

Belle II IR status during the Beast II phase

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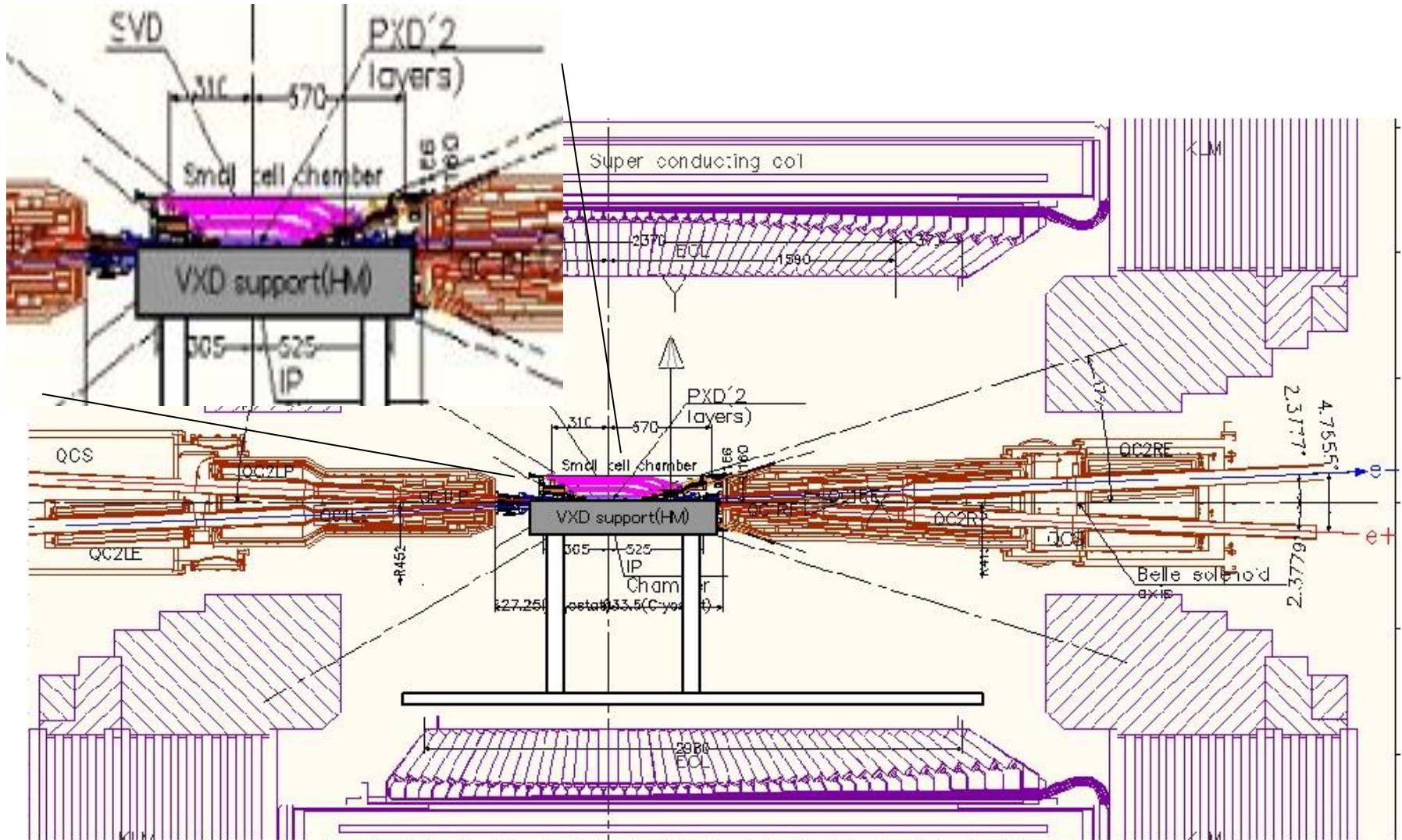
Install beam pipe for BEASTII

- There are two way to install beam pipe
 - 1 the same method with real VXD installation
(On this case, inner structure of CDC is needed)
 - 2, the beam pipe and QCS are installed independently

Beam pipe will be produced on next fiscal year

The first version of VXD mock-up will be produced before next B2GM which may use for BEASTII operation

BEAST II setup

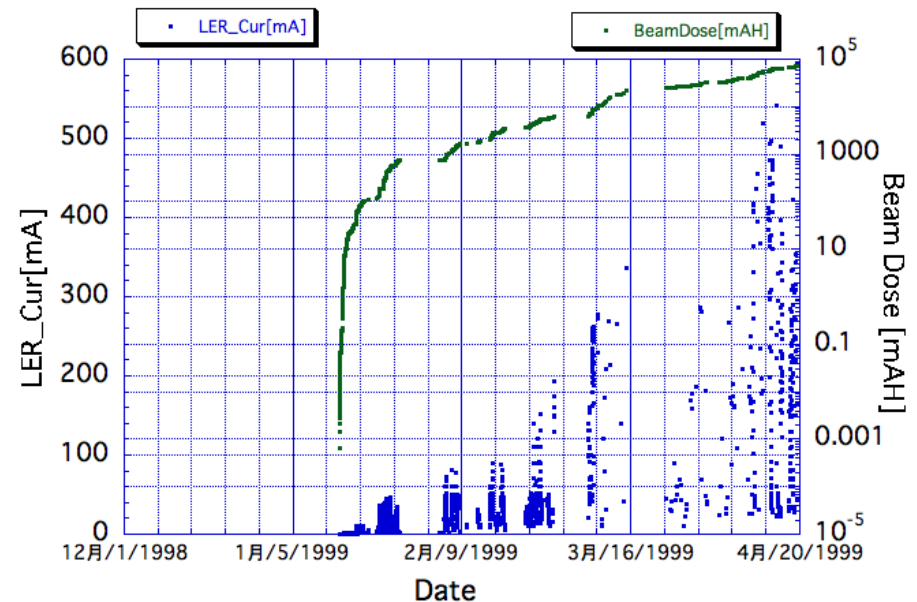
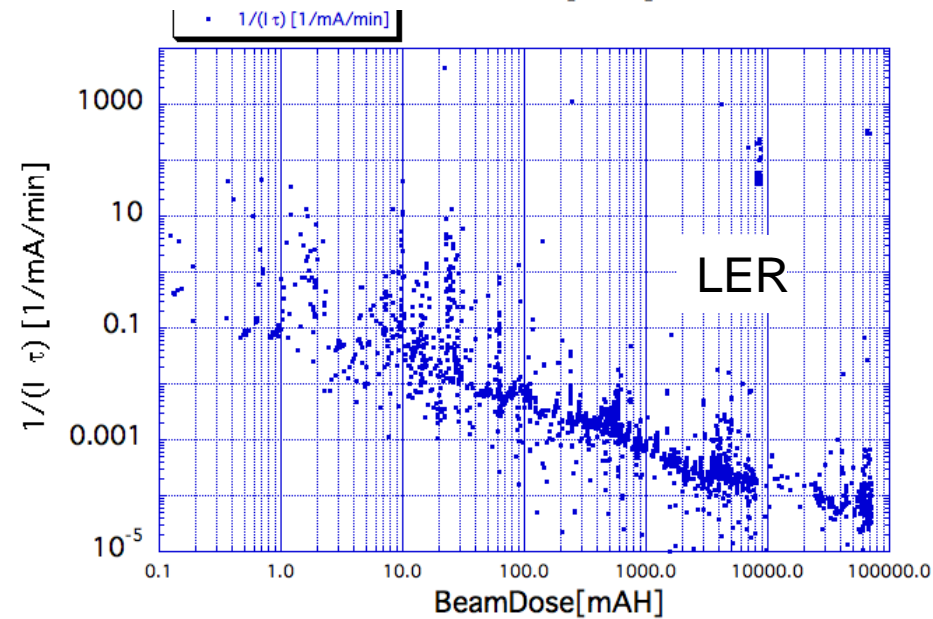
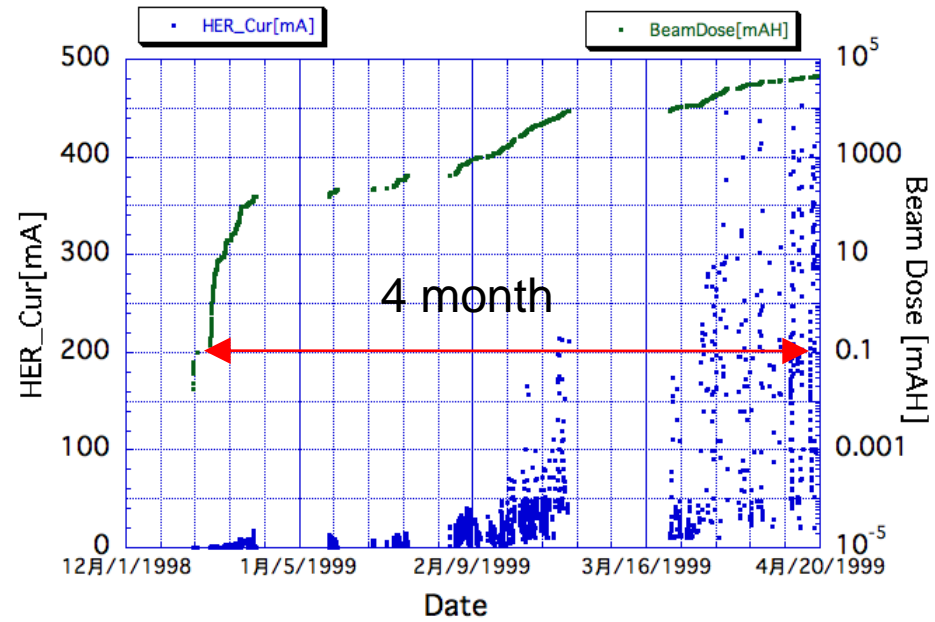
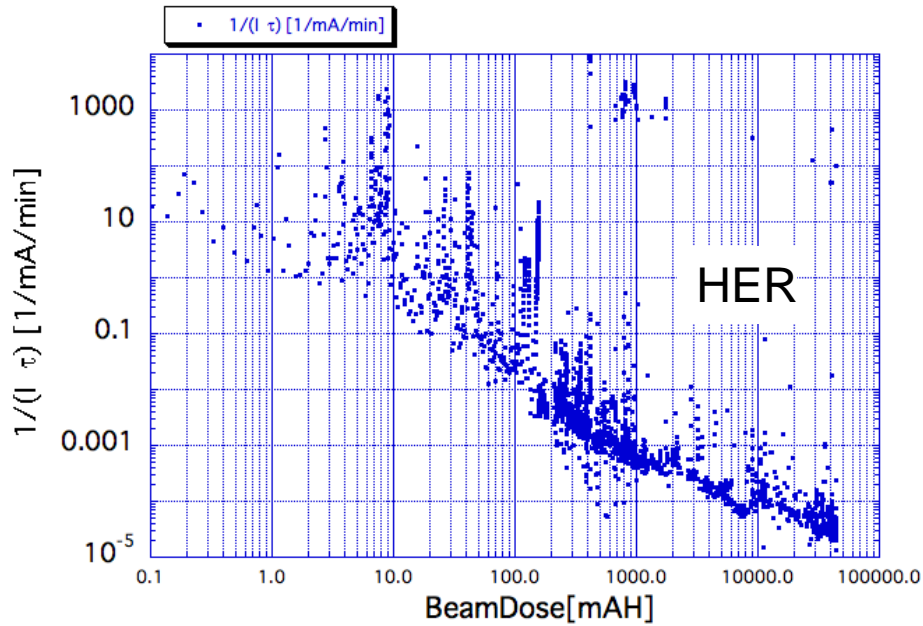


SuperKEKB(Machine study list)

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- **Commissioning I (1.5 Month)**
 - Linac tuning (Need check Beam Transfer(BT) from linac to KEKB ring)
 - Damping Ring tuning (no experience in KEKB(at least 10 day will be taken))
 - BT tuning
 - Injection tuning (with synchronous injection with PF)
 - COD correction、Optics correction (Roughly))
 - Abort system tuning
 - Monitor tuning (including Beam feedback)
 - Hardware tuning
 - Radiation monitor
 - Debugging each software
- Vacuum scrubbing (**Commissioning II**) (~3 Month)
- Belle II background study and their tuning (movable masks or adding material?)
- **More high precision beam tuning (Commissioning III)**
 - Optics Measurement、Optics correction, Beta function tuning
 - Collision and luminosity tuning
 - Applying higher current We should also take into account on time consuming by machine trouble or bad repeatability of beam condition

KEKB vacuum scrubbing (HER/LER)



BEASTII(Belle II detector side)

- 1 Just studying BG level and checking sensor response(like BEAST).
 - ex.: SR, Touschek and beam gas BG, Beam injection noise, Luminosity monitor (output to BG simulation) On this stage, each sub-part may study individually.
- 2 Pre-commissioning stage:
 - a, Trigger(ECL,KLM will be ready),
 - b, **Luminosity feedback to optimize beam orbit control,**
 - c, Beam injection veto(sending veto signal to trigger system on beam injection, which is critical subject on PXD system.)
 - d, Movable beam mask optimization to reduce BG
 - e, KEKB beam abort setting by each sub-detector As a result, all sub-detector(+machine) should join to BEASTII operation. (Therefore BEASTII is assigned to common session on next B2GM.)

superKEKB commissioning
meeting 2011.11.08

Kikuchi, M.

Dumping Ring Commissioning

•LTR commissioning	2 days	} ~ 9 days	} ~ 3 weeks by wishful thinking
•BPM commission			
•First turn	1 day		
•COD meas. and correction	2 day		
•BPM commission			
•Optics meas.	2 days		
•RTL commissioning	2 days		
•Injection to LER			
•25 Hz operation			
•SR commission			
•Vacuum scrubbing	~14 days		

Luminosity Initial target (example)

	SuperKEKB Design		SuperKEKB Initial Target (example)	
	LER	HER	LER	HER
Luminosity	$8 \times 10^{35} \text{ cm}^{-2} \text{ s}^{-1}$		$3 \times 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$	
I_{beam}	3.6A	2.6A	0.51A	0.37A
ξ_y	0.088	0.081	0.040	0.033
β_y^*	0.27mm	0.30mm	0.54mm	0.60mm
β_x^*	32mm	25mm	62mm	50mm
ε_x	3.2nm	4.6nm	3.2nm	4.6nm
κ (x-y coupling)	0.27%	0.28%	2.1%	2.2%
# of bunches	2500		357	

Discussion : Beta function should be 1 order higher than design value

Summary

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(discussion by Belle and machine groups)

- BeastII setup is taken with Belle roll-in position (solenoid is critical for QCS tuning).
 - We don't consider vacuum scrubbing with Belle roll-out position like BeastI.
- SuperKEKB consists three stage:
 - 1. Machine start up (1.5 Month)
 - (DR should be start in parallel with KEKB tuning)
 - 2. Vacuum scrubbing (3 month)
 - 3. Fine tuning of machine settings
- Beast II study list
 - 1. Beam BG study, BG control by beam masks, Belle abort level tuning
 - 2. pre-commissioning of each detector
 - 3. Luminosity tuning
 - BeastII study should be continue until Luminosity $> 1 \times 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$

Cont'd

- Luminosity target value= $1 \times 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$
 - We should achieve within 4-6month
 - Beam current: 1/7 at start up
 - Beta function at IP: 1 order higher than design value (first target value)
 - Beam-beam parameter : 0.03 (first target value)