may use the Zoom chat for “live” discussions;
  - (mostly) for the benefit of those who cannot attend live, we created a Slack chat. If you did not receive the invitation (for technical reasons), you can subscribe using the link:

https://join.slack.com/t/belleiiphsyic-rds3817/shared_invite/zt-jdhqhhn9-7TlOkAlugwUWHtNOqeRJ3A

Schedule

	Monday	Tuesday	Wednesday	Thursday	Friday
	Introduction	Snowmass white papers			
Morning session	Amplitude analyses intro	Amplitude analyses theory	(Free)	How to build an amplitude model	Discussion session
	Dark Higgstrahlung	(Free)	$B^+ \to K^+ \nu \nu$	Statistics SuperKEKB update	(Belle + Belle II) ϕ_3
Afternoon session	Semileptonic B decays - 1	Semileptonic B decays - 2	τ amplitude analyses - 1	Amplitude analyses – experimental considerations	τ amplitude analyses - 2
	MCTruth	Inclusive V_{cb}	(Free)	τ mass measurement	Informal session + discussion

The Belle II papers sessions (in light blue) are invisible in Indico to non-Belle II members. The link to the Zoom session is posted as presentation material within those blocks.

We will try to keep the schedule as much as we can: if a session finishes early, we will not advance the start of the following.

Let's have a fruitful week

- Number of participants (as of this morning JST):

Participants:	**157**
Belle II members	140
From other experiments	5
Theorists	12

Welcome!!!

- Having a long remote event will not be easy, but let's try to make the most of it!

- Please participate to the discussions and (especially if you are not a Belle II member): please let us know what are the measurements that Belle II should do in the next few years!