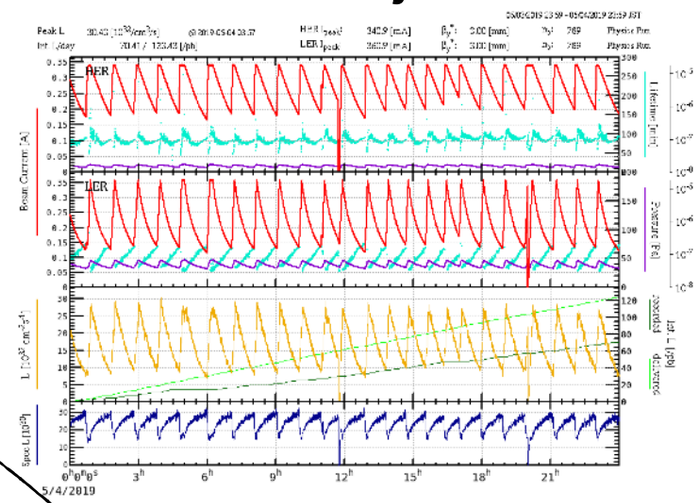
Charge of the Workshop

- Operation
  - Thanks to the tremendous efforts of people at KEK and in the home labs we are very successfully taking physics data
  - Machine colleagues are pushing SuperKEKB performance ⇒ continuous injection, higher beam currents
    - Next steps in β^*_y only after summer break → probably this will lead to new challenges
  - Open issues and concerns for PXD
    - Occupancy drops during background bursts (Are we facing fundamental limitations here?)
    - Gated mode operation (Before summer we must know how well this works or where we have to improve)
    - Do we understand the background well enough to confidently extrapolate to final conditions (… and beyond)
      - When will we hit our limits in terms of occupancy and accumulated dose?
    - Do we understand and monitor the PXD data quality well and fast enough?
- PXD2020
  - A lot of work went into improving the ladder assembly procedure. What will be the final yield?
  - How can we recover from the recent switcher *SER_out* problem and when?
  - At the next TB meeting (June 5) we have to report on the production status
    - Schedule is very tight and it will require major efforts to be ready for installation in the summer shutdown 2020
    - How can we convince ourselves and the collaboration that we have a realistic chance to make it?
  - Will we be able to install the VXD with two times more PXD cables?
- Upgrade
  - Although prospects for realization are still very uncertain the discussions on a potential future upgrade of the Belle II vertex detector are gaining momentum
    - Belle II VXD Open Workshop, 8-10 July at CERN: https://indico.cern.ch/event/810687/
  - What could be possible contributions from DEPFET community?

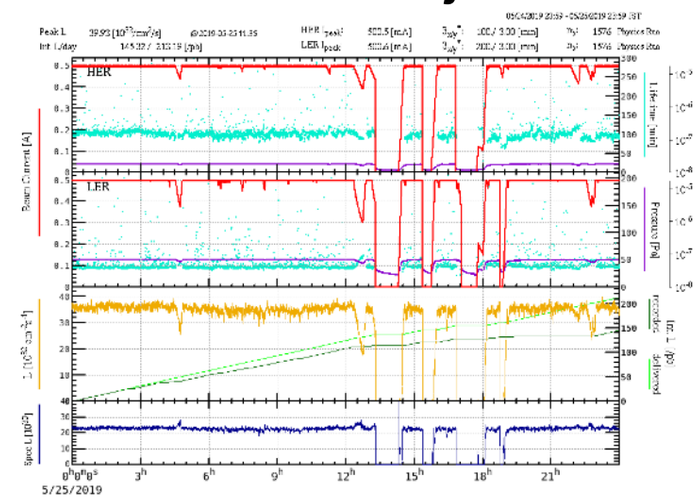
SuperKEKB Operation and PXD

- Same optics as at the end of phase 2
  - until summer stay with $\beta^*_y = 3$ mm
  - machine currents presently limited by
    - HOM heating in bellows → n_b doubled
    - CDC current & TOP PMT rates

Normal injection

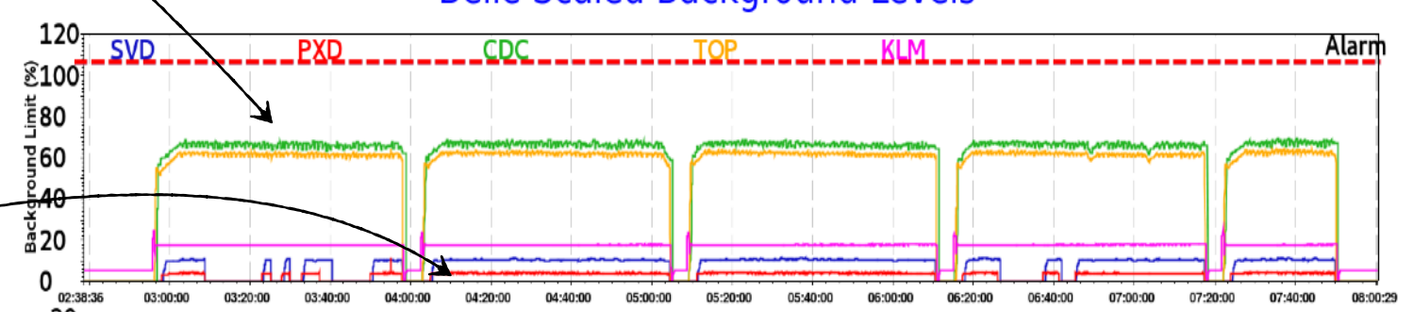


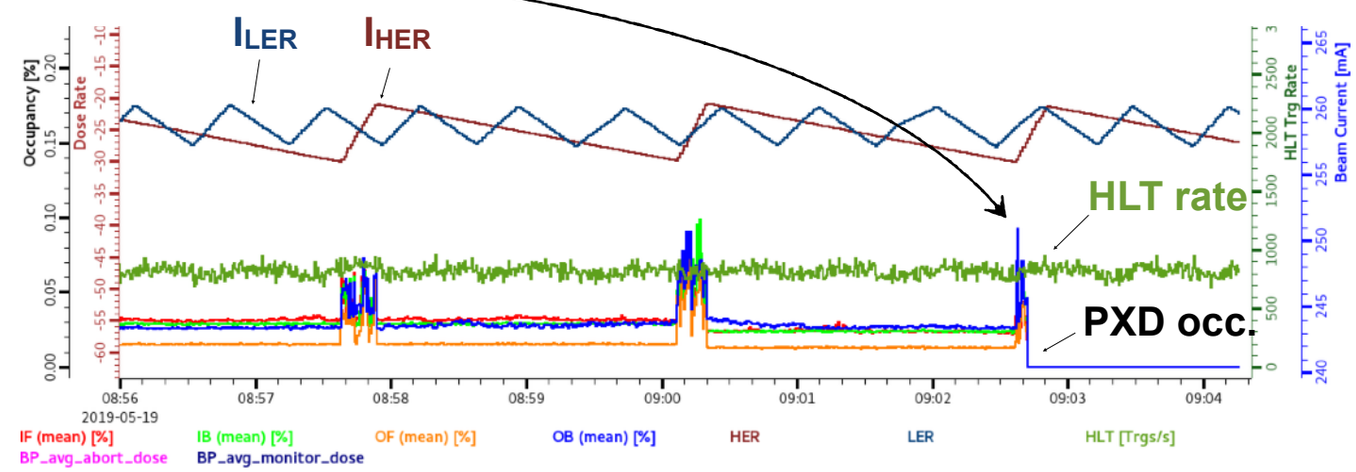
Continuous injection



- Operation mode routinely changed to continuous injection
  - in principle background seems tolerable
  - PXD can even operate without „gated mode“
    - occupancy well below limit of 3%
  - recently observe loss of synchronisation between DHP and DHE mainly during HER injection → under study

Belle Scaled Background Levels





- Background studies / optimisation
  - collimator tuning still ongoing: many small improvements but „golden knob“ not yet found

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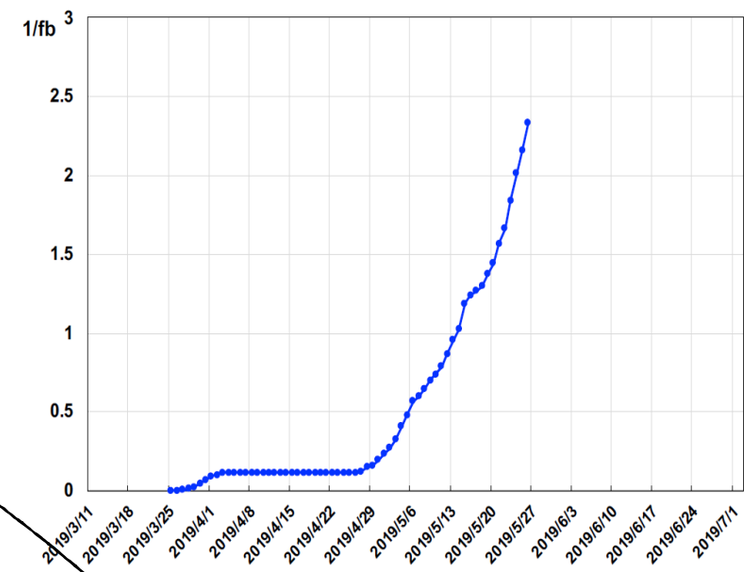

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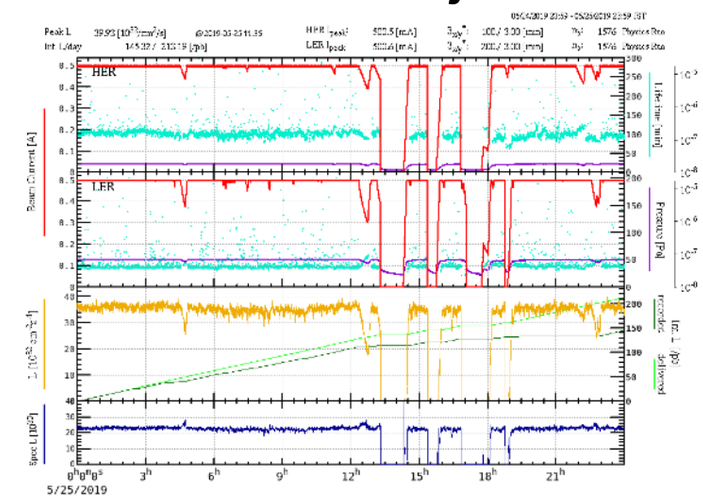

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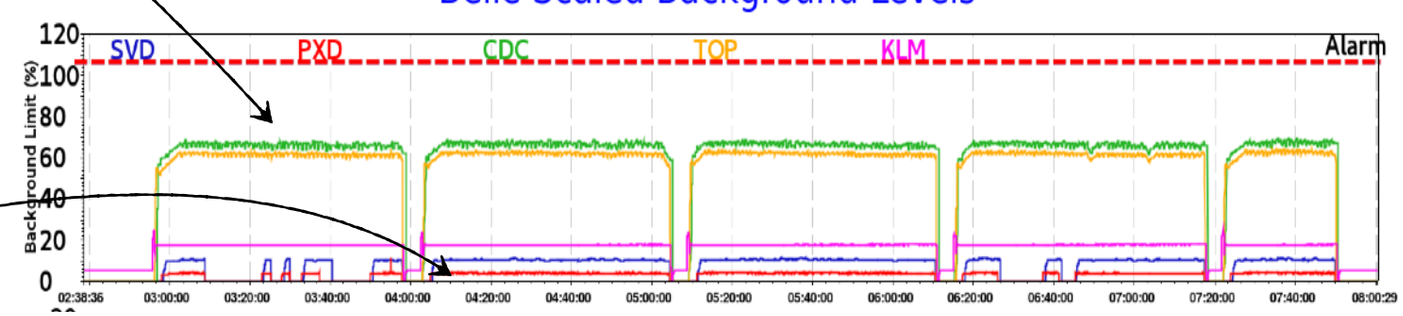

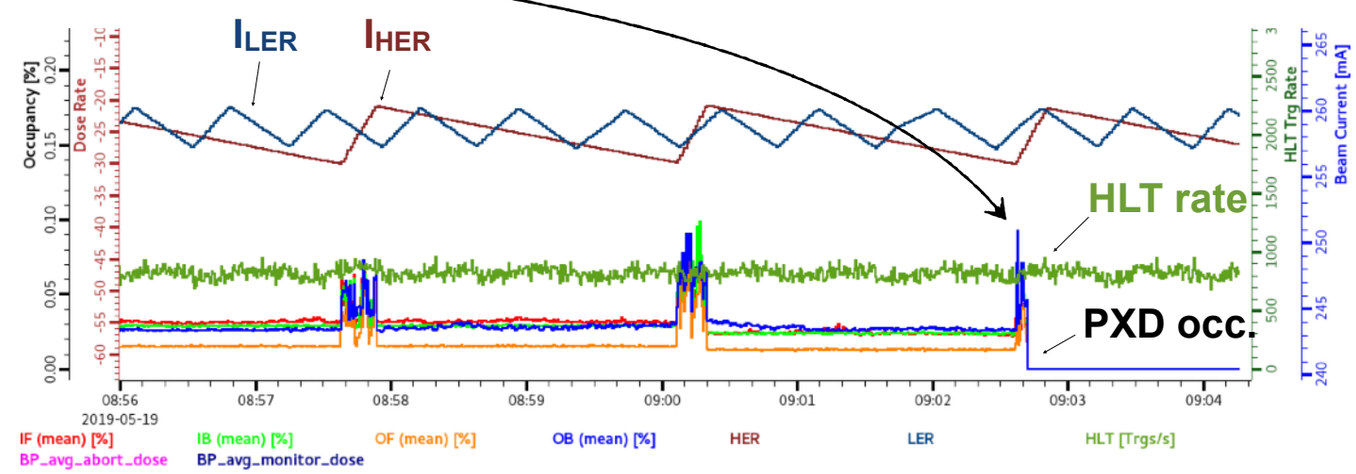

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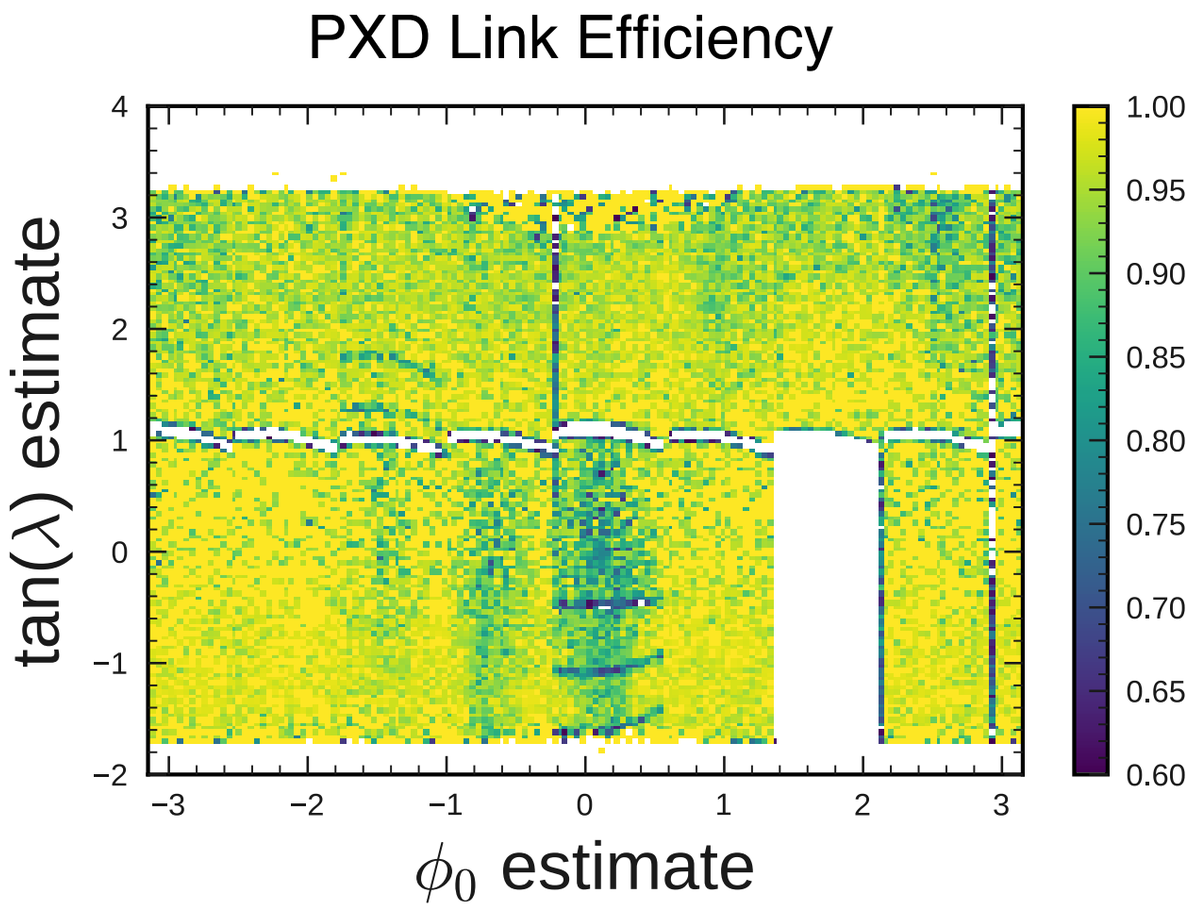
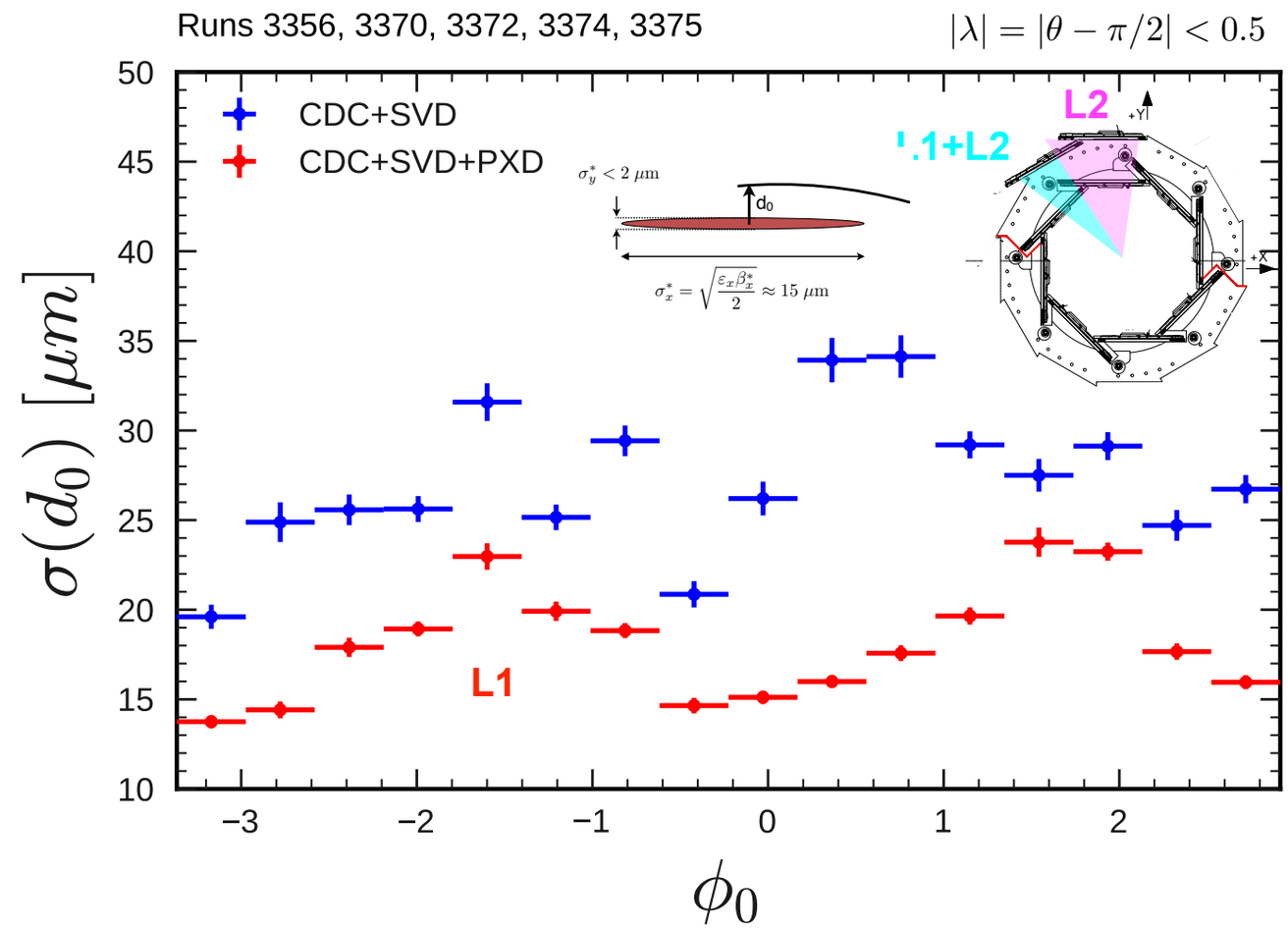
PXD Performance





- Most local inefficiencies are well understood
  - with PXD2020 should be able to fill gaps
  - impact of residual misalignment under study
- Impact parameter resolution after correcting SVD geometry and PXD re-alignment

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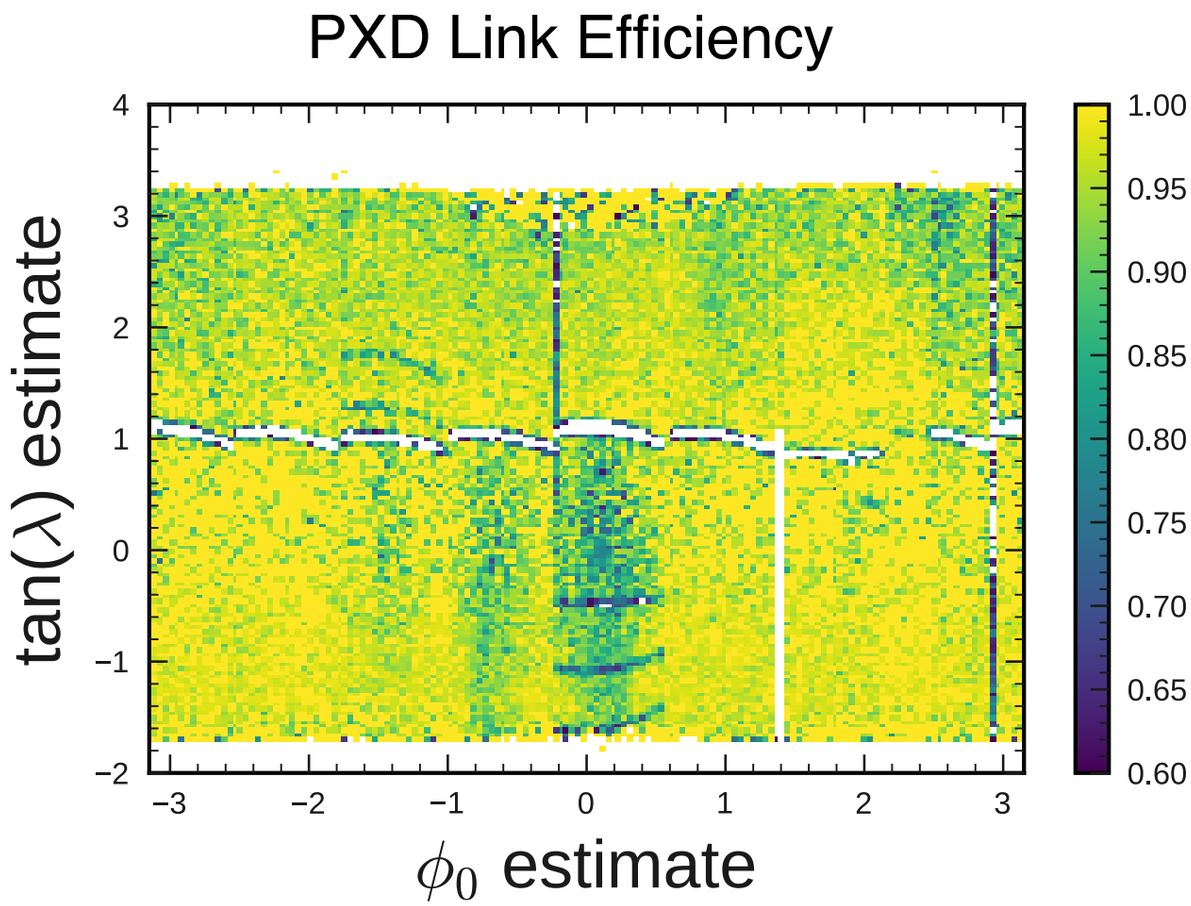

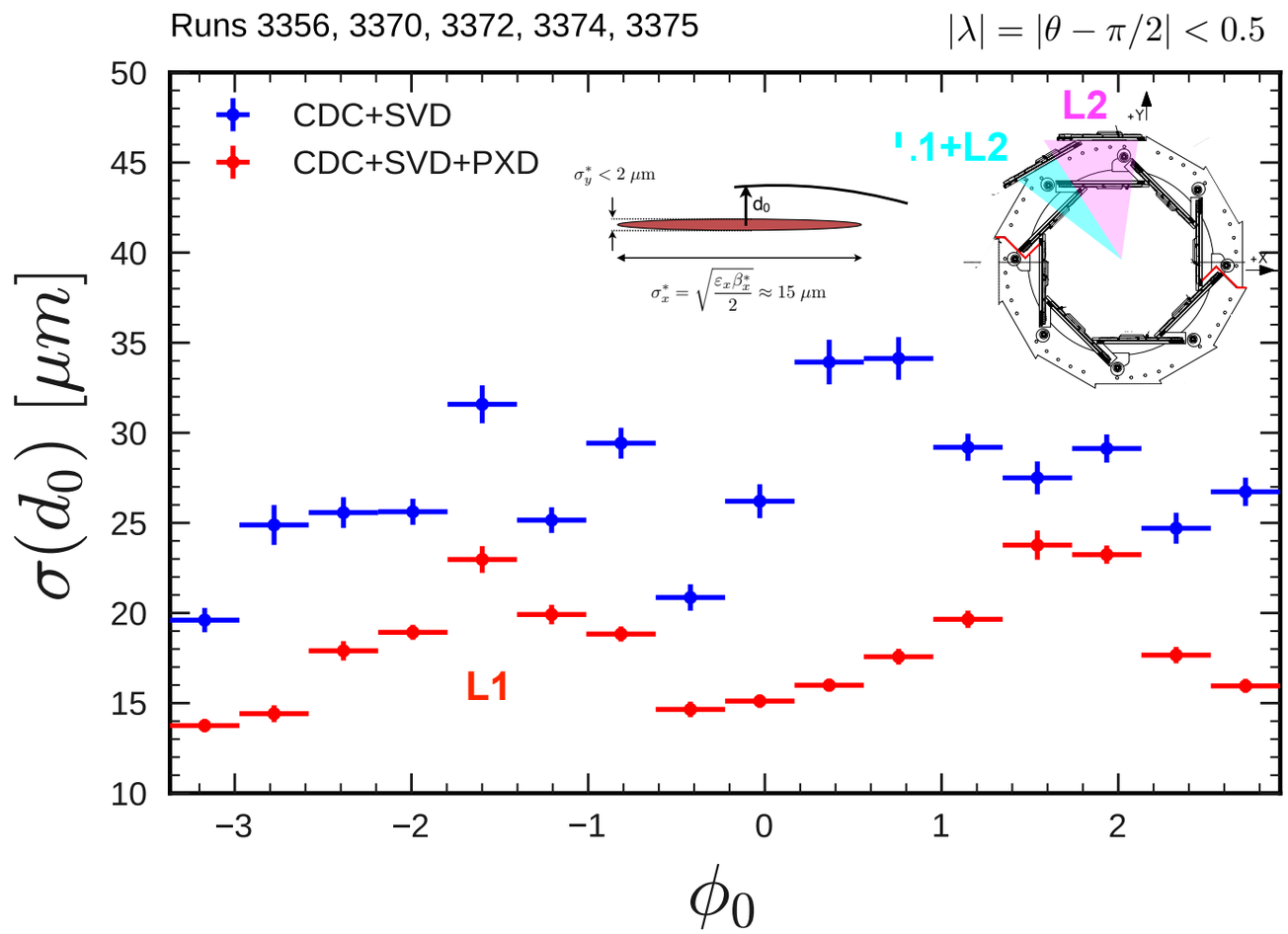

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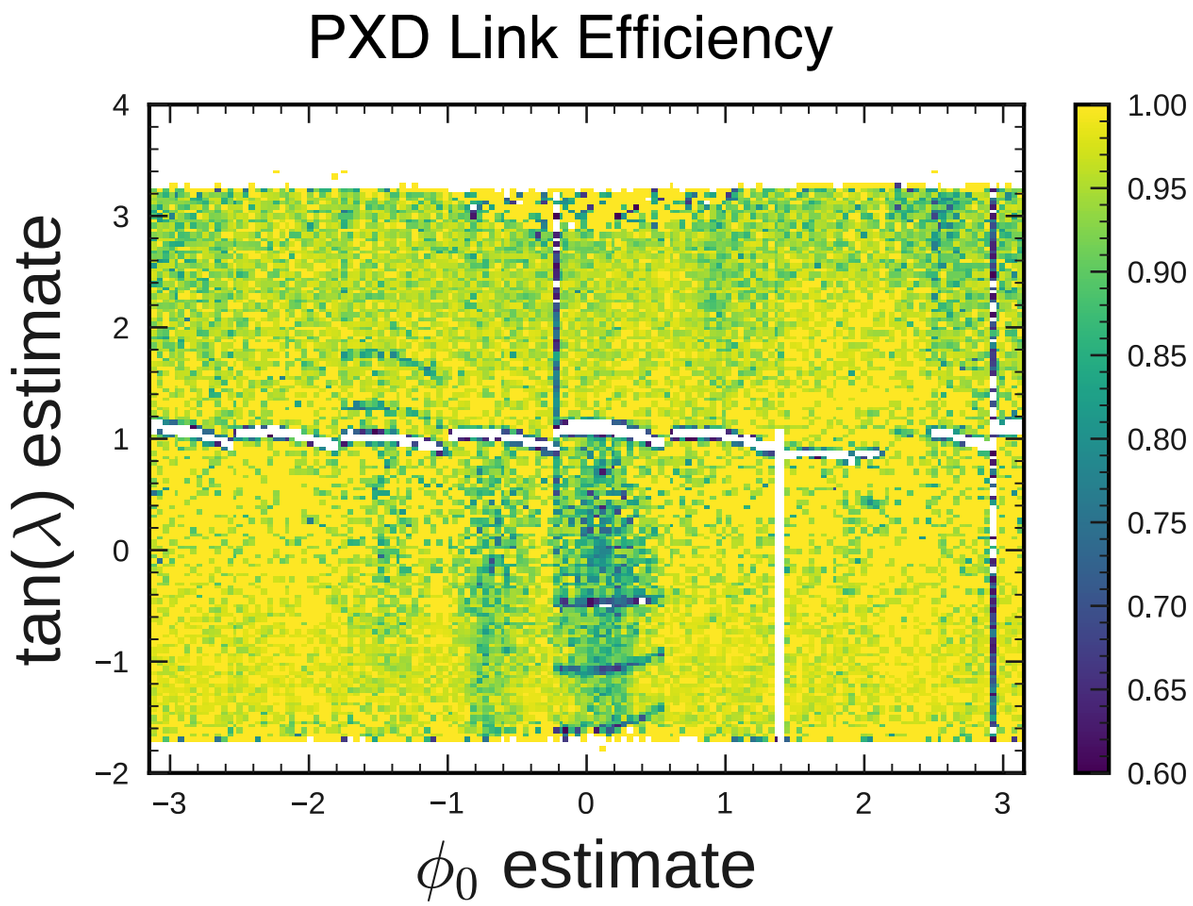

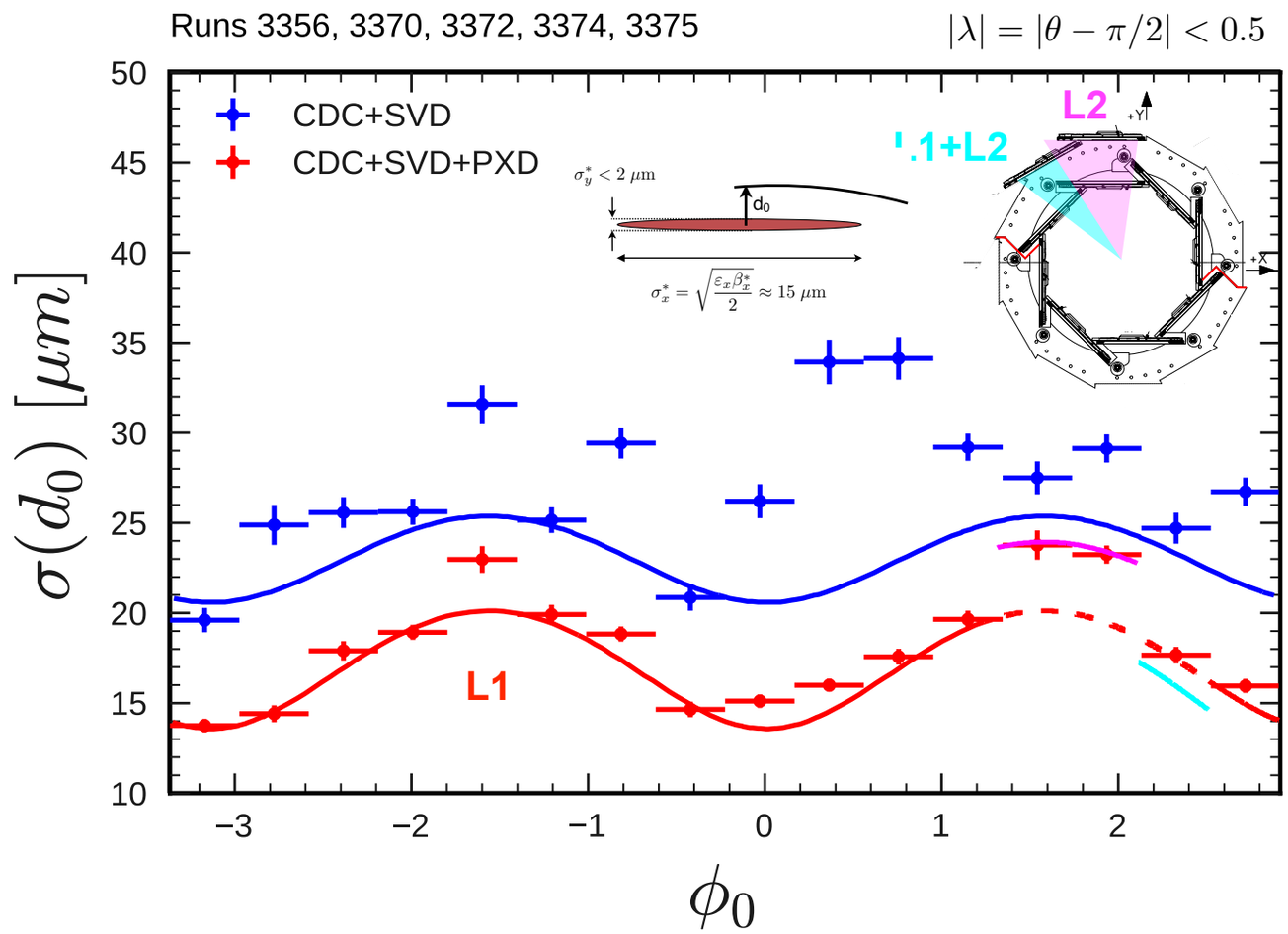

- Most local inefficiencies are well understood
  - with PXD2020 should be able to fill gaps
  - impact of residual misalignment under study
- Impact parameter resolution after correcting SVD geometry and PXD re-alignment
  - d_0 vs ϕ_0 prediction using realistic values for beam parameters:
    - β_x(HER) = 100 mm, β_x(LER) = 200 mm
    - ε_x(HER) = 4.6 nm, ε_x(LER) = 2.1 nm
  - local discrepancies remain for SVD (also seen in other distributions, e.g. overlaps)
  - ⇒ further improvements expected from refined alignment procedure
- Reaching full understanding of measured resolution has impact on case for PXD2020

February BPAC

- Concerns
  - As noted before, it is a bit of concern that the **30 kHz gated mode** could not be tested during Phase 2.
  - With the start of the Phase 3 run, expertise will be required to commission and operate the full PXD detector and analyse its data. The construction of a complete PXD2020 detector requires the continuous availability of additional resources for nearly another two years. To keep the expertise and enthusiasm of the current PXD crew will require good resource management. Furthermore, the modified assembly procedures might require some modification of the current infrastructure for the assembly, requiring additional technical resources.
  - Although the availability of components does not seem to be of concern, the **schedule remains demanding for the PXD team, especially in the early part of 2020**.
- Recommendations
  - Development and testing of the firmware for **30 kHz operation as early as possible** is encouraged.
  - The committee applauds the internal review of the ladder production and encourages that **ladder assembly for the PXD2020 be started as soon as possible** after the review to exercise the assembly procedures and the quality control process to ensure maximal yield and create schedule contingency.
  - The committee encourages continued **detailed simulation of the VXD** with the latest beam pipe design, backgrounds at various levels and full performance evaluation of the VXD with PXD equipped with **zero, one and two layers**.
  - With the addition of new collimators and masks, the committee reiterates its recommendation that significant effort be directed towards **understanding the various background sources** with the new configuration.

JENNIFER2

Status as of March 2018

Tasks	DESY
T 1.1 Detector	x
T 1.2 CPV	x
T 1.3 LFV	x
T 1.4 Dark	x
T 1.5 Spectroscopy	x
WP1	70
T2.1 TPC	
T2.2 SuperFGD	
T2.3 Neutrino xsection	
T2.4 Oscillation	
WP2	
T3.1 Super-K Gadolinium	
T3.2 WC calibration	
T3.3 Outer Detector	
T3.4 FEE	
T3.5 Simulation	
WP3	
T4.1 SiPM ARICH	
T4.2 MCPMT TOP	
T4.3 Multi PMT HK	
T4.4 Organic PM	
WP4	
T5.1 Computing	4
T5.2 Remote and DAQ	4
T5.3 Statistical methods	2
T5.4 Generators	1
WP5	11
T6.1 Masterclasses	x
T6.2 Summer school	
T6.3 General public	x
T6.4 PhD co-supervision	

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Anzahl - B2id	Membership Category				
Belle2 Institution	PhD student	Physicist - faculty/staff	Physicist - term limited	Technical	Gesamtergebnis
Bonn	6	2	2		10
DESY	2	6	6	4	18
Giessen	1	1	2		4
Goettingen	4	1	1		6
Juelich		1			1
Karlsruhe	8	3	5	2	18
LMU	1	1	3		5
Mainz	1	2	2		5
MPG-HLL		2		3	5
MPP	6	5	2	6	19
TUM	3	1	1	3	8
Gesamtergebnis	32	25	24	18	99

Algorithm:

- total amount for Germany: 70 (WP1) + 11 (WP5) = 81 PM (person month)
- take into account group sizes but each group should get at least **4 PM**
- distribute rest of 81 - 4x11 = 37 PM according to group size - round to **integer**
  - take into account that some groups only contribute to one category
  - assign ~50/50 to **Detector Operation** and **Software/Physics**
- assign **11 PM for WP5** to groups involved and subtract this for final WP1 share

PM assignment per group & WP

						Person Months		
		Total share n				WP1		WP5
	N	calc	int.	r^DET	r^SW/P	DET	SW/P	
BN	10	8,3	**8**	1	1	**4**	**4**	
DESY	18	11,7	**12**	1	1	**6**	**5**	**1**
GIE	4	5,7	**6**	1	1	**2**	**2**	**2**
GOE	6	6,6	**7**	1	1	**4**	**3**	
JUL	1	4,2	**4**		1		**4**	
KIT	18	7,5	**8**		1		**7**	**1**
LMU	5	6,1	**6**	1	1	**1**	**1**	**4**
MZ	5	6,1	**6**	1	1	**3**	**3**	
MPG-HLL	5	5,2	**5**	1		**5**		
MPP	19	12,1	**12**	1	1	**7**	**5**	
TUM	8	7,4	**7**	1	1	**2**	**2**	**3**
Sum	99	81,0	**81**	80	94	**34**	**36**	**11**

$$n_i(\mathrm{WP1}+\mathrm{WP5}) = 4 + (81 - 11\cdot 4)\cdot \frac{N_i}{2}\cdot\left(\frac{r_i^{\mathrm{DET}}}{\sum_j N_j r_j^{\mathrm{DET}}} + \frac{r_i^{\mathrm{SW/P}}}{\sum_k N_k r_k^{\mathrm{SW/P}}}\right)$$

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Status as of today

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DESY	29	12,8	**13**	1	1	**6**	**6**	**1**
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MZ	6	5,8	**6**	1	1	**3**	**3**	
MPG-HLL	5	4,8	**5**	1		**5**		
MPP	25	11,6	**12**	1	1	**7**	**5**	
TUM	8	6,4	**6**	1	1	**1**	**2**	**3**
Sum	125	81,0	**81**	123	120	**33**	**37**	**11**

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A few Guidelines

- Before starting the first secondment: agreement with DESY must be signed at least one month (PhD students at least two) before
- Travel time counts as part of secondments (except if combined with vacation - then first/last working day at KEK, even if you return on a weekend)
- Vacation during the secondment is ok
- If return flight is cancelled actual travel dates count
- Start and return days are part of the secondment - independent of exact time of departure/arrival
- If vacation is longer than 5 working days, travel costs will not be reimbursed
- Conferences usually don’t count as secondments (unless very specific)