MR 2022 operation

Outline

- ✓ 2022ab operation status
  - Improved stability
  - Challenges
- ✓ Remaining program for June
- ✓ Accelerator side works during LS1

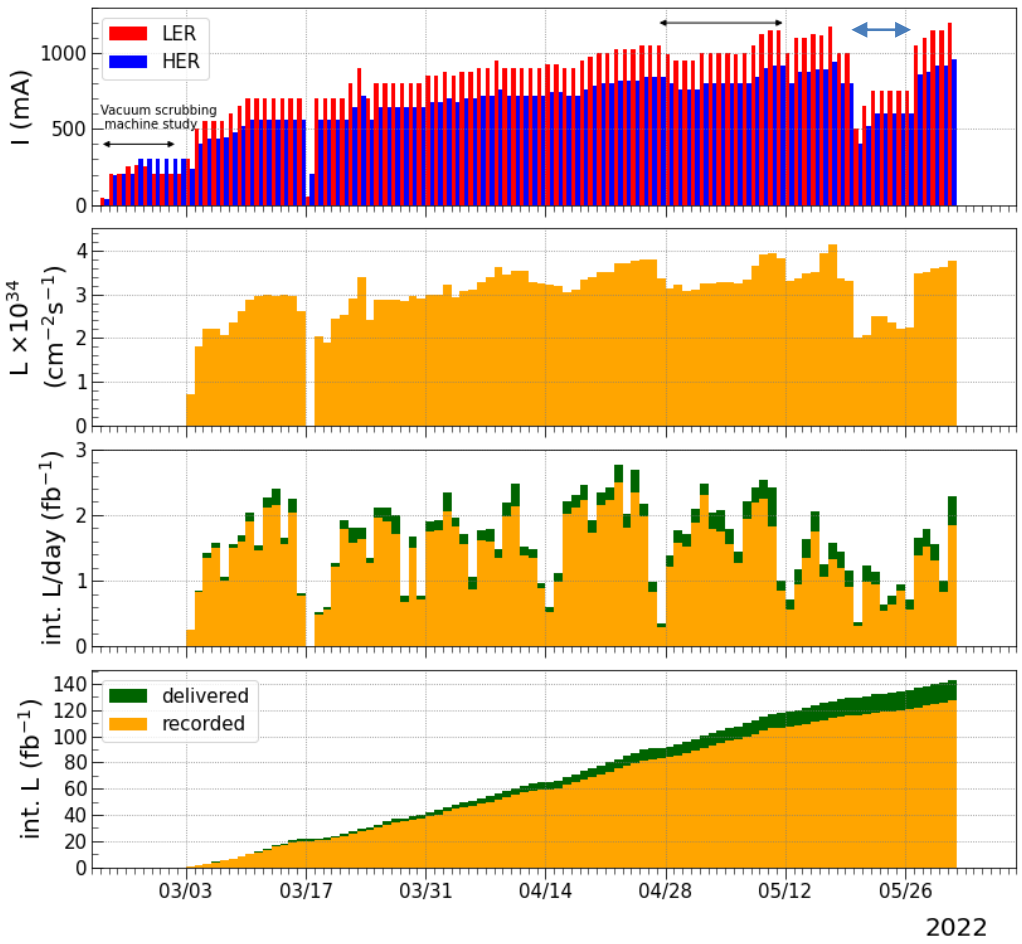
Xudong Wang

B2GM@KEK, 6 June 2022

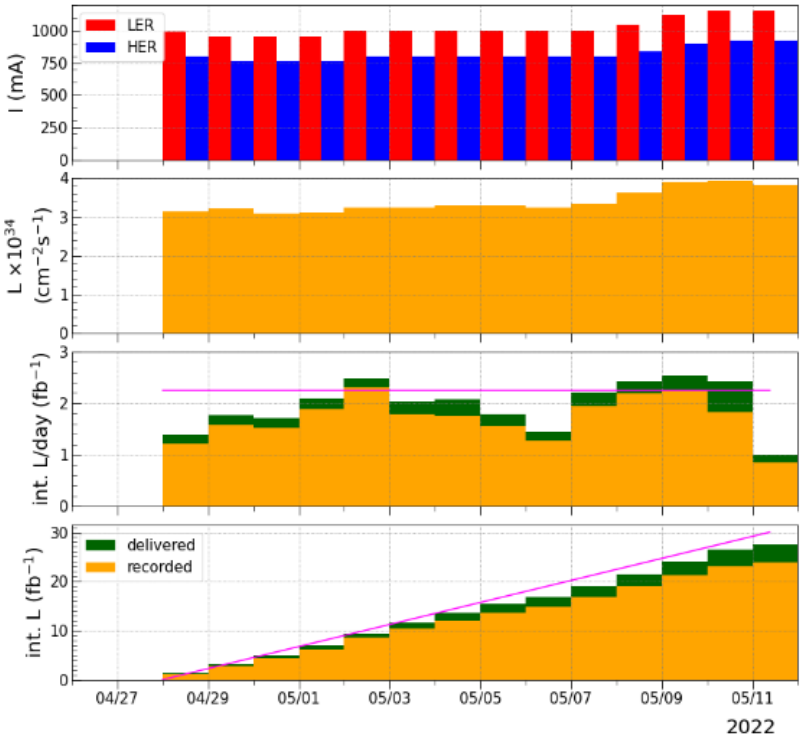
2022ab operation status

off-momentum

By*:0.8mm

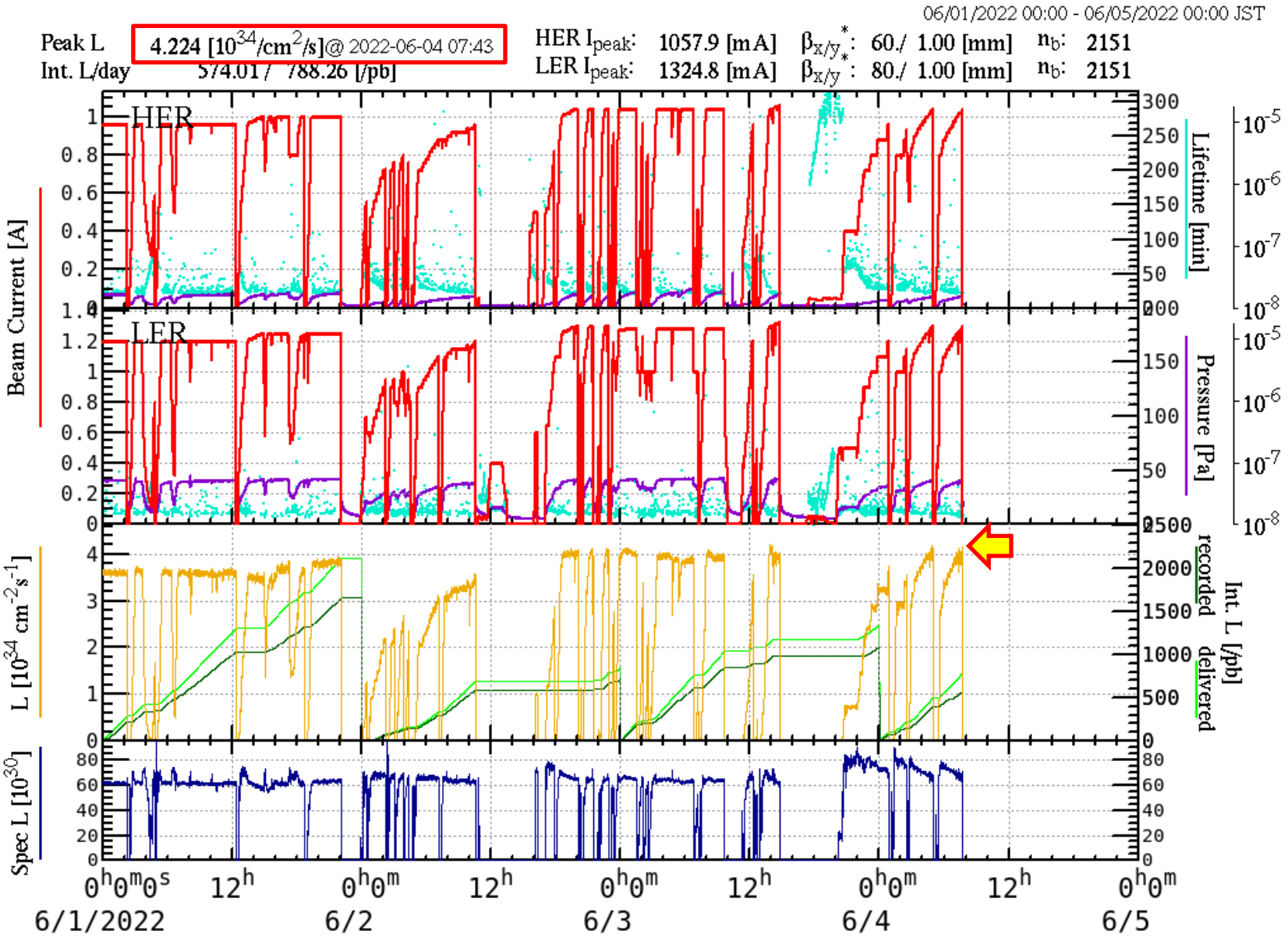


Off momentum run since Apr. 27 to May 11

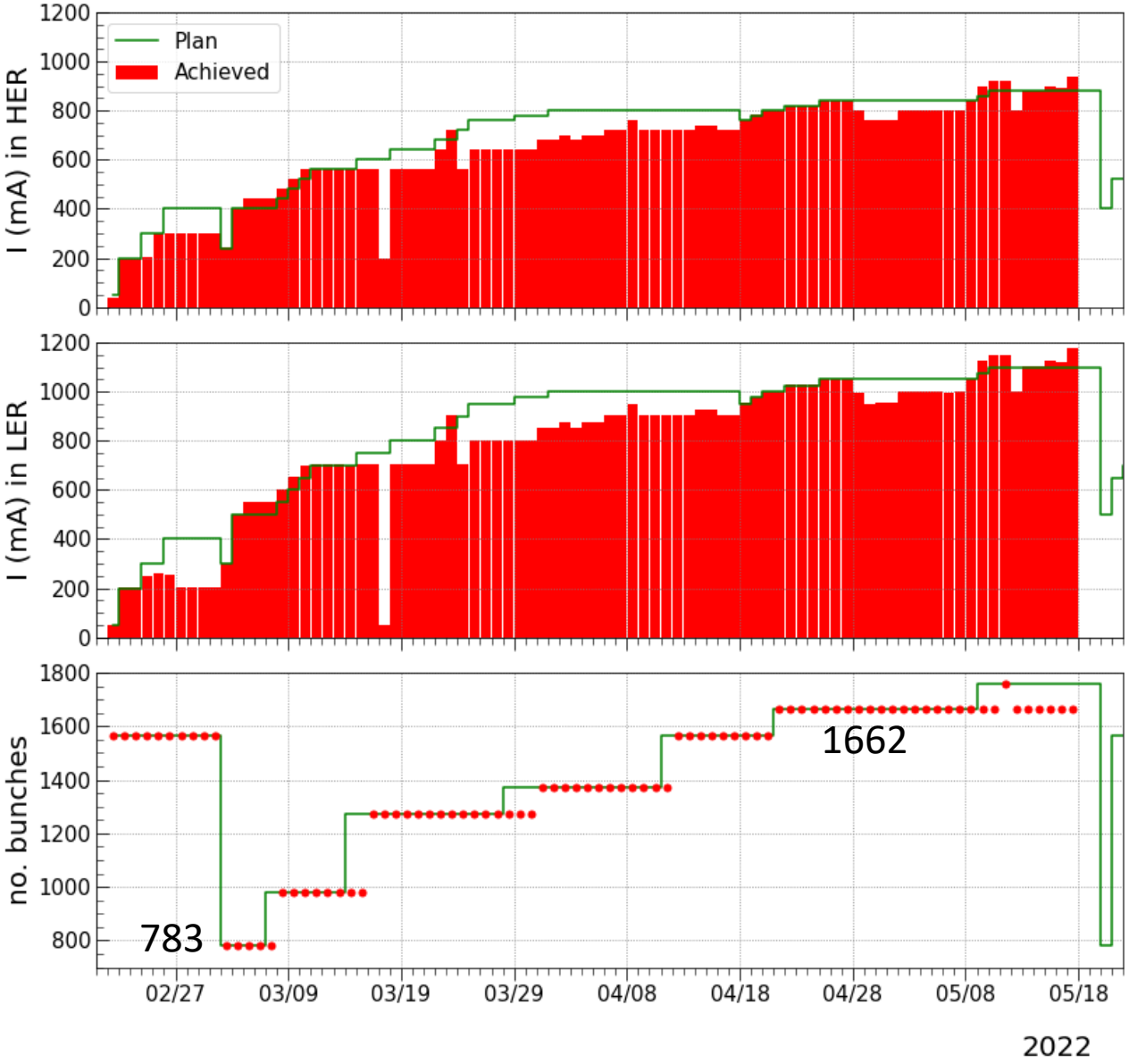


Latest operation status

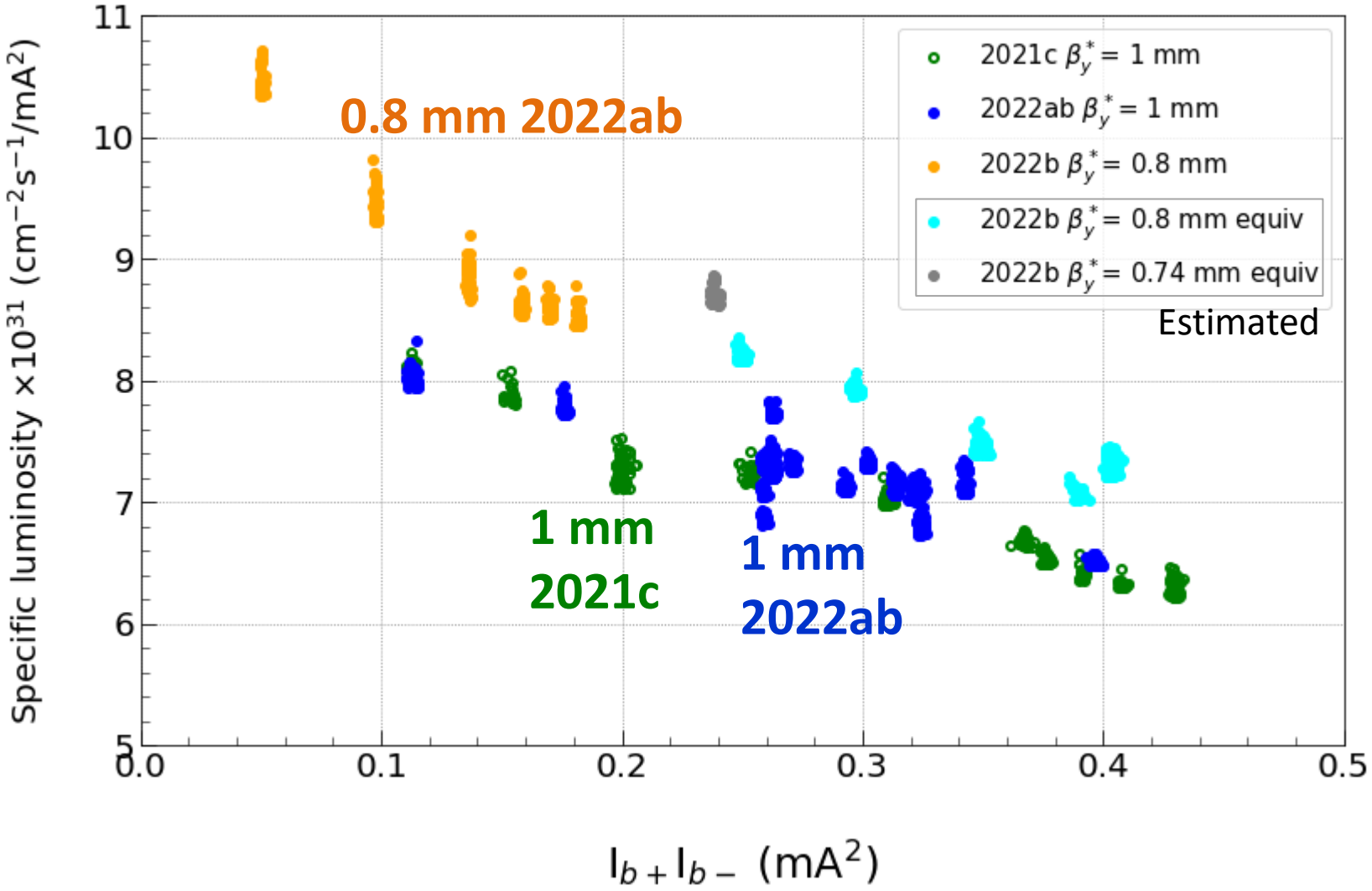
4.224×10^{34} $cm^{-2}s^{-1}$ Twice of the KEKB record!!!



Beam currents and number of bunches



Specific Luminosity vs bunch currents product



Improved stability

■ Continuous excitation of HER injection septum

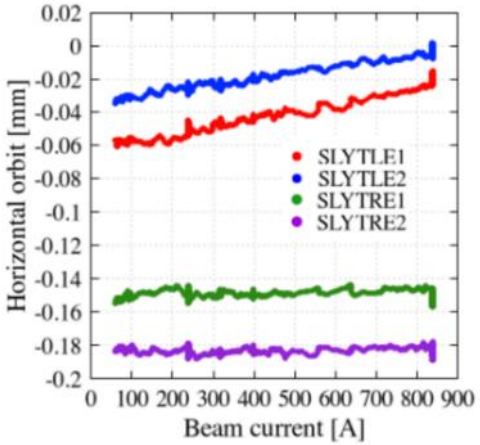
- Continuously excite with 25Hz rep.

■ Injection synchronized beam abort

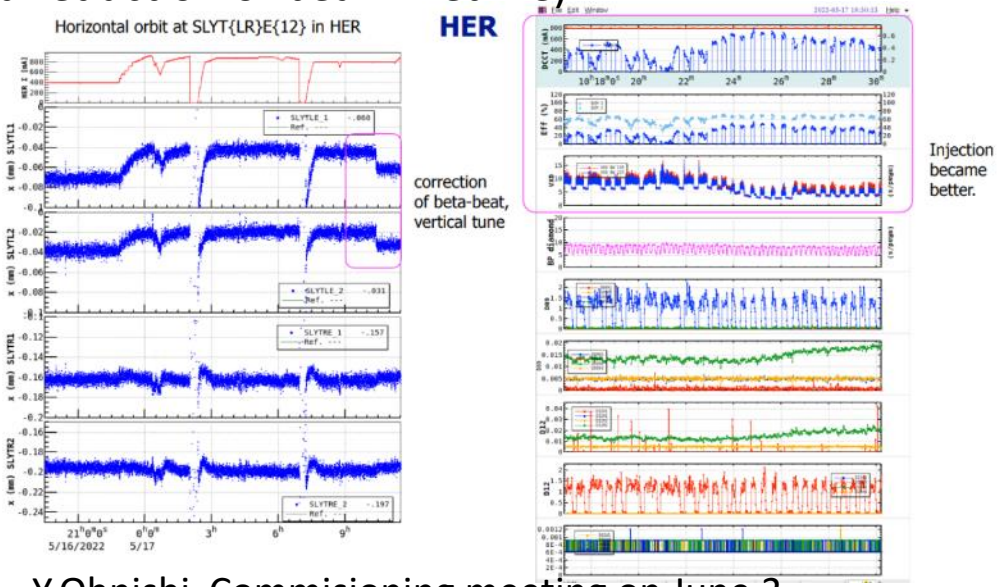
- Irregular beam injection after closing beam gate without kicker excitation.
- Introducing additional kicker excitation after closing the beam gate.

■ Correction of horizontal beam orbit around local chromaticity correction(LCC) section.

- Horizontal orbit changes at sextupole magnets of LCC could introduce additional focusing (defocusing) at IP, which usually cause additional beta-beating and resulting reduction of injection efficiency (and reduction of beam lifetime).



H. Sugimoto,
Commissioning meeting on May 20, 2022



Y.Ohnishi Commisioning meeting on June 3

Challenges

Injector

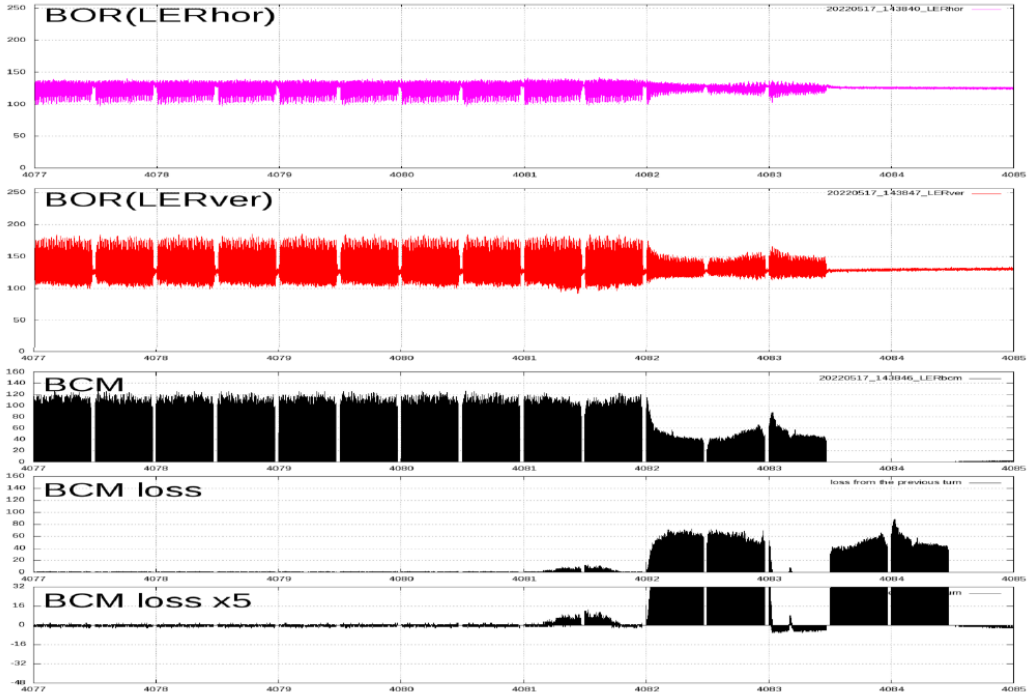
- Stability (orbit, energy, beam size, energy spread, etc.)
- Frequent re-tuning is needed up to now.
- Seems to be affected by the outside temperature.
- Photo RF gun (Laser, intensity, repetition)

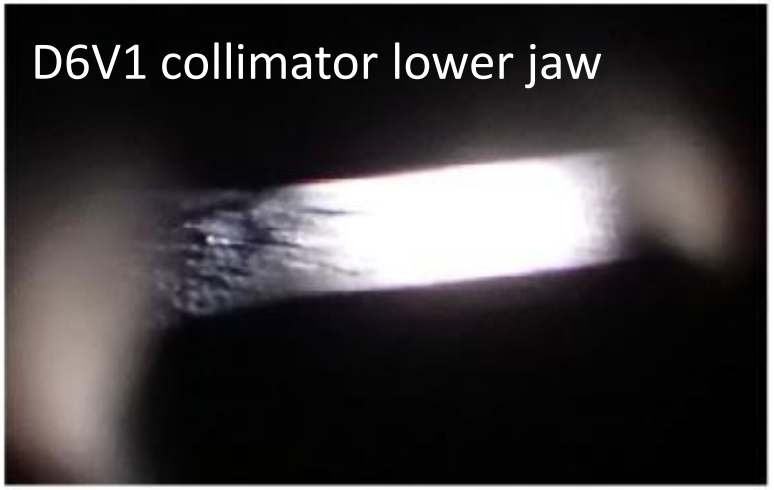
Ring

- Very rapid beam loss of LER had damaged the D6V1 collimator.
- Increases beam background.
- Higher environmental temperature (around end of May) caused many failures on the power supplies due to extremely high room temperature of the power supply buildings (>40 degC).

D6V1 collimator

D6V1 collimator was damaged in a major beam loss event on May 17th.





Remaining program for June

■ We will try to increase peak luminosity until the end of this run.

■ Also need to make many machine studies before LS1.

・ Investigating the damaged collimators
  Impedance measurement, etc.

・ Horizontal beam orbit shift around LCC section needs further investigation
  What is the source? Effect to the optics. How to correction.

・ Optimization of the vertical orbit in QCS of LER for the BG reduction and related correction of HER

・ Collimator study

etc.

Accelerator side works during LS1

■ Non-linear collimator at OHO straight section.

• Remove ~1/3 damping wigglers and install a pair of skew sextupoles, quadrupole magnet(s) and a vertical collimator.

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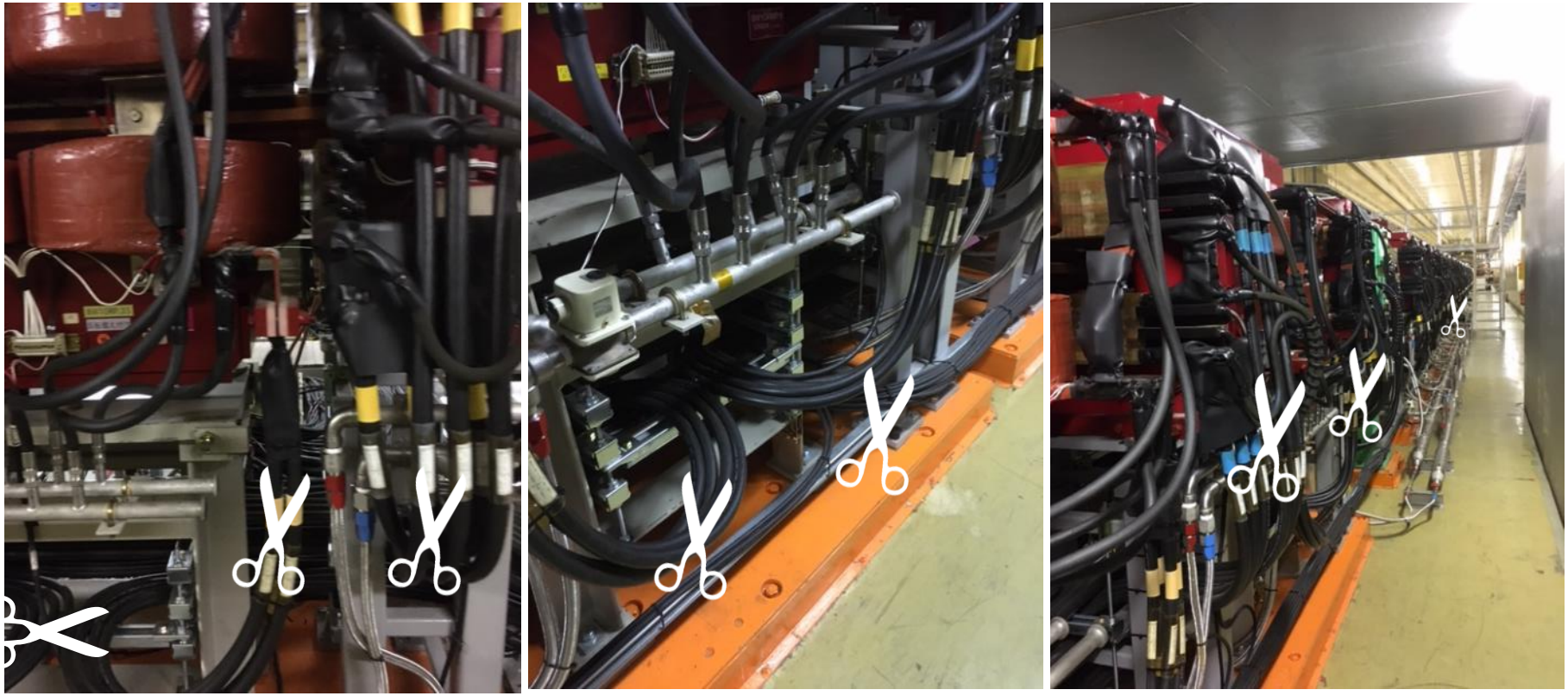
We will chop up the power cables and remove them this summer/fall



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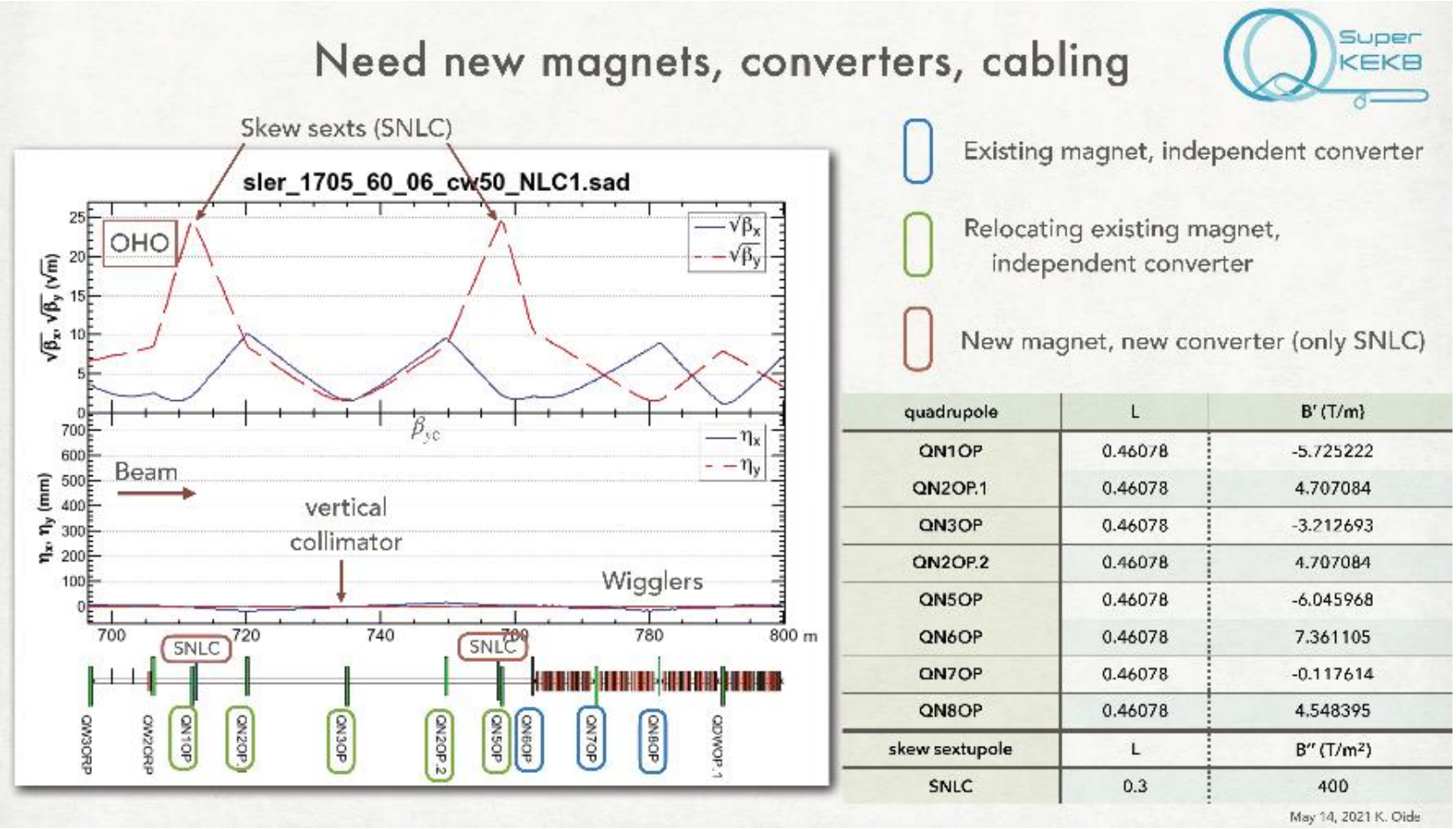


quadrupole	L	B' (T/m)
QN1OP	0.46078	-5.725222
QN2OP.1	0.46078	4.707084
QN3OP	0.46078	-3.212693
QN2OP.2	0.46078	4.707084
QN5OP	0.46078	-6.045968
QN6OP	0.46078	7.361105
QN7OP	0.46078	-0.117614
QN8OP	0.46078	4.548395
skew sextupole	L	B'' (T/m²)
SNLC	0.3	400

May 14, 2021 K. Oide

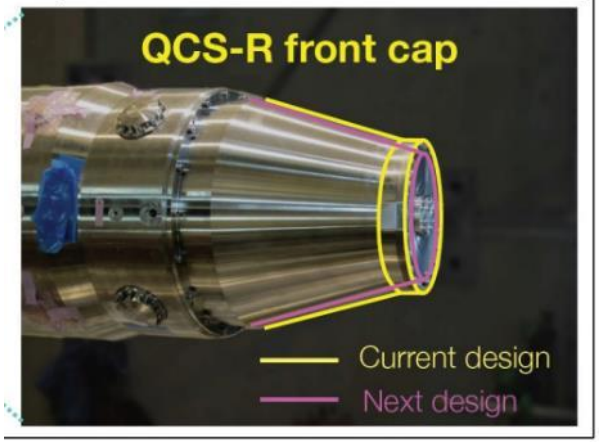
Accelerator side works during LS1

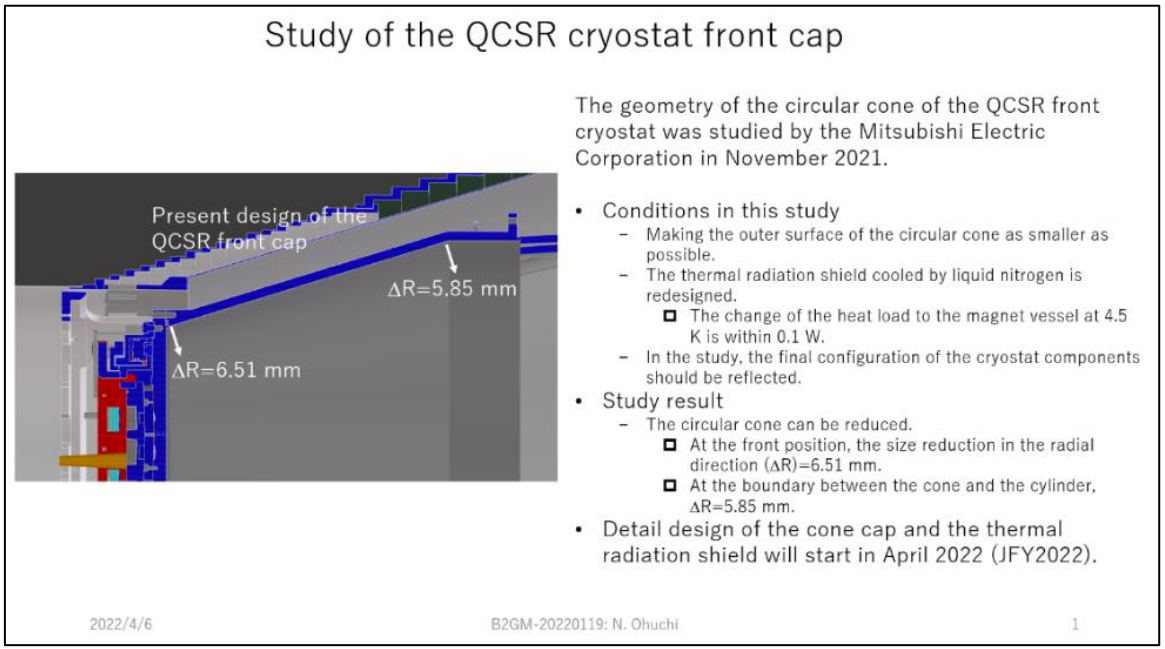
■ Exchange of QCS front cap and plate

- Exchange a smaller QCS-R front cap to widen the gap between the front cap and CDC.

  The gap is expected to increase up to 8 mm at the cap tip.
- Exchange the material of QCS-R front cap and QCS-L front plate from W to SUS.

Y. Arimoto
40th B2GM: PXD/SVD joint session





Accelerator side works during LS1

- Exchange of HER vacuum chamber around injection point, including injection BPM for much wider horizonal aperture.
- Repair of the damaged collimator heads (D6V1, D2V1, etc)
- Install a carbon-head collimator at D6H2 for robust beam stopper.
- QCS-R cryostat vacuum leak searching and repairing
- Add a radiational shield around QC1 bellows on Belle II side

Thank you for your attention！

The slides are based on Tobiyama-san's talk at Belle II EB for 1st June.