News from the KEK Meetings

Belle-II General Meeting 7.-9. July

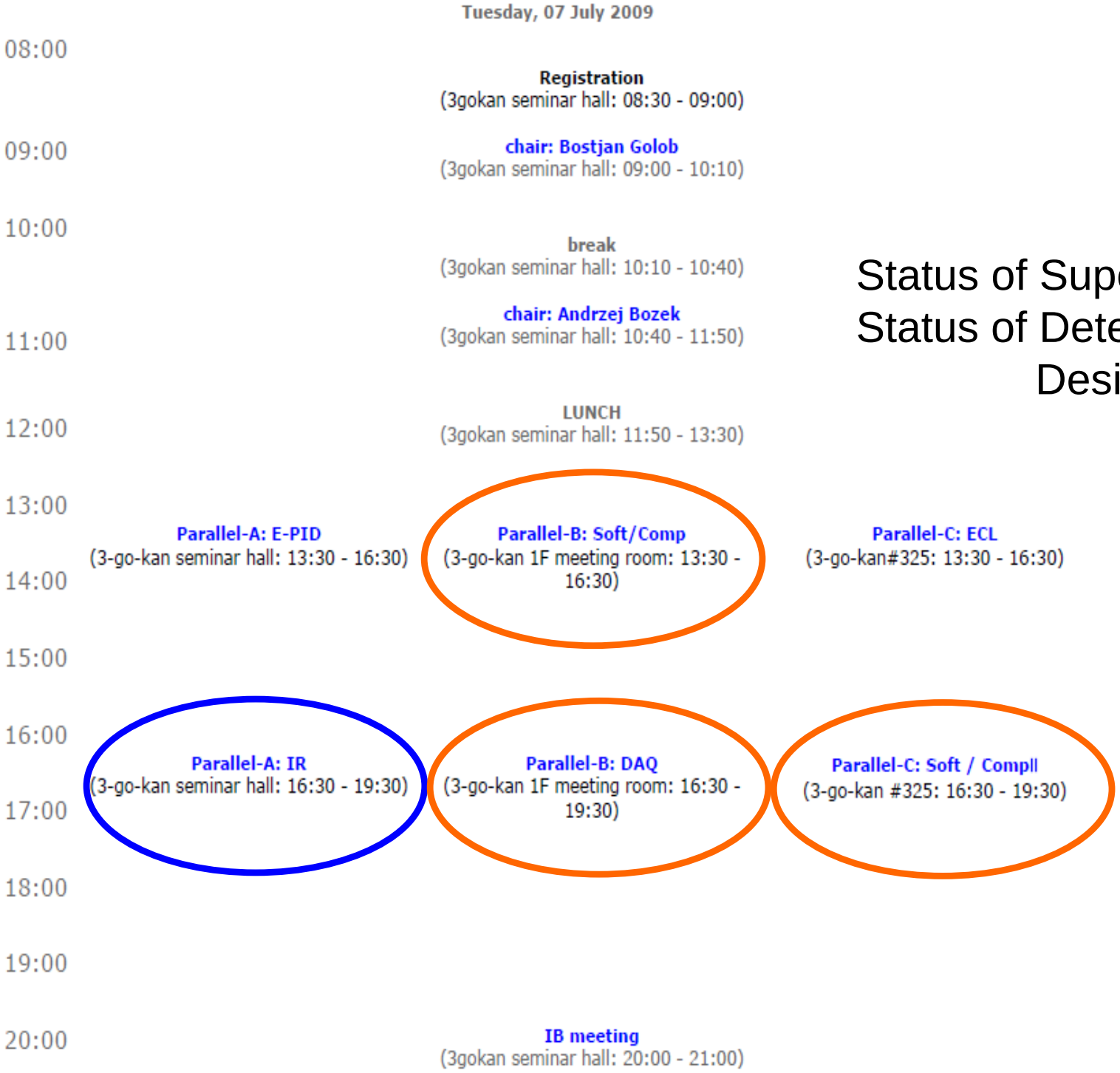
New Belle-II Spokesperson:

Opening remarks

Peter Križan

University of Ljubljana and J. Stefan Institute

3nd Open collaboration meeting, July 7, 2009



Status of SuperKEKB
Status of Detector
Design


Wednesday, 08 July 2009
08:00
09:00
Parallel-A: B-PID
(3-go-kan seminar hall: 09:00 - 12:00)
Parallel-B: SVD
(3-go-kan 1F meeting room: 09:00 - 12:20)
vacant
(3-go-kan #325: 09:00 - 12:00)
10:00
11:00
12:00
LUNCH
(3gokan seminar hall: 12:00 - 13:30)
13:00
Parallel-A: TRG
(3-go-kan seminar hall: 13:30 - 15:30)
Parallel-B: PXD
(3-go-kan 1F meeting room: 13:30 - 16:30)
vacant
(3-go-kan #325: 13:30 - 16:30)
14:00
15:00
Parallel-A: KLM
(3-go-kan seminar hall: 15:30 - 17:00)
16:00
Parallel-B: vacant
(3-go-kan 1F meeting room: 16:30 -
Parallel-C: CDC
(3-go-kan #325: 16:30 - 17:30)

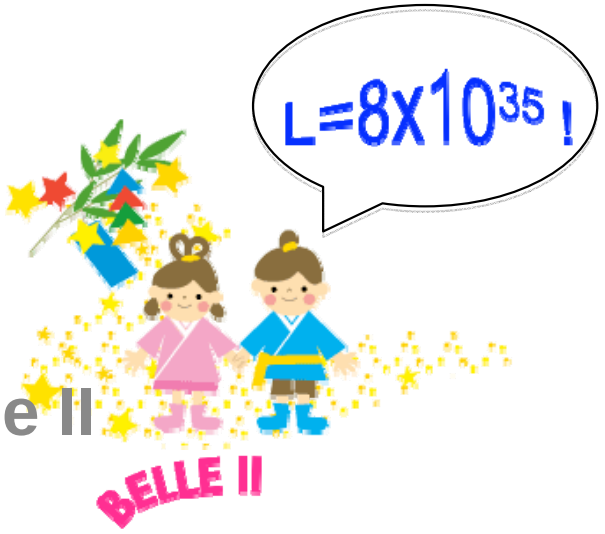
Status of SuperKEKB Design: Lattice and IR

Y. Ohnishi

July 7, 2009

3rd Open Meeting of the Belle II collaboration

KEK



"Tanabata": Festival of the Weaver ?

Strategy of Nano beam

Smaller σ_y* provides higher luminosity.

Smaller β_y* provides smaller σ_y*, however longer σ_z is OK. (less HOM, no CSR)

Hourglass (H.G) condition requires smaller σ_x*, namely smaller β_x* is necessary.

Smaller beam-beam parameter is preferable, so ε_y should be smaller in proportional to β_y*

Small β_x*, β_y* and small emittance is required.

Lattice design

Requirement: 8×10^{35} cm^{-2}s^{-1}

"Nano beam scheme"

LER/HER

ε_x = 2.8 nm / 2.0 nm

β_x^* = 17.8 mm / 25 mm

β_y^* = 0.26 / 0.26 mm

ξ_y = 0.079 ~ KEKB

7

Machine parameters

Tentative parameters:

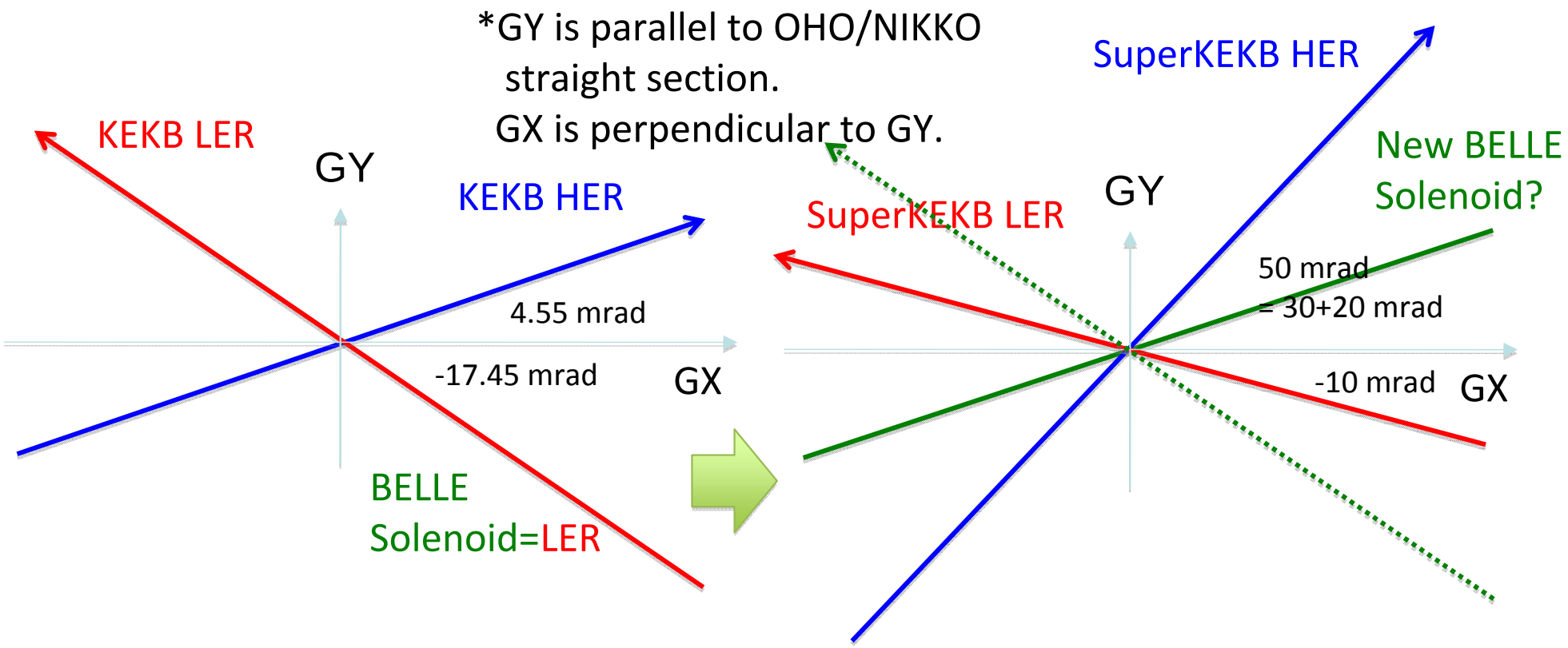
		LER	HER	
Emittance	ε_x	**2.8**	**2.0**	nm
Coupling	$\varepsilon_y/\varepsilon_x$	**0.74**	**1.80**	%
Horizontal beta at IP	β_x^*	**17.8**	**25.0**	mm
Vertical beta at IP	β_y^*	**0.26**	**0.26**	mm
Horizontal beam size	σ_x^*	**7.06**	**7.07**	μm
Vertical beam size	σ_y^*	**0.073**	**0.097**	μm
Bunch length	σ_z	**5**		mm
Half crossing angle	ϕ	**30**		mrad
Beam Energy	E	**3.5**	**8.0**	
Beam Current	I	**3.84**	**2.21**	A
Number of bunches	n_b	**2252**		
Beam-beam	ξy	**0.079**	**0.079**	
Luminosity	L	**8×10^{35} (8.5×10^{35} with CW)**		$cm^{-2}s^{-1}$

*** Luminosity is obtained from beam-beam simulations.**

Summary of items

	LER	HER
Low emittance	• Longer bends • 0.89 m to 4 m long	• Increase number of arc cells • Smaller dispersion in bends • 28 cells to 44 cells
Low beta at IP	• Separated final quads. • Closer to IP • Superconducting or permanent magnets	
Local chromaticity correction (LCC) (to get large DA)	• KEKB-LER type • Chicane-like (reverse bends) • Geometrical flexibility • Emittance is generated.	• ILC/SuperB type (modified to SuperKEKB) • Bending angle is necessary (no reverse bends). • Emittance can be ignored.

Beam axis and Solenoid axis



What is the Belle solenoid axis ?

Solenoid axis is:

(a) LER axis -> +7.45 mrad

(b) ½ of finite-crossing angle -> +37.45 mrad

(c) or no solution to rotate BELLE

Tuesday, 07 July 2009

16:00

[75] **Introduction (schedule, etc)** slides
by Masako IWASAKI (Tokyo Univ.)
(3-go-kan seminar hall: 16:30 - 16:45)

[76] **Vibration Measurements** slides
by Mika MASUZAWA (KEK)
(3-go-kan seminar hall: 16:45 - 17:00)

17:00

[77] **Optics** slides
by Akio MORITA (KEK)
(3-go-kan seminar hall: 17:00 - 17:15)

[78] **QCS magnet** slides
by Norihito OHUCHI (KEK)
(3-go-kan seminar hall: 17:15 - 17:30)

[79] **IP chamber design** slides
by Ken-ichi KANAZAWA (KEK)
(3-go-kan seminar hall: 17:30 - 17:45)

[80] **HOM calculation** slides
by Hitoshi YAMAMOTO (Tohoku U.)
(3-go-kan seminar hall: 17:45 - 18:00)

18:00

[81] **Assembly + BG simulation 1** slides
by Masako IWASAKI (Tokyo Univ.)
(3-go-kan seminar hall: 18:00 - 18:15)

[82] **BG simulation 2** slides
by Clement NG (U.Tokyo)
(3-go-kan seminar hall: 18:15 - 18:30)

[83] **Discussion**
(3-go-kan seminar hall: 18:30 - 19:00)

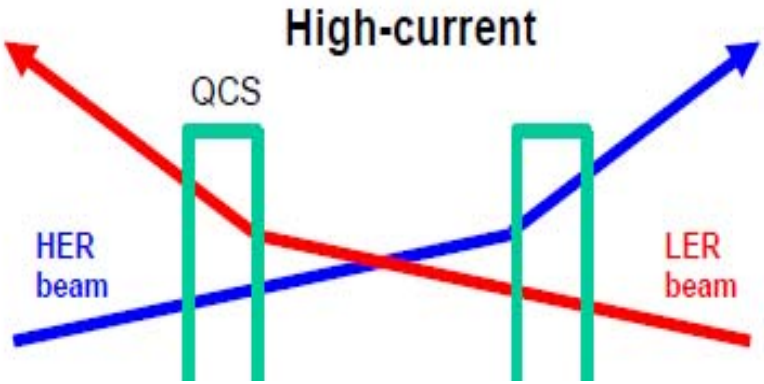
IR parallel session

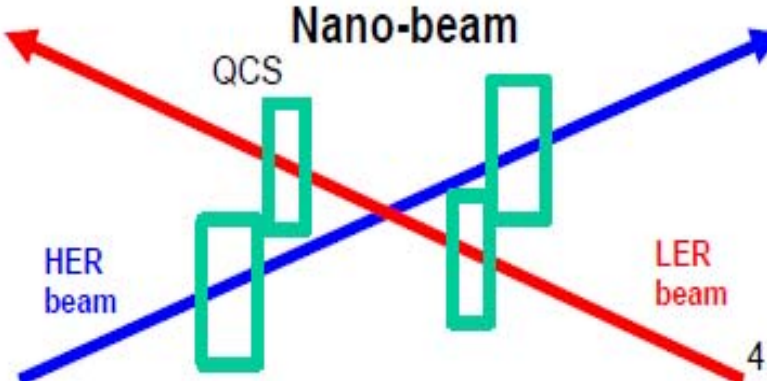
M. Iwasaki

First priorities

High-current option … SR BG & HOM heating
Nano-beam option … IR assembly & support

	High current (LER/HER)	Nano-beam(LER/HER)
Beam current I (A)	High current : 9.4/4.1	~3/~2
Bunch length σ_z (mm)	Short bunch length : 5/3	6/6
Emittance ε_x (nm)	24/18	Low emittance : 1/1
β_y (nm)	3/6	Small β : 0.22/0.22
Beam size σ_y	0.85/0.73 (μm)	Small beam size : 34/44 (nm)
Final Q-magnet layout	- Common QCS for 2 beams - location 40cm (L) / 65cm (R) Little space in L side	Two separate Q-magnets for each 2 beams Little space in both L/R sides

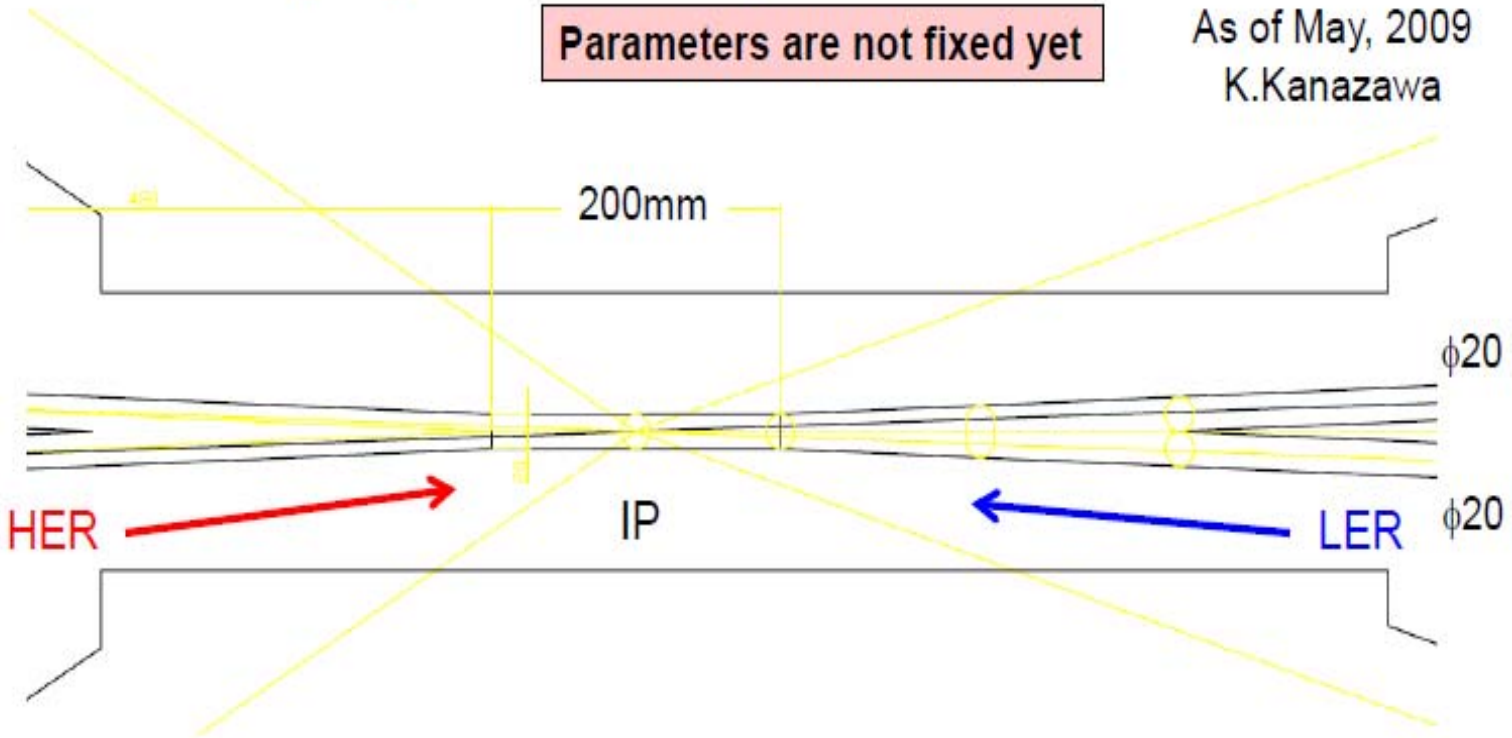




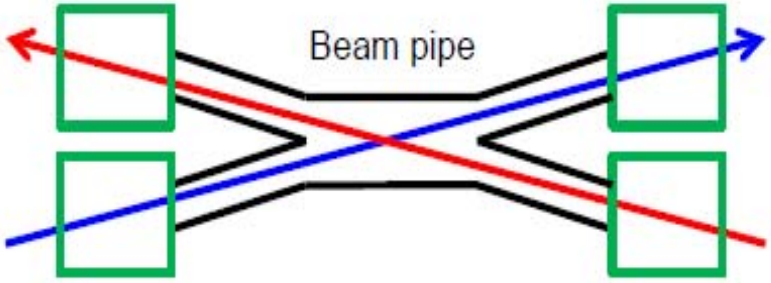
Beam pipe example : Nano-beam

Parameters are not fixed yet

As of May, 2009
K.Kanazawa



M. Iwasaki



To connect with the separate Q magnets
the IP beam pipe has branch structures
(crotch structures)

K. Kanazawa

IP Design

Design Features

- LER beam (incoming): 7.46 mrad with respect to the Belle solenoid axis.
- HER beam (outgoing): 67.46 mrad with respect to the Belle solenoid axis.
- ϕ 20 mm x l 200 mm straight pipe parallel to the Belle solenoid axis at IP.
- With beam position monitors (BPM)
- ISO-KF-like flange.
- Avoid cavity-like structure at IP.

Soft/Comp Session

Kolja

Tuesday, 07 July 2009

13:00

[46] **Discussion of Framework Requirements and Decision Procedure** slides
by ALL
(3-go-kan 1F meeting room: 13:30 - 14:30)

14:00

[47] **A General Event Display** slides
by ANDREAS MOLL (MPI)
(3-go-kan 1F meeting room: 14:30 - 14:50)

[48] **Twiki and Subversion Repository for Belle-II** slides
by THOMAS KUHR (Karlsruhe U.)
(3-go-kan 1F meeting room: 14:50 - 15:00)

15:00

[49] **Data Handling Prototype** slides
by TOM FIFIELD (Melbourne)
(3-go-kan 1F meeting room: 15:00 - 15:20)

[50] **AMGA Metadata Catalog** slides
by JUNGHYUN KIM (KISTI)
(3-go-kan 1F meeting room: 15:20 - 15:40)

[51] **Grid Computing at Ljubljana and Nova Gorica** slides
by MARKO BRACKO (Jozef Stefan)
(3-go-kan 1F meeting room: 15:40 - 16:00)

16:00

[52] **News on Cloud Computing** slides
by TOM FIFIELD (Melbourne)
(3-go-kan 1F meeting room: 16:00 - 16:10)

[53] **Computing Resources** slides
by TAKANORI HARA (KEK)
(3-go-kan 1F meeting room: 16:10 - 16:20)

[54] **Status of Simulation and Reconstruction Software** slides
by TAKANORI HARA (KEK)
(3-go-kan 1F meeting room: 16:20 - 16:30)

DAQ Session

Tuesday, 07 July 2009

16:00

[56] **Status of front end unification** slides
by G.VARNER (HAWAII)
(3-go-kan 1F meeting room: 16:30 - 16:45)

[57] **Status of CDC readout** slides
by M.TANAKA (KEK)
(3-go-kan 1F meeting room: 16:45 - 17:00)

17:00

[58] **Strategy for unified data link** slides
by Z.LIU (IHEP)
(3-go-kan 1F meeting room: 17:00 - 17:15)

[59] **Timing distribution** slides
by M.NAKAO (KEK)
(3-go-kan 1F meeting room: 17:15 - 17:30)

[60] **COPPER status** slides
by T.HIGUCHI (KEK)
(3-go-kan 1F meeting room: 17:30 - 17:45)

[61] **Event builder design** slides
by S.Y.SUZUKI (KEK)
(3-go-kan 1F meeting room: 17:45 - 18:00)

18:00

[62] **HLT and data flow** slides
by R.ITOH (KEK)
(3-go-kan 1F meeting room: 18:00 - 18:15)

[63] **Pixel readout I** slides
by K.PROTHMANN (MPI)
(3-go-kan 1F meeting room: 18:15 - 18:25)

[64] **Pixel readout II** slides
by S.LANGE (GIESSEN)
(3-go-kan 1F meeting room: 18:25 - 18:35)

[65] **Discussion on design consistency and plan** slides
by R.ITOH (KEK) (COORDINATOR)
(3-go-kan 1F meeting room: 18:35 - 18:55)

SVD Session

Wednesday, 08 July 2009

09:00

[104] **Introduction**
by Toru TSUBOYAMA (KEK)
(3-go-kan 1F meeting room: 09:00 - 09:10)

[105] **DSSD update** slides
by Manfred VALENTAN (HEPHY Vienna)
(3-go-kan 1F meeting room: 09:10 - 09:30)

[106] **Construction and Status of the Origami Module Prototype** slides
by C. IRMLER (HEPHY Vienna)
(3-go-kan 1F meeting room: 09:30 - 09:50)

[118] **Status of kupid v2.0** slides
10:00
by Eunil WON (Korea Univ.)
(3-go-kan 1F meeting room: 09:50 - 10:10)

[107] **Idea of SVD structure** slides
by Toru TSUBOYAMA (KEK)
(3-go-kan 1F meeting room: 10:10 - 10:30)

Break
(10:30 - 10:40)

[108] **Belle II SVD simulation** slides
by Z. DRASAL (Charles University, Prague)
(3-go-kan 1F meeting room: 10:40 - 11:00)

11:00

[119] **SVD only tracking** slides
by Andreas MOLL (MPI)
(3-go-kan 1F meeting room: 11:00 - 11:20)

[120] **Track Based Alignment** slides
by Andreas MOLL (MPI)
(3-go-kan 1F meeting room: 11:20 - 11:40)

[110] **Tasks** slides
by T. TSUBOYAMA (KEK)
(3-go-kan 1F meeting room: 11:40 - 12:00)

PXD Session

Wednesday, 08 July 2009

13:00

[66] **Status of SOI R&D** — slides
by Yasuo ARAI
(3-go-kan 1F meeting room: 13:30 - 13:45)

[67] **DEPFET: Project Status** — slides
by Christian KIESLING
(3-go-kan 1F meeting room: 13:45 - 14:05)

14:00

[68] **Sensor and ASIC R&D** — slides
by Hans-Günther MOSER
(3-go-kan 1F meeting room: 14:05 - 14:25)

[69] **Consequences of nano-beams** — slides
by Hans-Günther MOSER
(3-go-kan 1F meeting room: 14:25 - 14:40)

[70] **Mechanics** — slides
by Frank SIMON
(3-go-kan 1F meeting room: 14:40 - 15:00)

15:00

[71] **Cooling** — slides
by Thomas MüLLER
(3-go-kan 1F meeting room: 15:00 - 15:20)

[72] **Simulations** — slides
by Kolja PROTHMANN
(3-go-kan 1F meeting room: 15:20 - 15:40)

[73] **Test Beam** — slides
by Zdenek DOLEZAL
(3-go-kan 1F meeting room: 15:40 - 15:55)

[74] **Technical Choices** — slides
by Hans-Günther MOSER
(3-go-kan 1F meeting room: 15:55 - 16:05)

16:00

DEPFET-Collab. @ Belle-II

Original Collaboration: DEPFET pixel detector @ ILC (since 2002)
now: Unite efforts to deliver a REAL PXD by 2013 for Belle-II

University of Barcelona, Spain
Universitat Ramon Llull, Barcelona, Spain
Bonn University, Germany
Heidelberg University, Germany
Giessen University, Germany
Goettingen University, Germany
Karlsruhe University, Germany
IFJ PAN, Krakow, Poland
MPI Munich, Germany
Charles University, Prague, Czech Republic
IGFAE, Santiago de Compostela University, Spain
IFIC, CSIC-UVEG, Valencia, Spain

with important help from Hawaii, KEK, Vienna

DEPFET@Belle-II

New management:

- IB- Board
- Project Leader
  C. Kiesling
- Technical Coord.
  H.-G. Moser
- „Integration Coord.“
  (Liaison @ KEK)

Institutes and Group Leaders (IB)

Czech Rep.	PRA	Charles-University Prague	Zdenek Dolezal
Germany	BON	University of Bonn	Norbert Wermes
	GIE	University of Gießen	Sören Lange
	GOE	University of Göttingen	Ariane Frey
	HEI	University of Heidelberg	Peter Fischer
	KAR	University of Karlsruhe	Thomas Müller
	MPI	Max-Planck-Institute for Physics, Munich	Christian Kiesling
		Semiconductor Laboratory (HLL)	Hans-Günther Moser
Poland	KRA	Institute of Nuclear Physics, Krakow	Henryk Palka
Spain	IFV	Instituto de Fisica Corpuscular (IFIC), Valencia	Carlos Lacasta
	URL	University Ramon Llull, Barcelona	Jordi Riera Babures
	UBA	University of Barcelona	Lluis Garrido
	CNM	Centro Nacional de Microelectronica, Barcelona	Enric Cabruja
	IFB	Instituto de Fisica d'Altes Energies (IFAE), Barcelona	Mokhtar Chmeissani
	USC	University of Santiago de Compostela	Pablo Vazquez Regueiro
	IFC	Instituto de Fiisica de Cantabria (IFCA), Santander	Ivan Vila Alvarez
Austria	VIE	Institute for High Energy Physics (HEPHY), Vienna	Markus Friedl
Japan	KEK	KEK	Toru Tsuboyama
USA	HAW	University of Hawaii	Gary Varner

Funding of the DEPFET-Collab.

Model: The DEPFET-Collaboration will deliver the PXD hardware and ensure the operation of the detector at Belle-II

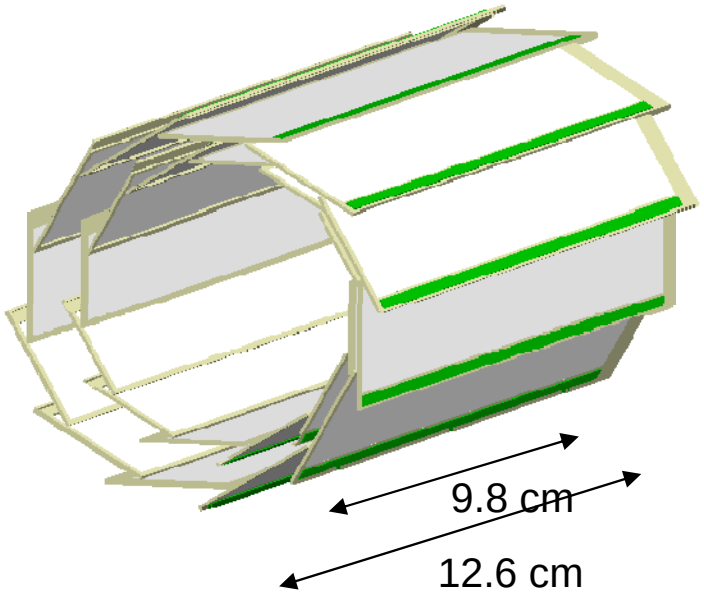
Total cost of deliverables (core cost): 2.5 M€

Funding will be provided by the DEPFET-Collaboration

The German groups have applied for Belle-II funding to the Government in December of 2008 (for the years 2009-2012):

- Asked for total of 2.17 M€ + 13.5 FTE
  (includes travel, MPI will contribute another 1 M€)
- Very positive evaluation by the Ministery
  Granted funds: 1.05 M€ + 3.5 FTE (48% of requested sum)
- New application possible after approval of SuperKEKB + MoU

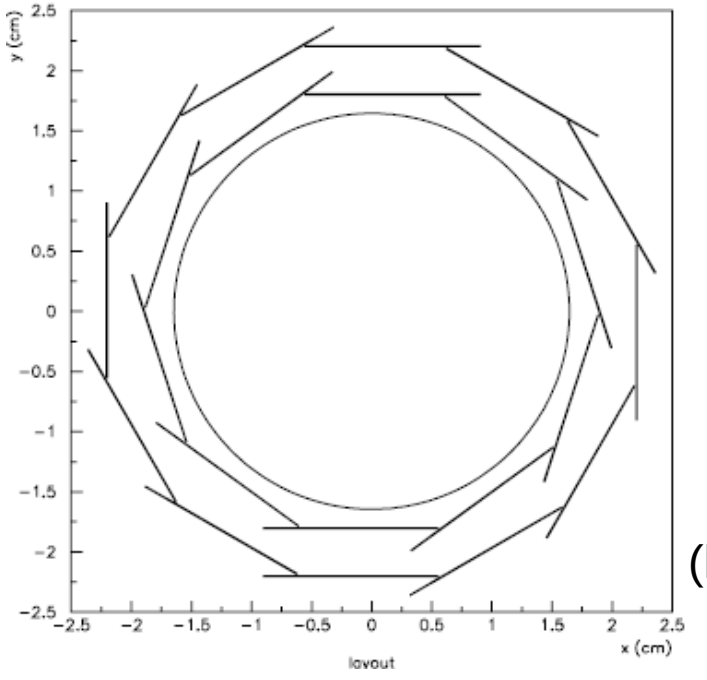
DEPFET Pixel Detector @ Belle-II



Small, thin (50µm) Detector:
2 layers, 20 modules (in total)

Beam pipe radius (presently):
1.0 cm in the nanobeam option (NB)

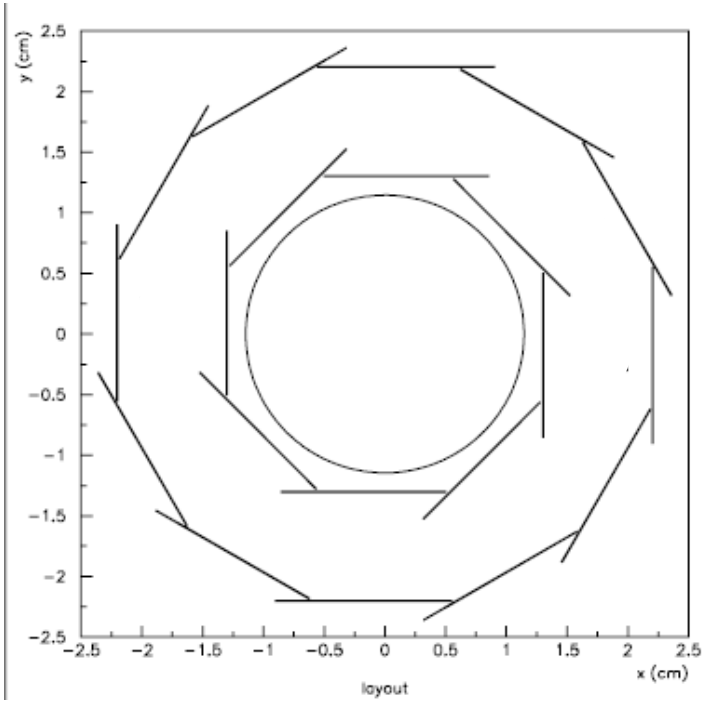
Radii still subject to optimisation:



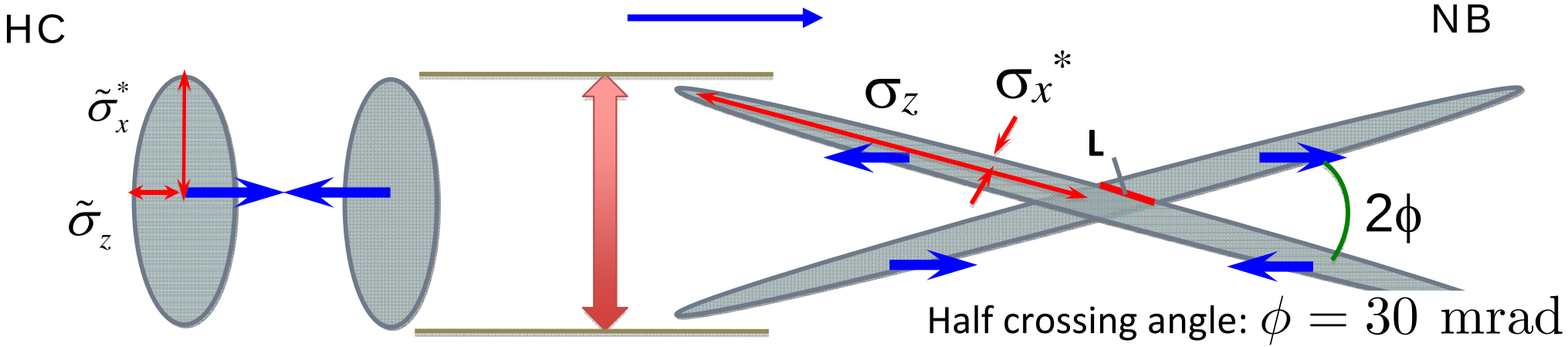
Likely scenario now:

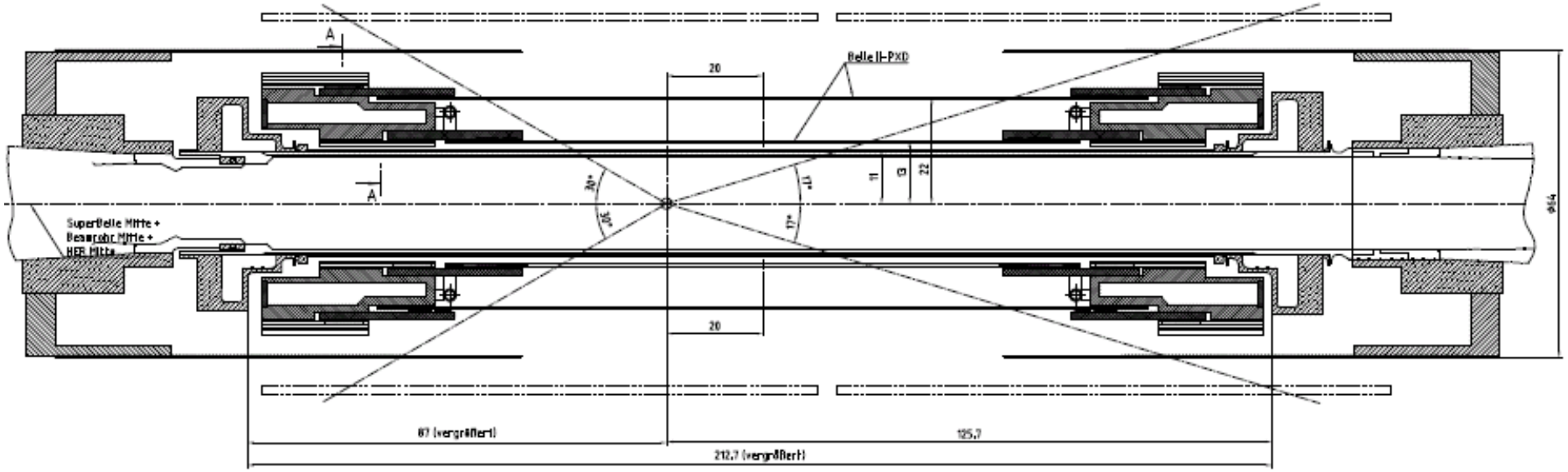
Layer 1 at 1.3 cm
Layer 2 at 2.2 cm

HC → NB
(high current)



NanoBeam Option





NB: so far only „good points“ for the PXD:

- less SR (~ Belle)
- smaller beam pipe (BP)
- BP parallel to Belle-II solenoid

Main R&D Issues currently

K. Prothmann
Z. Drasal

Sensors: pixel geometry -> parameter studies
prototyping, radiation hardness (> 10Mrad),
thinning, interconnection with ASICs

Read-out ASICs: Current Digitizer chip (DCD):
prototype OK, needs test at full speed (x2)

H.-G. Moser

Switcher:
rad-hard design, speed OK, redesign for Belle-II

DHP & DHH: Zero-suppr: 400 Gpx/s -> 3 Gpx/s (triggered)
-> 2.5 Gb/s per half module

DAQ: 100 Gb/s total -> Gießen ATCA system

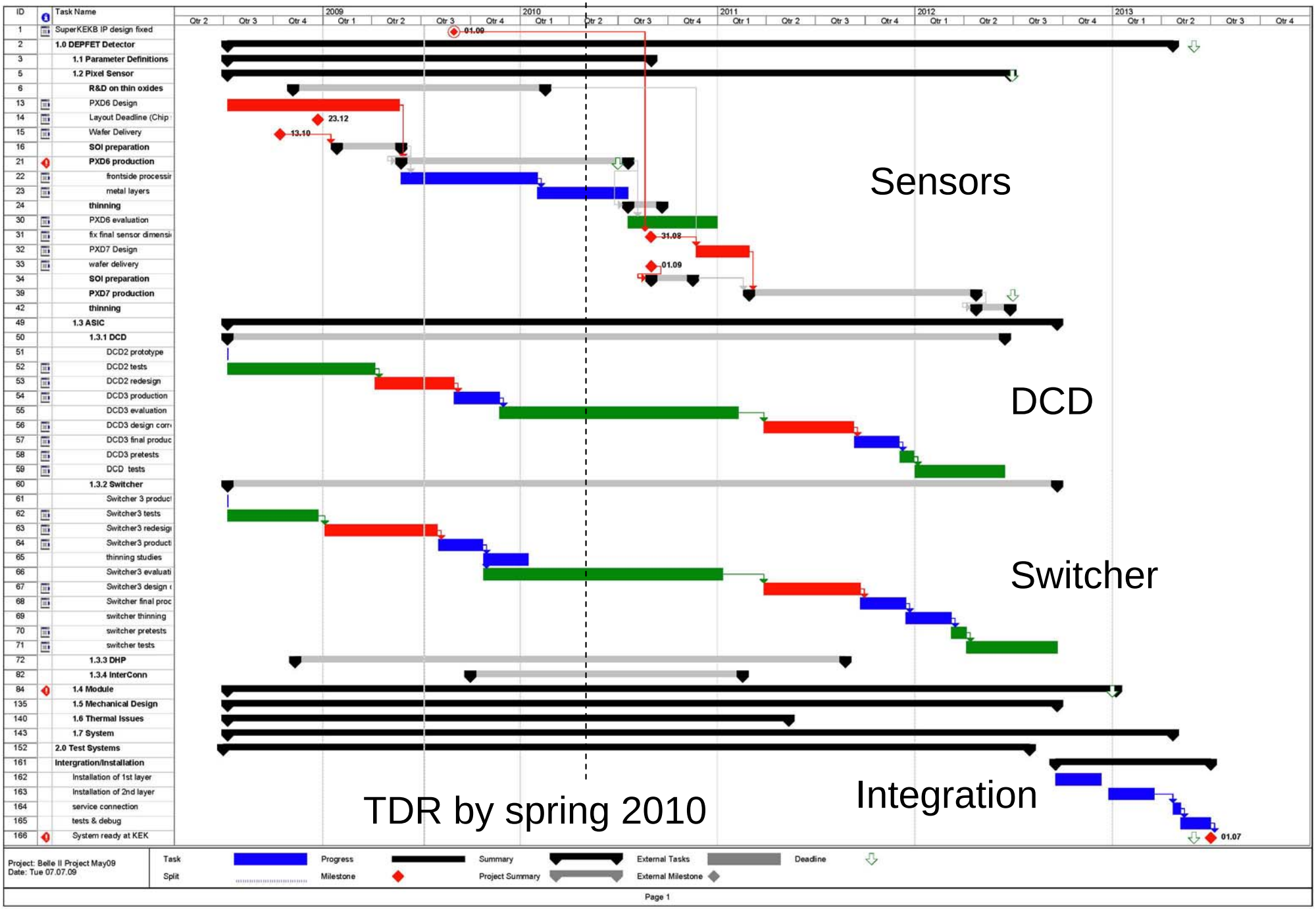
K. Prothmann, S. Lange

Mechanics: Mounting structure, cooling, alignment …,

F. Simon T. Müller A. Moll

Timeline

2009 | 2010 | 2011 | 2012 | 2013



KEKB Plans

- Increase the luminosity
  - Specific luminosity
    - Correction of x-y coupling at IP (study at Y(1S)?)
  - Peak luminosity: target value 2.5 x 10^{34} cm^{-2} s^{-1}
    - Improve specific luminosity
    - Higher HER beam currents
      - 1200 -> 1350mA?
- Total integrated luminosity
  - To exceed 1000 fb^{-1} (~964 fb^{-1} so far : need more accurate value)
- Machine study
  - Vacuum R&D (~2 days (shutdown for vac. works) + ~1day)
  - RF R&D (~2 days?)
  - BT R&D (~1day?)
  - Efforts to increase specific luminosity (~10 days?)

EB Conclusion on Fall 2009 Run Plan

8 weeks total expected to be available

Integrate for 3 weeks on the 5S

Integrate for 3 weeks on the lower resonances (2S, 1S)

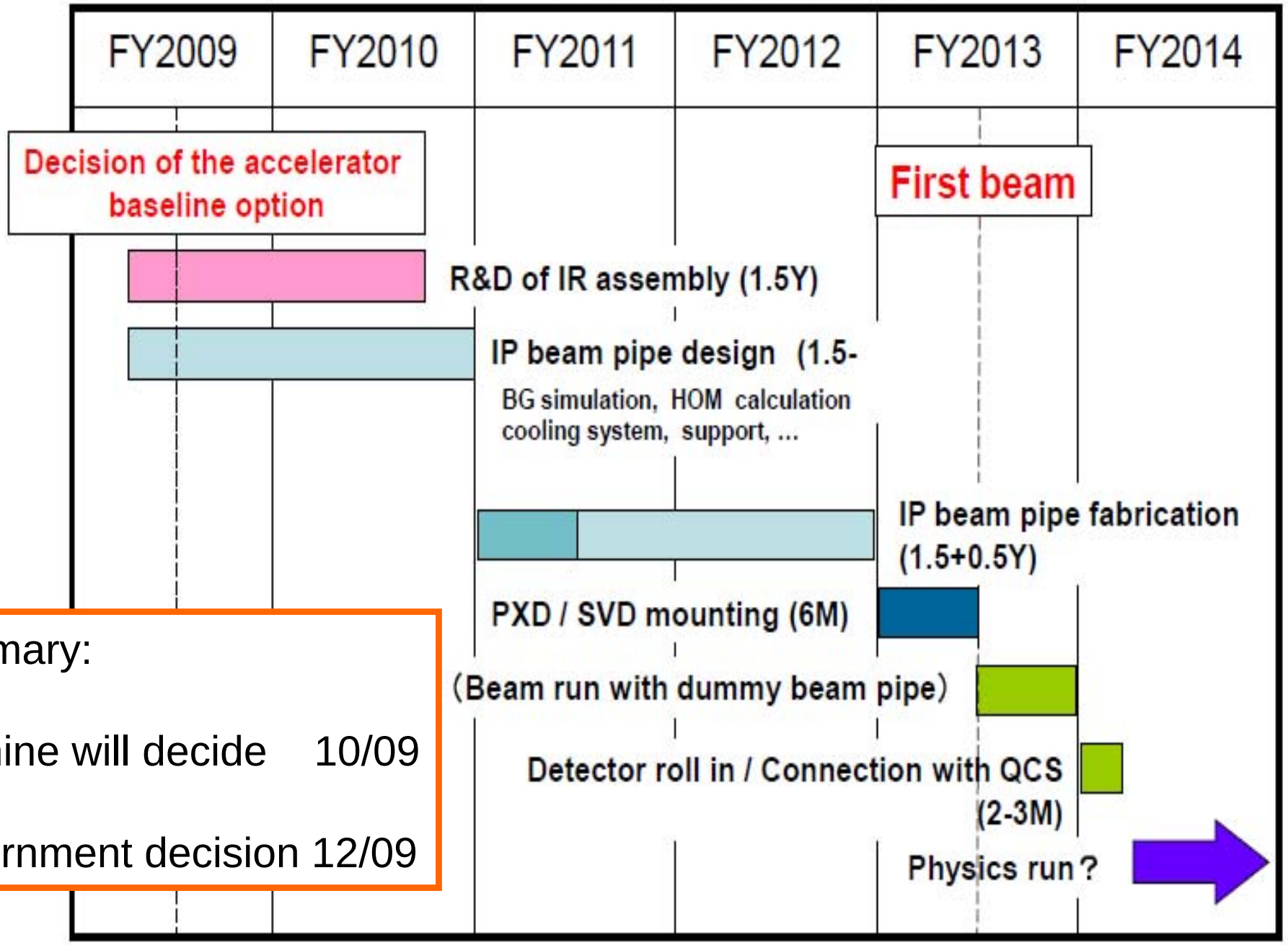
May help with x-y coupling issues

Dedicated machine experiments (2 weeks)

The exact scheduling will be decided by KEKB in consultation with Belle

M. Iwasaki

Schedule



Summary:

Machine will decide 10/09

Government decision 12/09