

IR status

2009/9/8 M. Iwasaki (Tokyo)

Accelerator design (as of 2009, Aug-)

- The base design is Nano-beam option
 - There are two final-Q magnets in both L / R sides
- Crossing angle becomes 83 mrad
 - to put the final-Q magnets closer to the IP
- The QCS chamber radius is 1cm
 - to avoid the resonant cavity structure,
our IP beam-pipe radius should be 1cm
- 7x4GeV beam energy is considered
(To get the large dynamic aperture
to solve the Touschek life-time problem.)

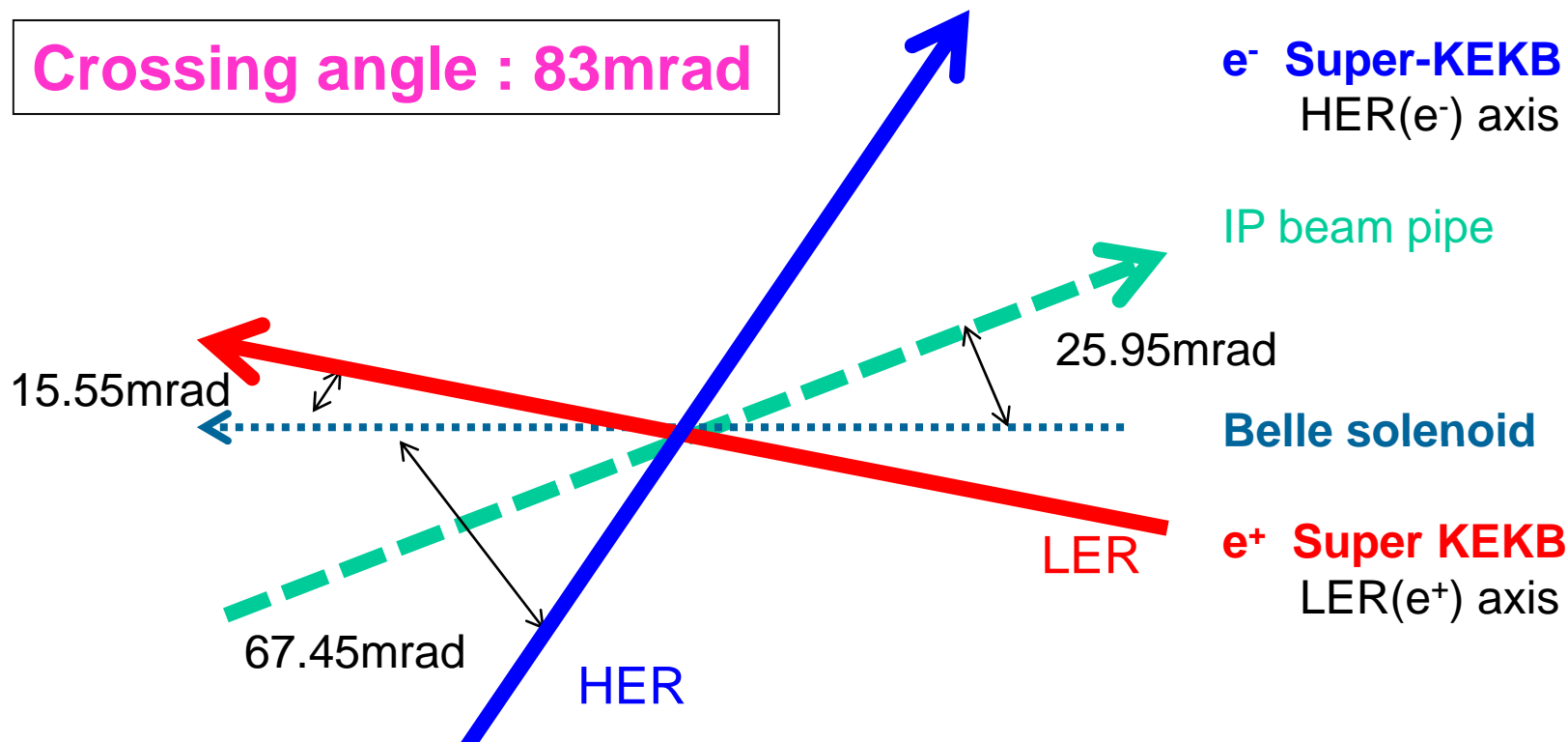
Beam Optics design

To design the IR optics,
there are several constraint

- **Current KEKB tunnel geometry**
- Separated final focusing Q-magnet geometries
- Local chromaticity correction performance
- Low emittance local chromaticity correction

→ We cannot change the HER direction

Relationship between Belle-II and Super-KEKB: Nano-beam



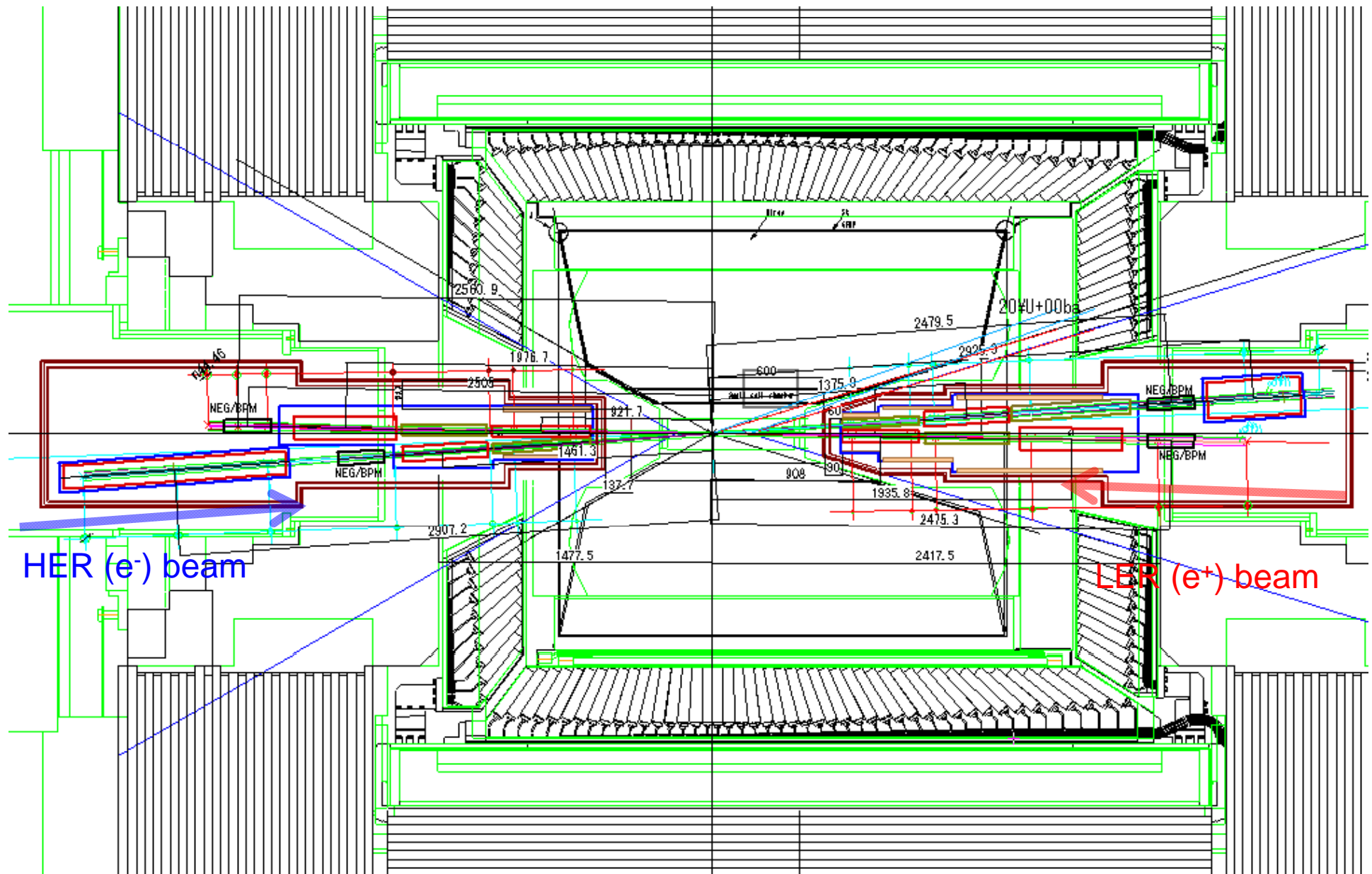
**Beam pipe : center direction of the LER and HER
(25.95 mrad from Belle solnoid)**

Parameters are not fixed yet

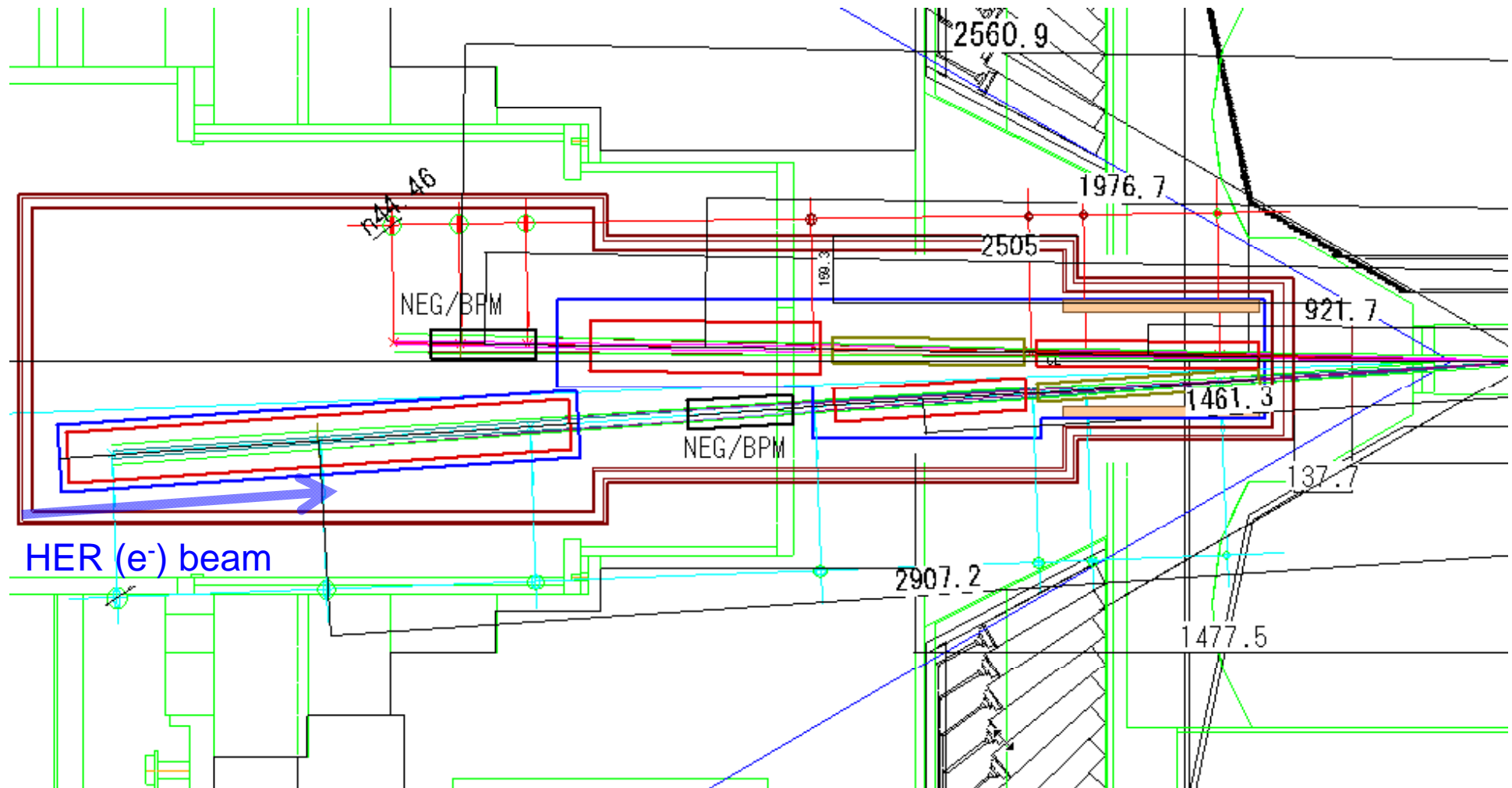
- To Do: We need to check the SR BG - Rotate Belle-II?!

Final Focus Magnet Design

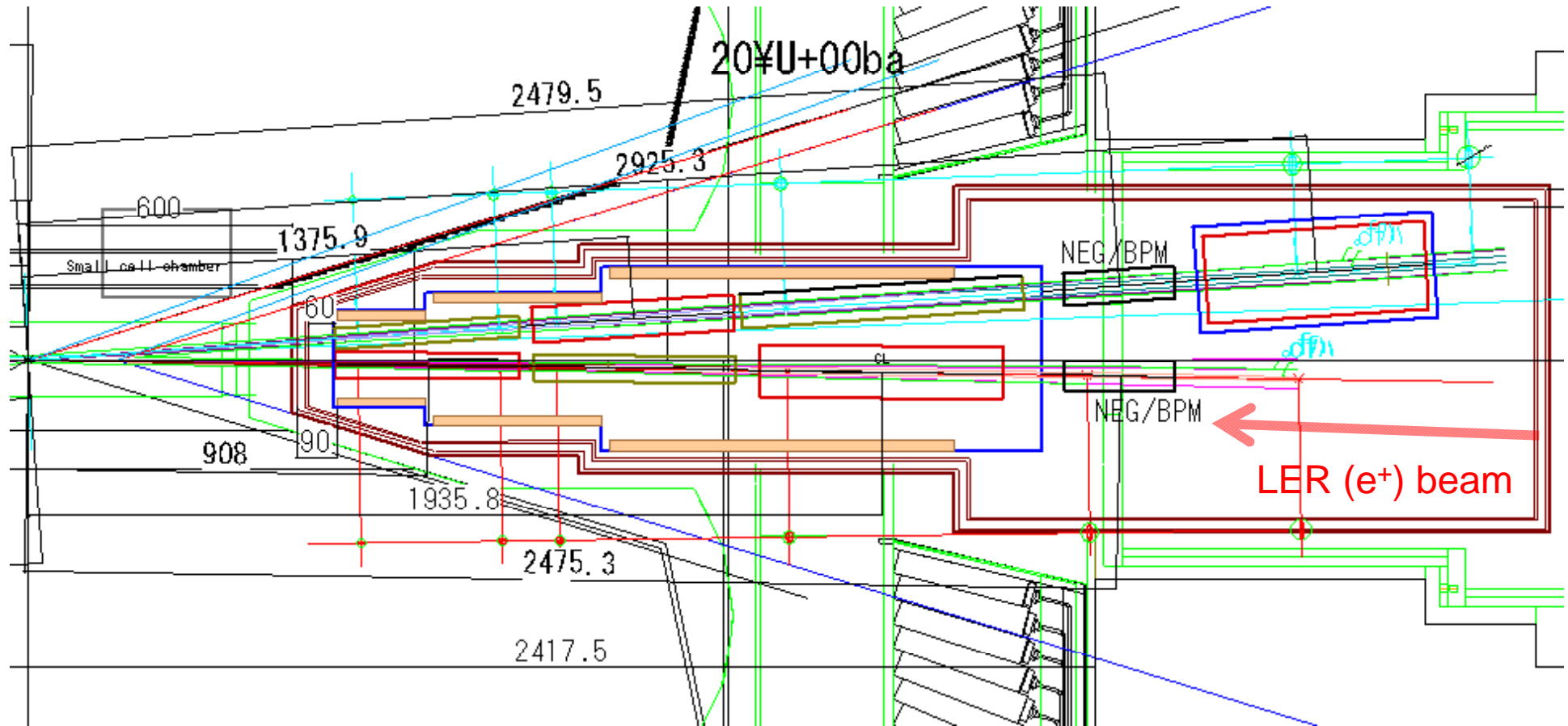
IR Magnets in Belle



IR-magnets in the left side



IR-magnets in the right side



QCS design

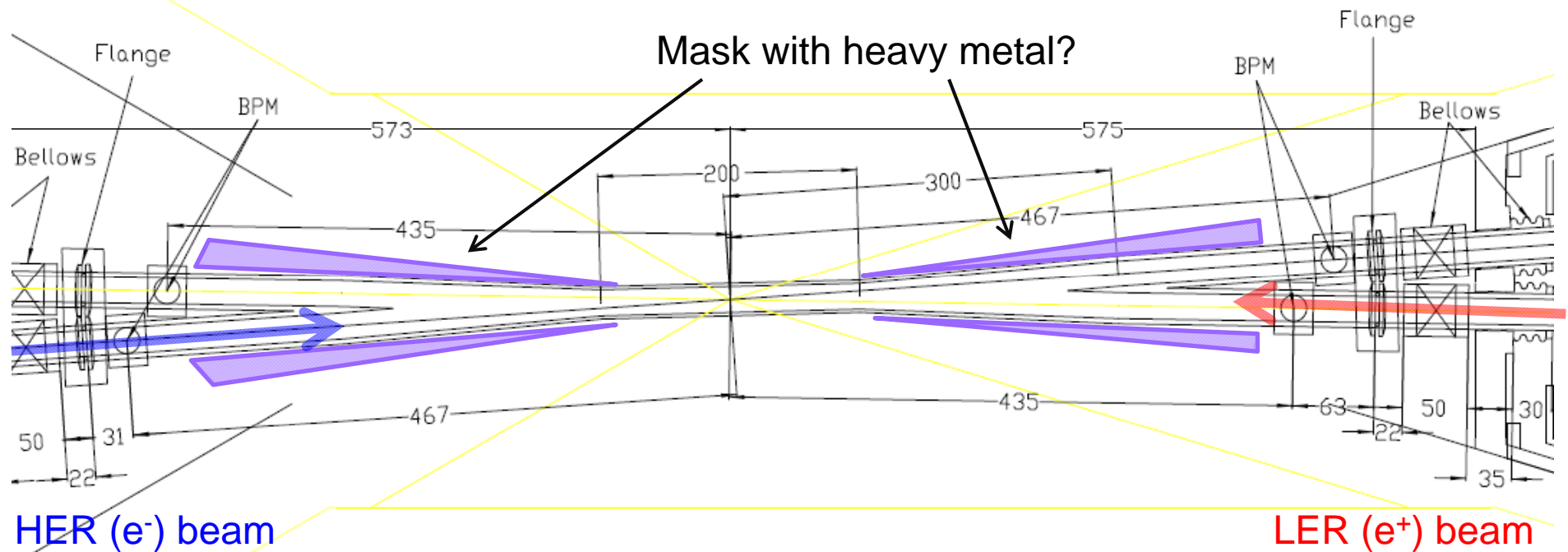
Inner radius = 1.05cm

- To avoid the resonant cavity structure, IP beam-pipe inner radius = 1cm
- It is difficult to keep good vacuum with small-radius long-length (IP+)QCS beam pipes
 - Vacuum level will be 10^{-4} Pa level (~100x current KEKB)
 - **Beam-gas BG must increase**

To Do: We'll estimate the beam-gas BG

Preliminary IP chamber design

Belle-II IP chamber design (2009, Aug)



- Size / shape : preliminary
- Assume 1cm radius to Be straight part beam pipe
 - We need to think about the support of the heavy metal masks (~20kg in one side)

They should be supported by SVD and CDC
(otherwise, 1cm radius Be pipe will be broken)

Detector BG

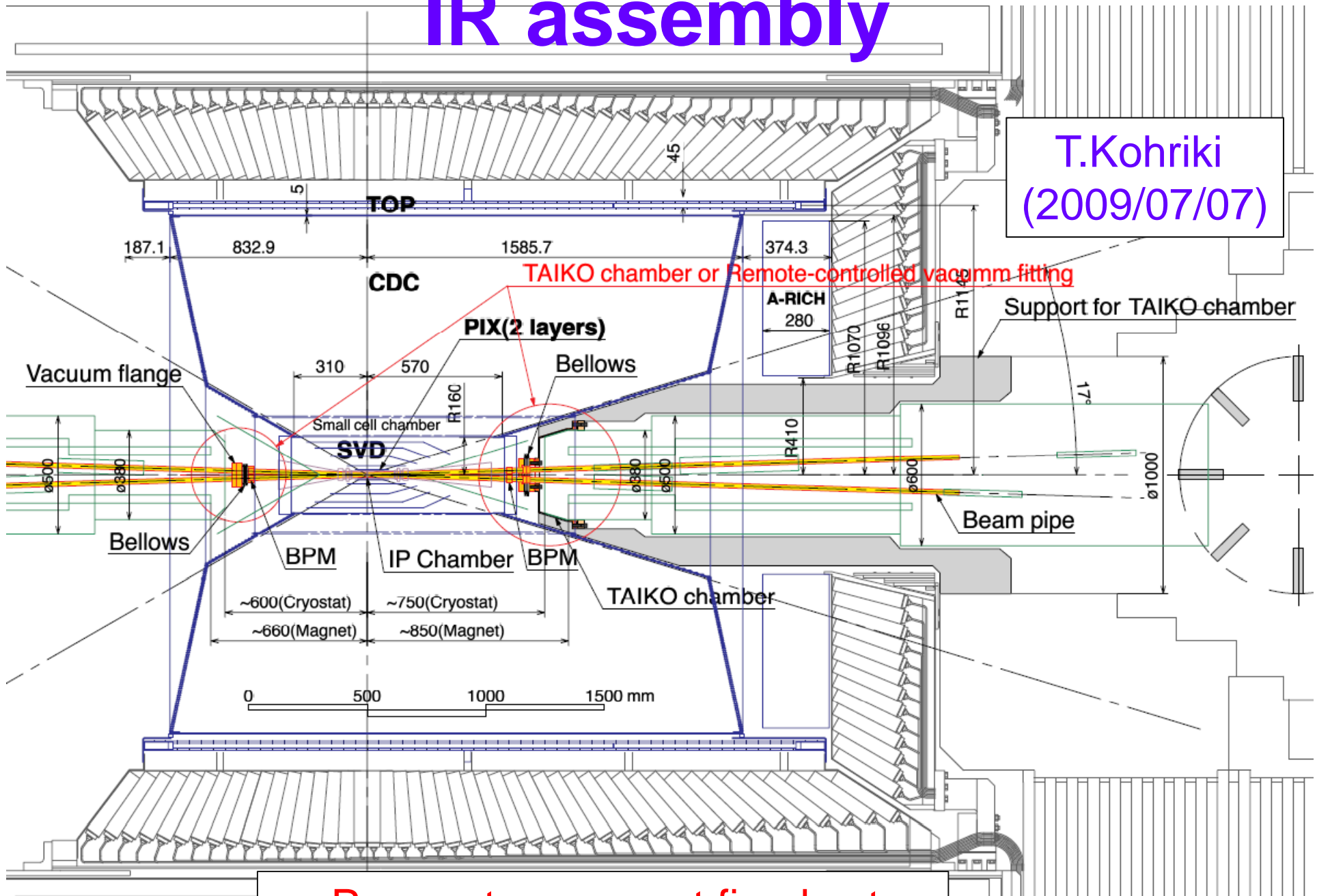
Current status:

We don't have the final optics yet.

But we'll re-start the BG simulations.

1. To design the beam pipe, we'll re-start the SR simulation first.
(SR direct hits, energy deposit)
2. Touschek BG will be estimated by Tohoku.
(currently under constructing the simulation)
3. We'll re-start the Radiative-BhaBha.
(but it seems lower BG source)
4. We need to start the beam-gas BG soon.

IR assembly



T.Kohriki
(2009/07/07)

TAIKO chamber or Remote-controlled vacuum fitting

Parameters are not fixed yet

IR assembly : current status

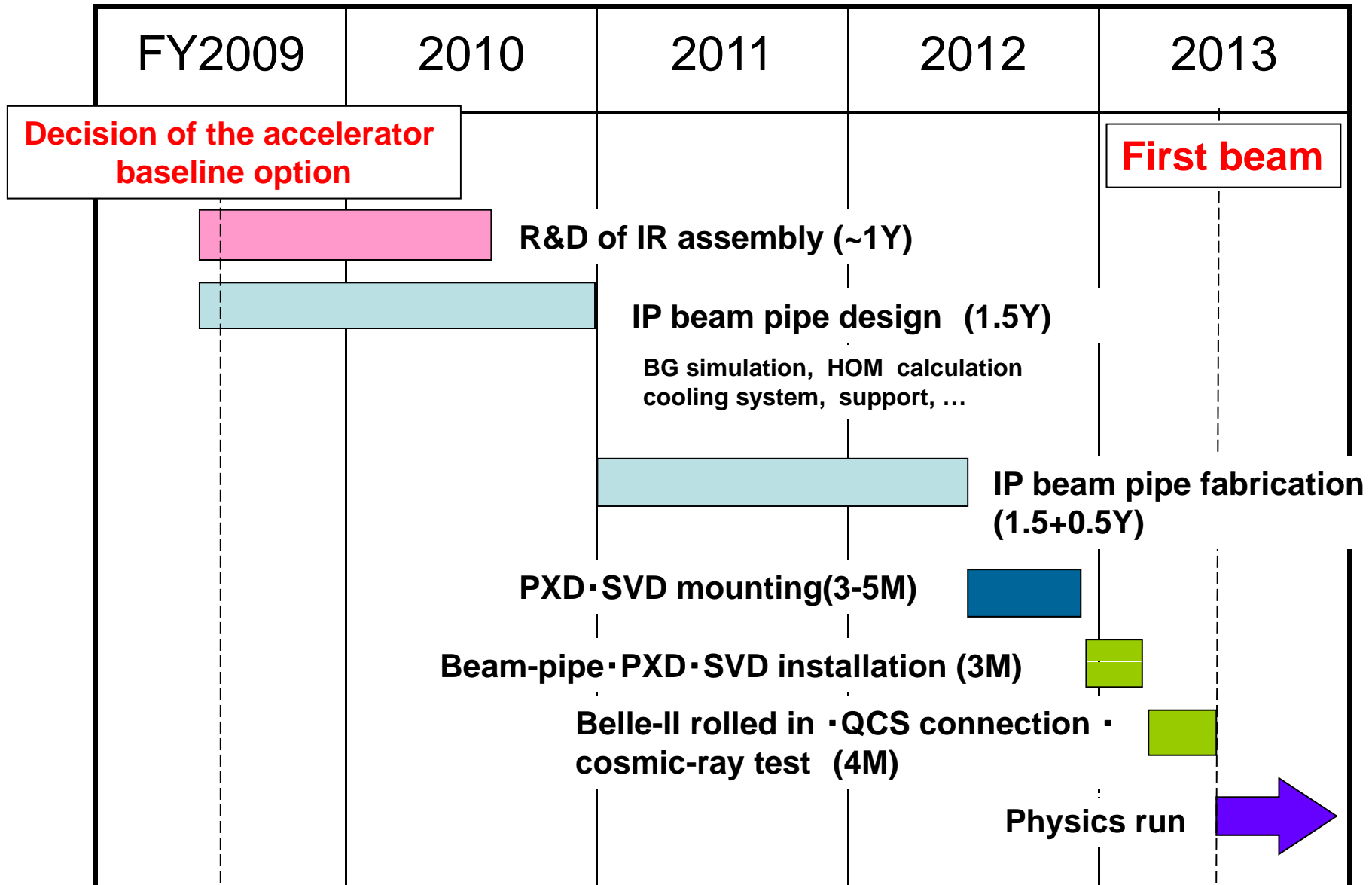
Members:

KEK T.Kohriki + Machine shop

R&D of remote-controlled vacuum fitting

- We start weekly meeting with Kohriki-san and Machine shop
- Currently several ideas for the remote-controlled connection
(But we didn't consider the details yet)
- We must do remote-controlled vacuum connection test soon

Schedule



Summary

1. Beam optics is still under working
2. Belle-II detector rotation is under considering
3. To design the IP-beam pipe, we need
 - SR BG simulation
 - Structure analysis
 - ... depends on mask design/support and IR assembly
 - HOM calculation, Thermal calculation, etc
4. Remote-controlled vacuum fitting R&D is underway
5. Due to the small radius of the QCS chambers,
vacuum level might be worse than current
6. To estimate the particle BG, we need simulations
 - Touschek, Beam-gas, radiative-BhaBha