MDI current status

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Tokyo / Tohoku / KEK

http://hep.phys.s.u-tokyo.ac.jp/superKEKBMDI/

Introduction

To assure the stable detector operation

IR design is very important

Issues of the IR design:

1. Beam background

   High beam current / High B-field at final Q-magnets

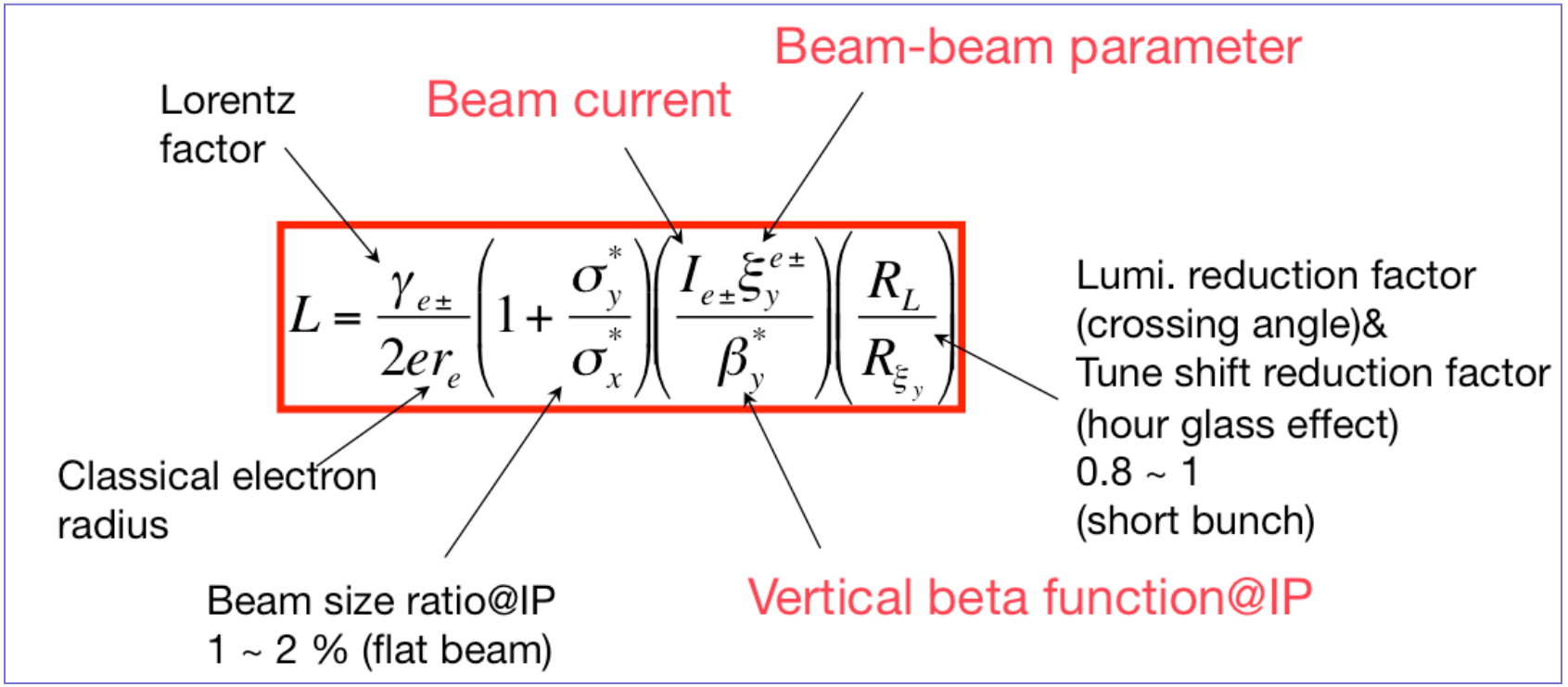
2. Heating of IR components

   Short bunch length / High current / High power SR

3. Assembly / support of IR components

   Little space / Small beam size (vibration around IP)

From KEKB to Super-KEKB
Strategies for Increasing Luminosity



High-Current Option

(1) Smaller β_y^*

(2) Increase beam currents

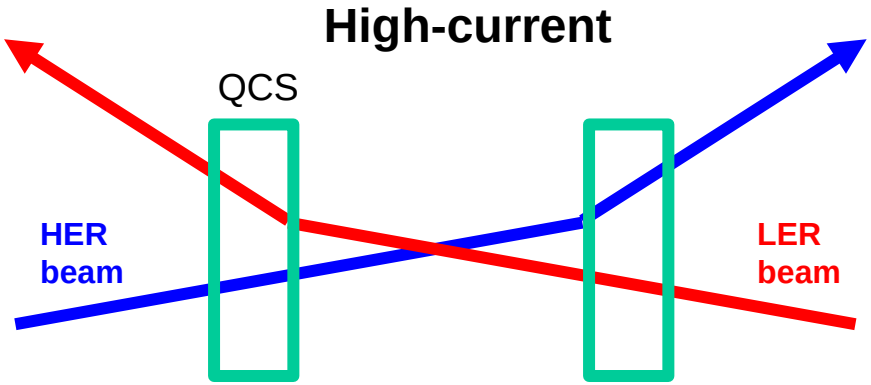
(3) Increase ξ_y

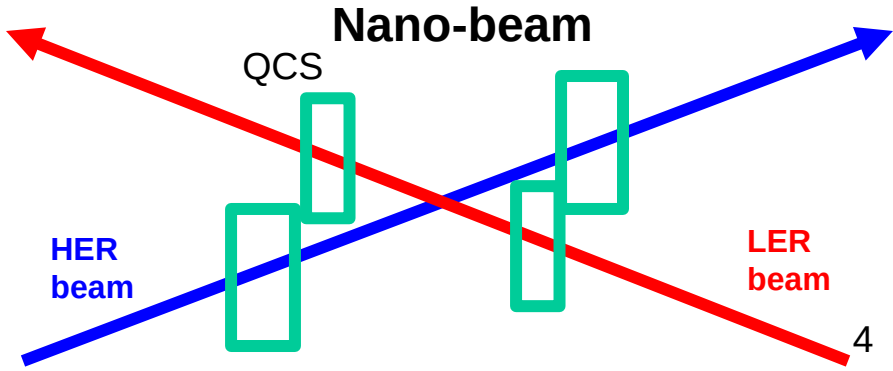
Nano-Beam Option

First priorities

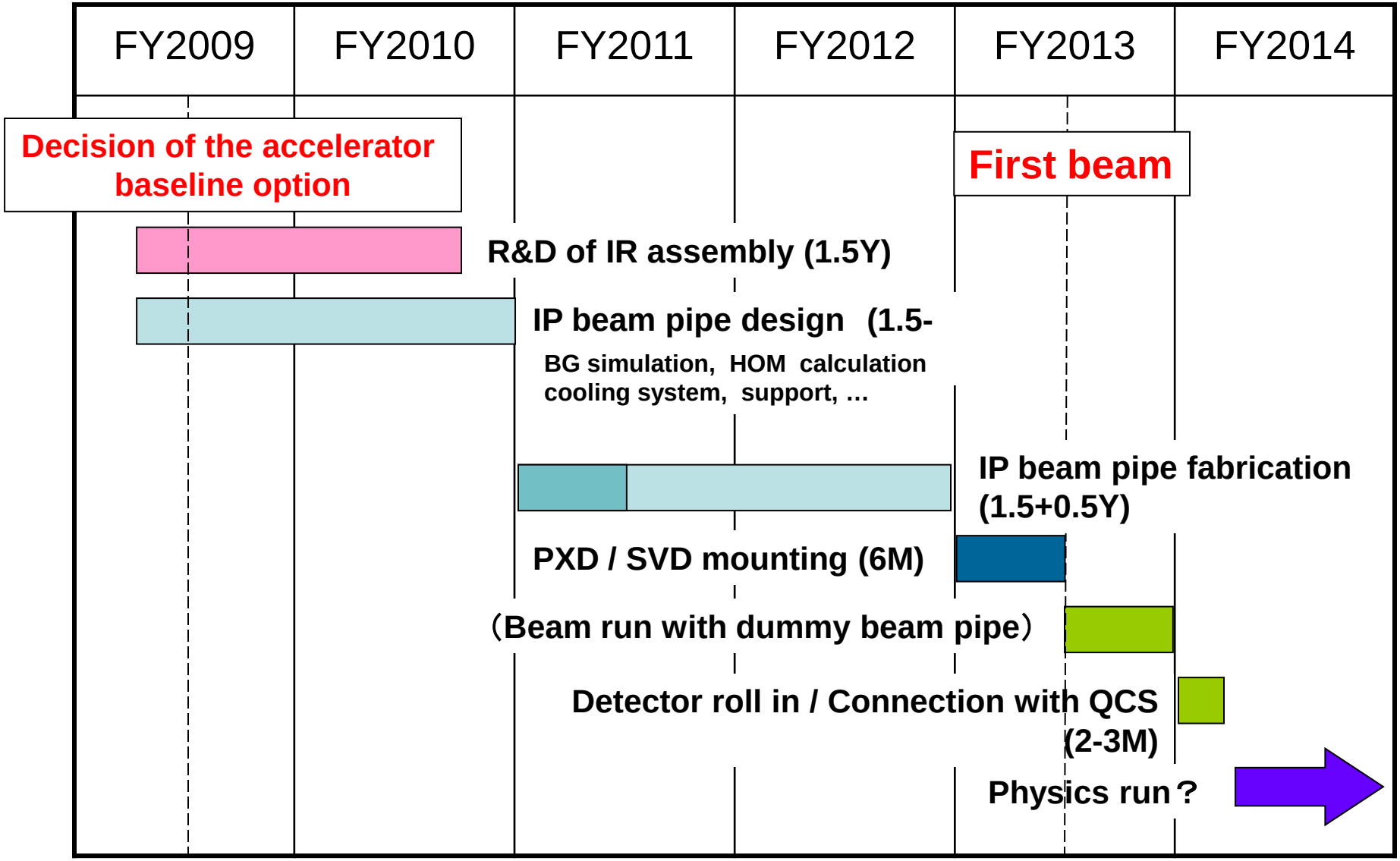
High-current option … SR BG & HOM heating
Nano-beam option … IR assembly & support

	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**





Schedule


FY2009
FY2010
FY2011
FY2012
FY2013
FY2014
Decision of the accelerator baseline option
First beam
R&D of IR assembly (1.5Y)
IP beam pipe design (1.5-
BG simulation, HOM calculation
cooling system, support, …
IP beam pipe fabrication
(1.5+0.5Y)
PXD / SVD mounting (6M)
（Beam run with dummy beam pipe）
Detector roll in / Connection with QCS
(2-3M)
Physics run？

Strategy

For the Nano-beam option,

R&D of the IR assembly / support design is important

Need to fix the IP beam pipe baseline design in <2years

Beam pipe geometry（size, direction, material, SR mask）

SR BG simulation / HOM calculation

Cooling system

Thermal calculation, cooling test

Support and integration with QCS / PXD/ SVD

Strategy

1. Start the IR assembly R&D and Beam pipe design (SR, HOM..)
2. The other particle BG simulation

   Touschek, beam-gas, radiative BhaBha
3. IR support design

   Vibration measurement, structure calculation

Current status

		High-current	Nano-beam
BG simulation SR	Tokyo	done	On going
Radiative BhaBha	Tokyo	---	On going
Touschek	Tohoku	---	---
Beam-gas	(KEK? Tokyo?)	---	---
HOM calculation	Tohoku	On going	
Thermal calculation	KEK	done	---
Cooling system design	?	---	
Beam pipe mechanical design	KEK + Tokyo?	---	
IR assembly	KEK	On going	
Vibration measurement	KEK + Tokyo?	On going	