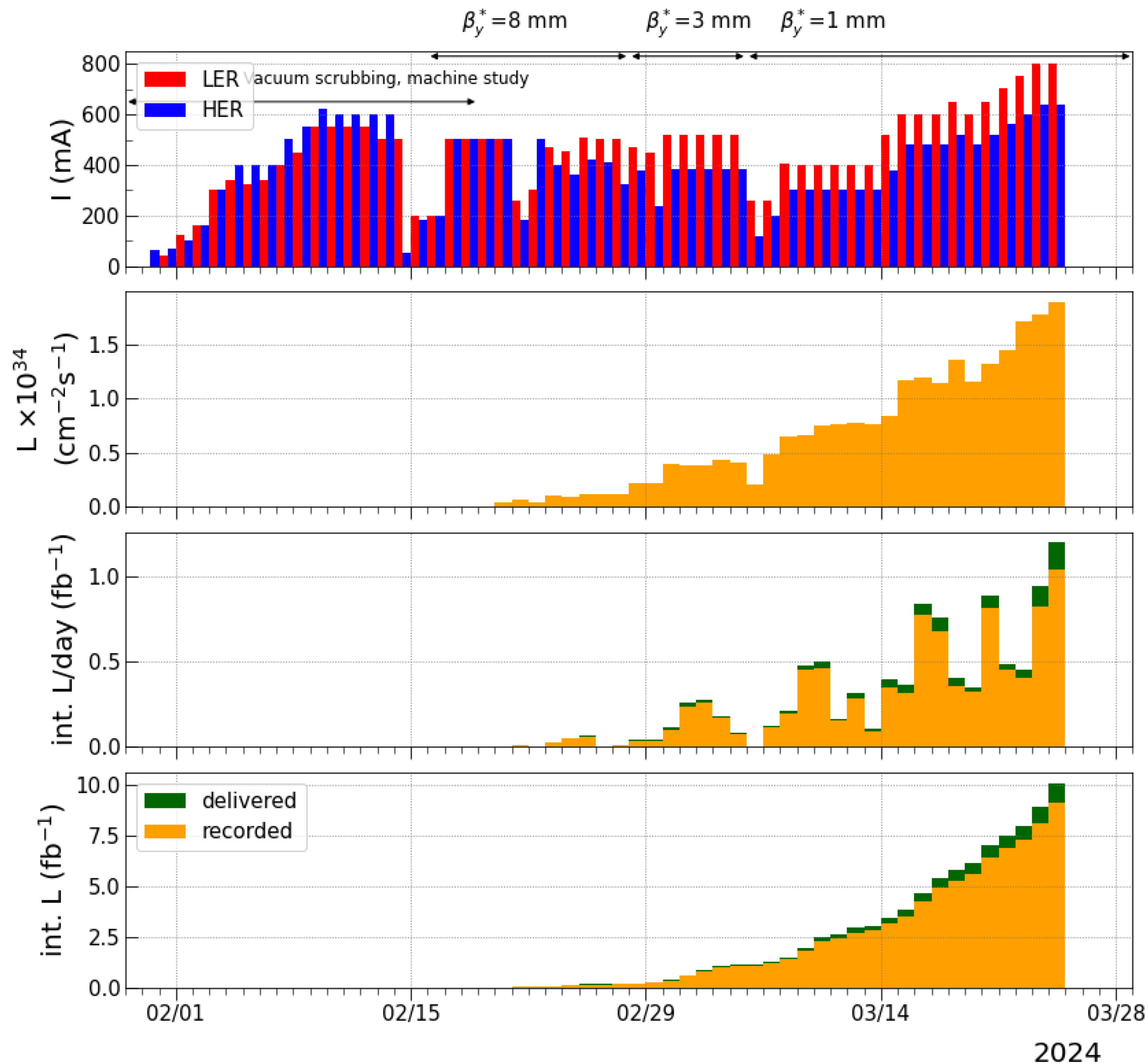


2024a Run

Y. Ohnishi



- Vacuum Scrubbing: January 29 - Feb. 20
- $\beta_y^* = 8 \text{ mm}$ Collision: Feb. 20 - Feb. 28
- $\beta_y^* = 3 \text{ mm}$ Collision: Feb. 28 - March 5
- $\beta_y^* = 1 \text{ mm}$ Collision: March 6 -
- Crab Waist OFF until March 18
- Crab Waist ON since March 18
- LER: 80 % and HER 40 %
- Increase Beam Currents with 2346 Bunches
- Machine Troubles
- LER Injection Kicker Accidental Fire
- Chiller and Cooling Water Pump Trouble (OHO)
- LER RF D07B Klystron End Of Life
- Magnet PS Trouble (SD3ORE and QFROE_4)

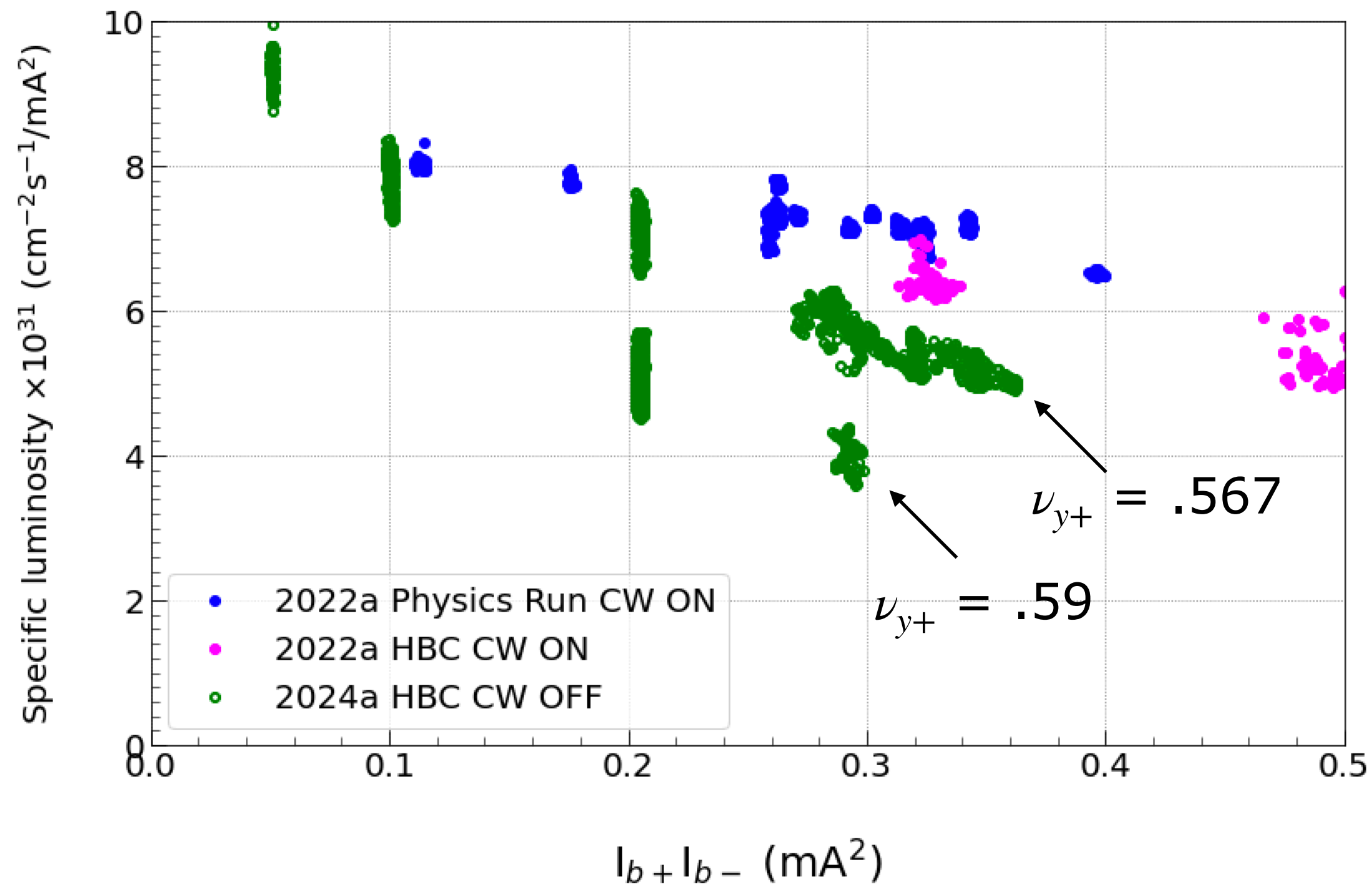
- Physics Run
 - $\beta_y^* = 1 \text{ mm}$
 - CW: 80 % (LER) and 40 % (HER)
 - LER: 800 mA and HER: 640 mA with 2346 Bunches
 - $L = 1.9 \times 10^{34} \text{ cm}^{-2}\text{s}^{-1}$
 - Luminosity Performance Is Back to the Performance of 2022ab Run.
- Single Beam Vertical Emittance
 - $\varepsilon_y = 10 \text{ pm} - 20 \text{ pm} \leftrightarrow 25 \text{ pm} - 35 \text{ pm}$ in 2022b Run
 - Key Point: Beam Orbit at IP and at Strong Sextupoles with BBA
- Injection Efficiency
 - LER: 100 % and HER: 20 % from Scratch
 - HER is Still Poor Efficiency.

- LER Nonlinear Collimator (D05V1)
- HER Injection Region
- New IP Beam Pipe and Tungsten Shielding at the IP Bellows
- Replacement of Damaged Collimator Head, Carbon(Low-Z) Head, and Adoption of Cu Coating
- QCS Cryostat Modification and Vacuum Leakage Repair (R-Side)
- Various Monitors to Detect Sudden Beam Loss in LER and Fast Beam Abort System
- Injector Linac Upgrade

- LER Nonlinear Collimator (D05V1)
 - Reduce Stored Beam Background without Increasing Impedance. → Suppress -1 Mode Instability
- HER Injection Region
 - New Beam Pipe with Larger Aperture and New Septum with Better Field Quality
- New IP Beam Pipe and Tungsten Shielding at the IP Bellows
 - Mitigate SR Hitting on PXD and Reduce BG due to Beam Loss at QCS-IP Bellows
 - Flexibility of Beam Orbit at IR (No Horizontal Angle Required) → Allow Low Emittance Tuning
- Replacement of Damaged Collimator Head, Carbon(Low-Z) Head, and Adoption of Cu Coating
 - Reduce Impedance and Good BG Suppression → Suppress -1 Mode Instability
- QCS Cryostat Modification and Vacuum Leakage Repair (R-Side)
 - Reduce BG
- Injector Linac Upgrade
 - Stable Injection and Good Quality of Injected Beam

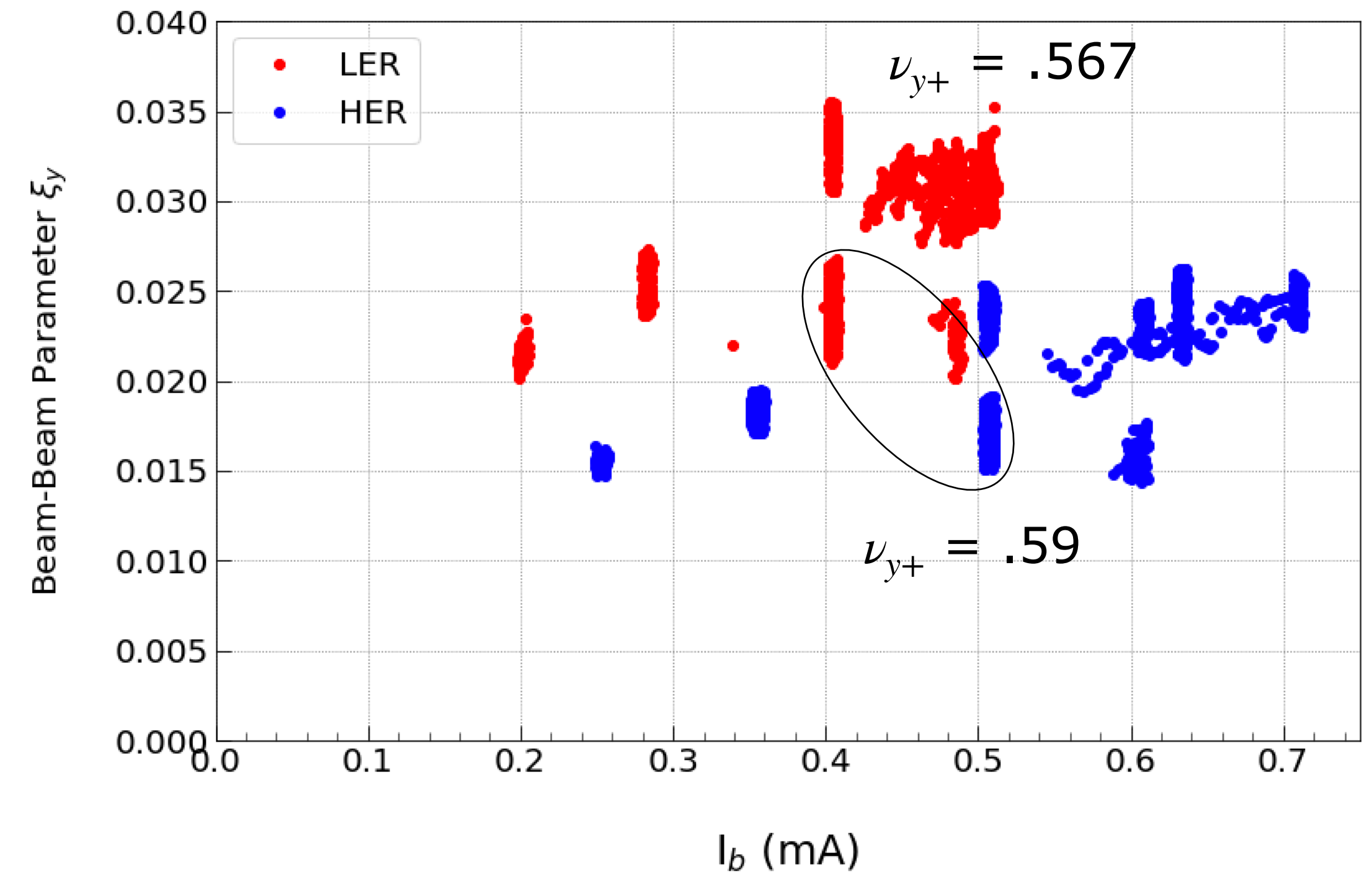


$\beta_y^* = 1$ mm: Crab Waist OFF and ON



$\beta_y^* = 1$ mm: Crab Waist OFF

March 12, 2024: CW 0 %



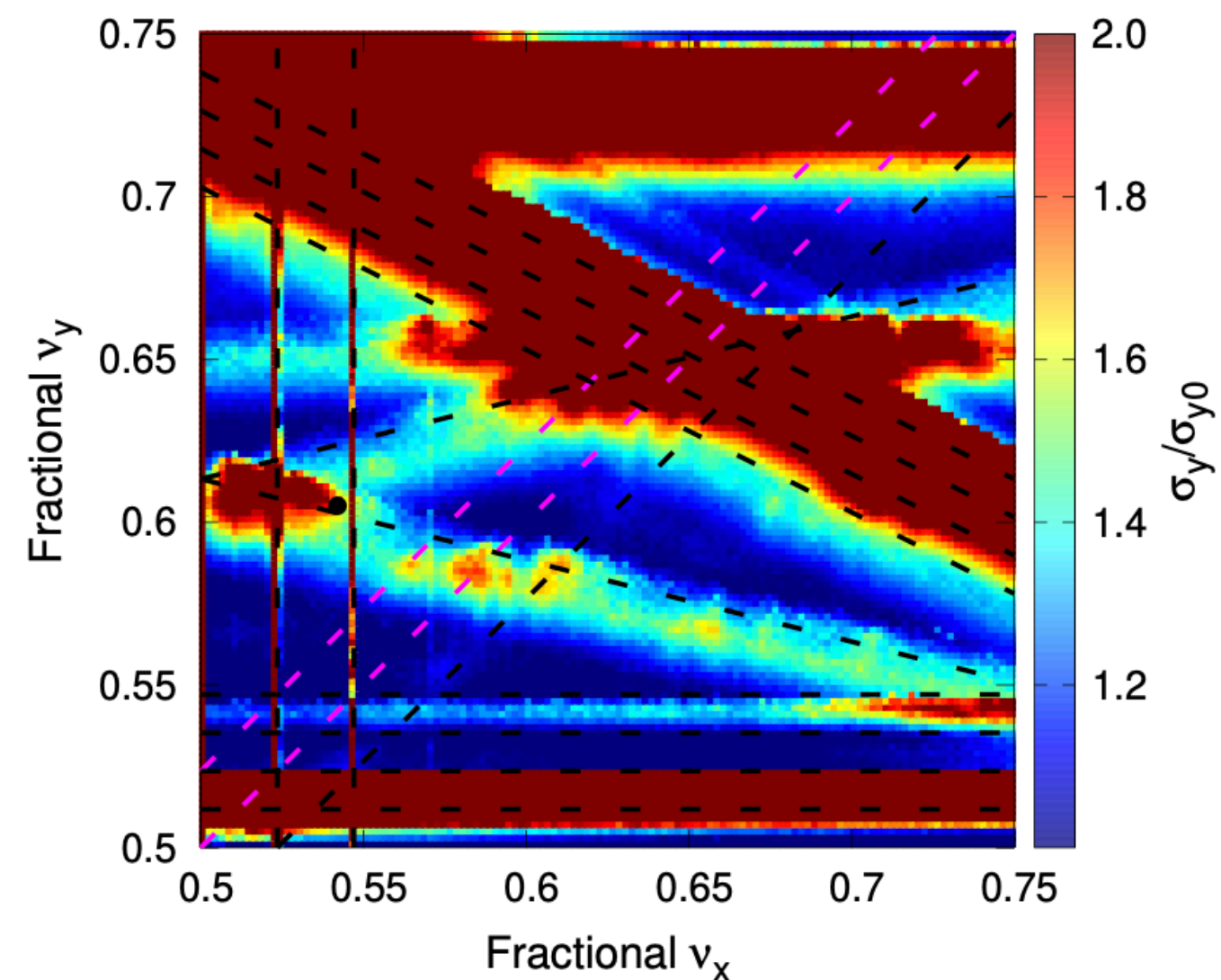
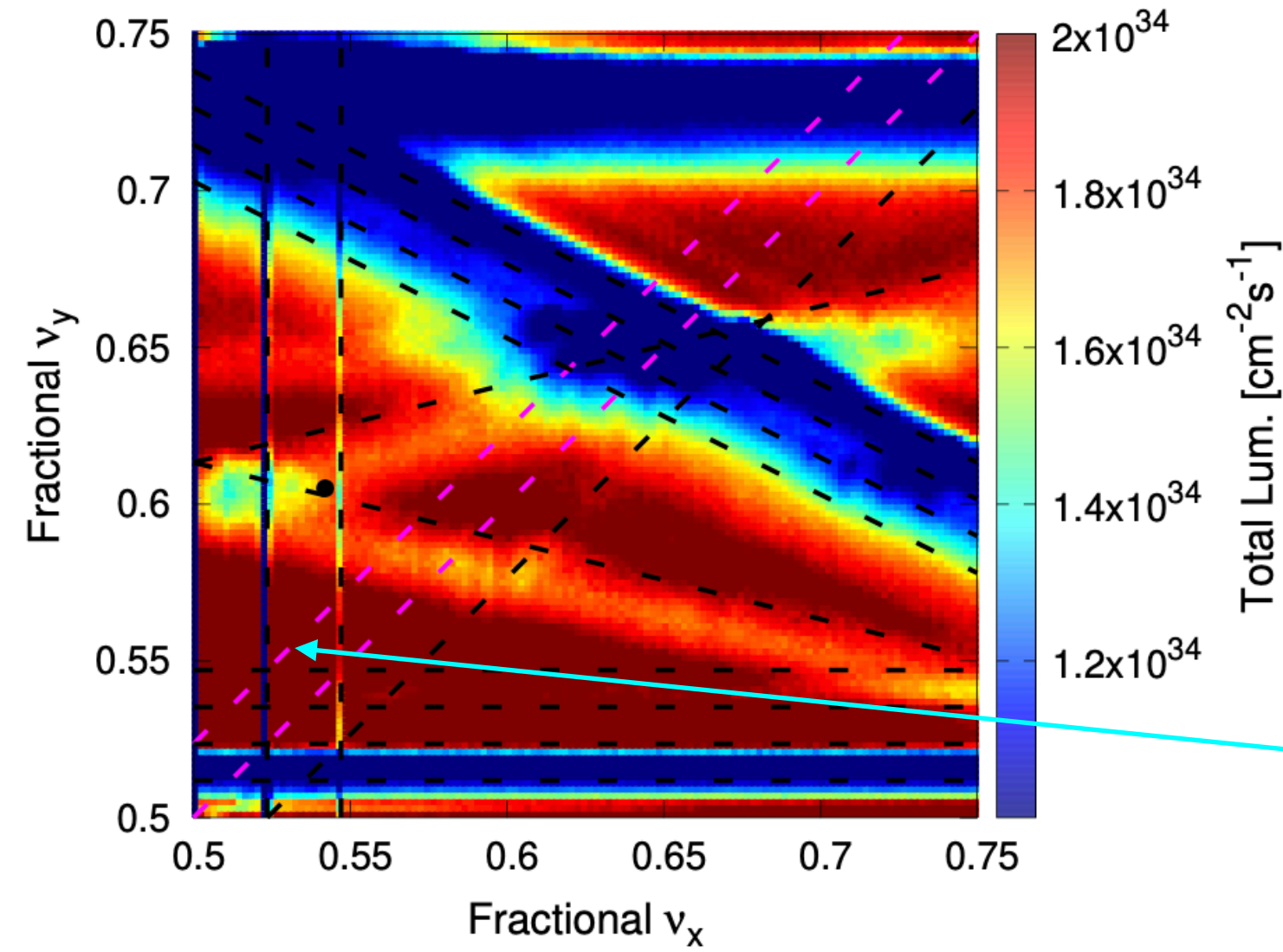
LER Beam Is Blowup Easily. LER Is Weaker than HER.
LER Vertical Tune Helps to Suppress LER Blowup.

Beam-Beam Parameter (Crab Waist OFF): $\xi_{y-} \sim 0.026$

Physics Run 2022 (Crab Waist ON): $\xi_y = 0.028$

2024a HBC data is consistent with 2019 data.

D. Zhou et al., Phys. Rev. Accel. Beams 26, 071001 (2023)



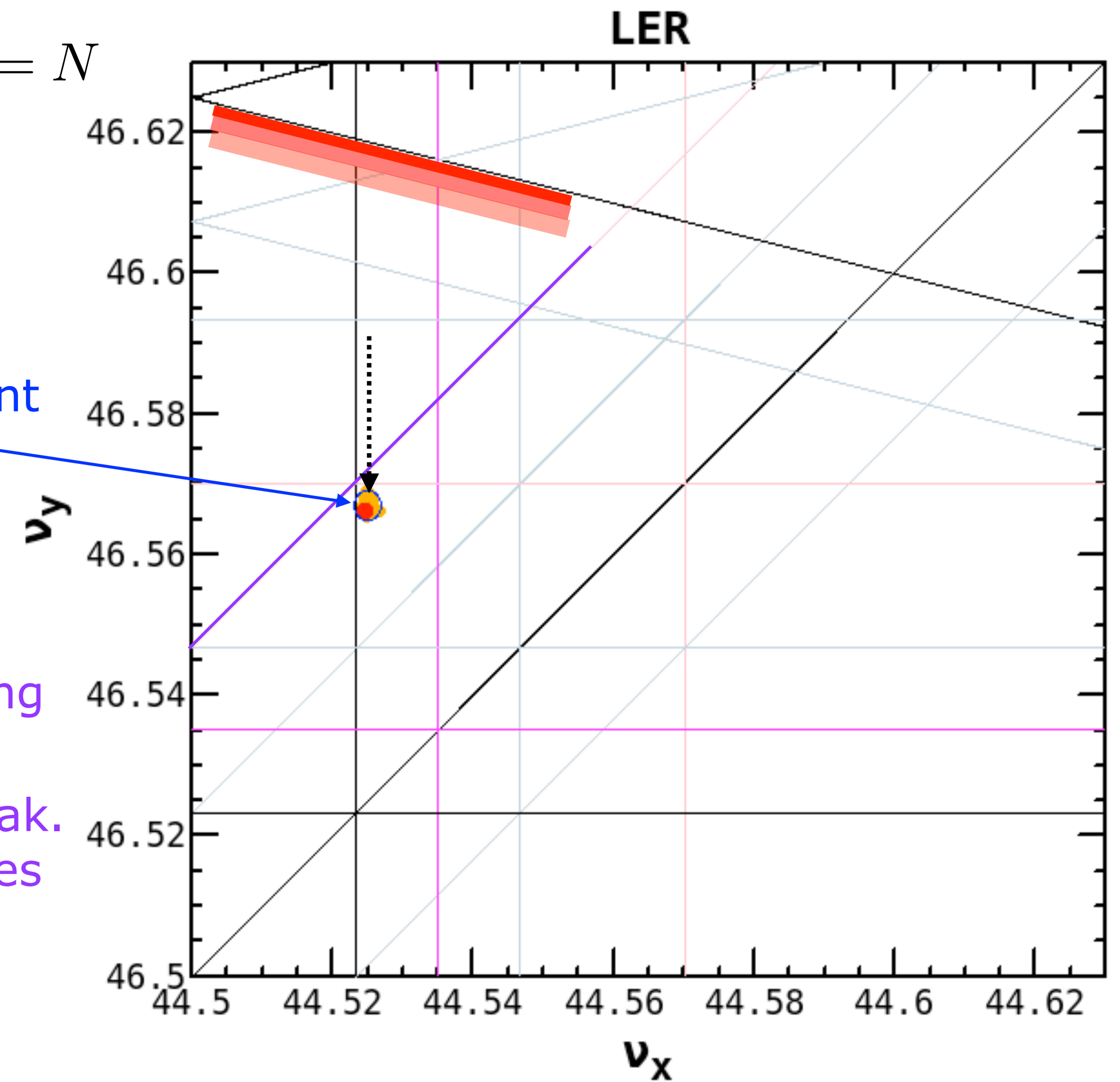
$$\nu_x + 4(\nu_y + \xi_y) = N$$

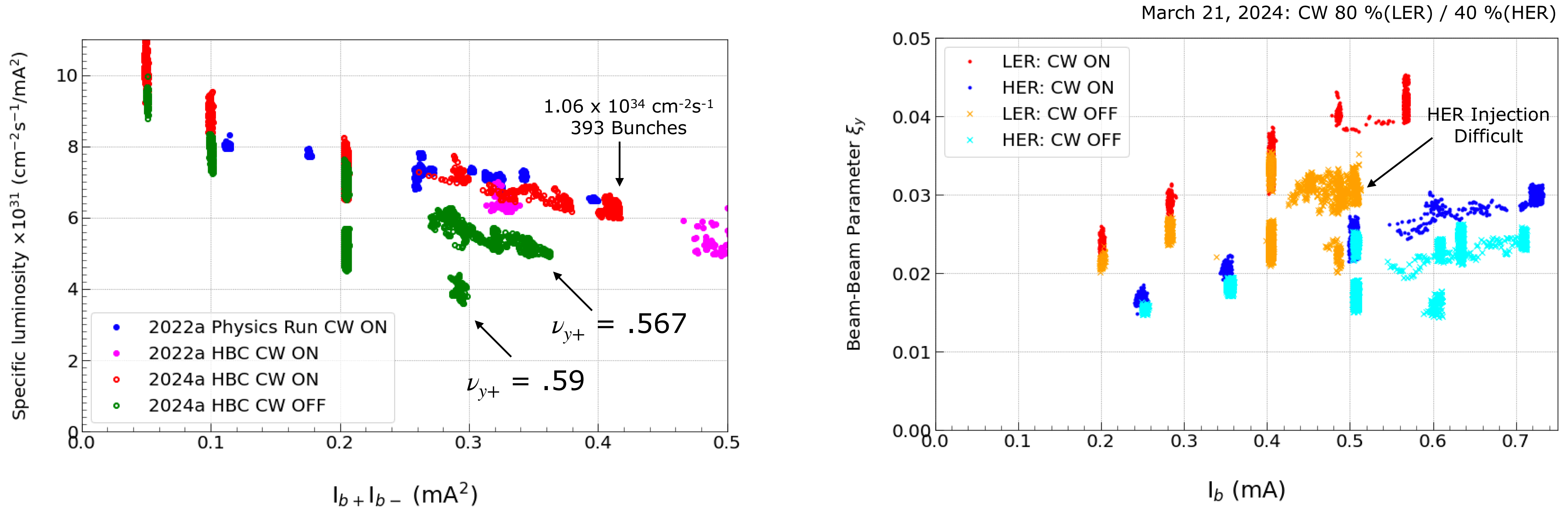
Beam-Beam Resonance

Better Working Point at Higher Bunch Current Collision

Chromatic X-Y Coupling Resonance

This Resonance is Weak. \rightarrow Rotating Sextupoles "Fine Tuning"





Crab Waist Improves Specific Luminosity at Higher Bunch Current Product.

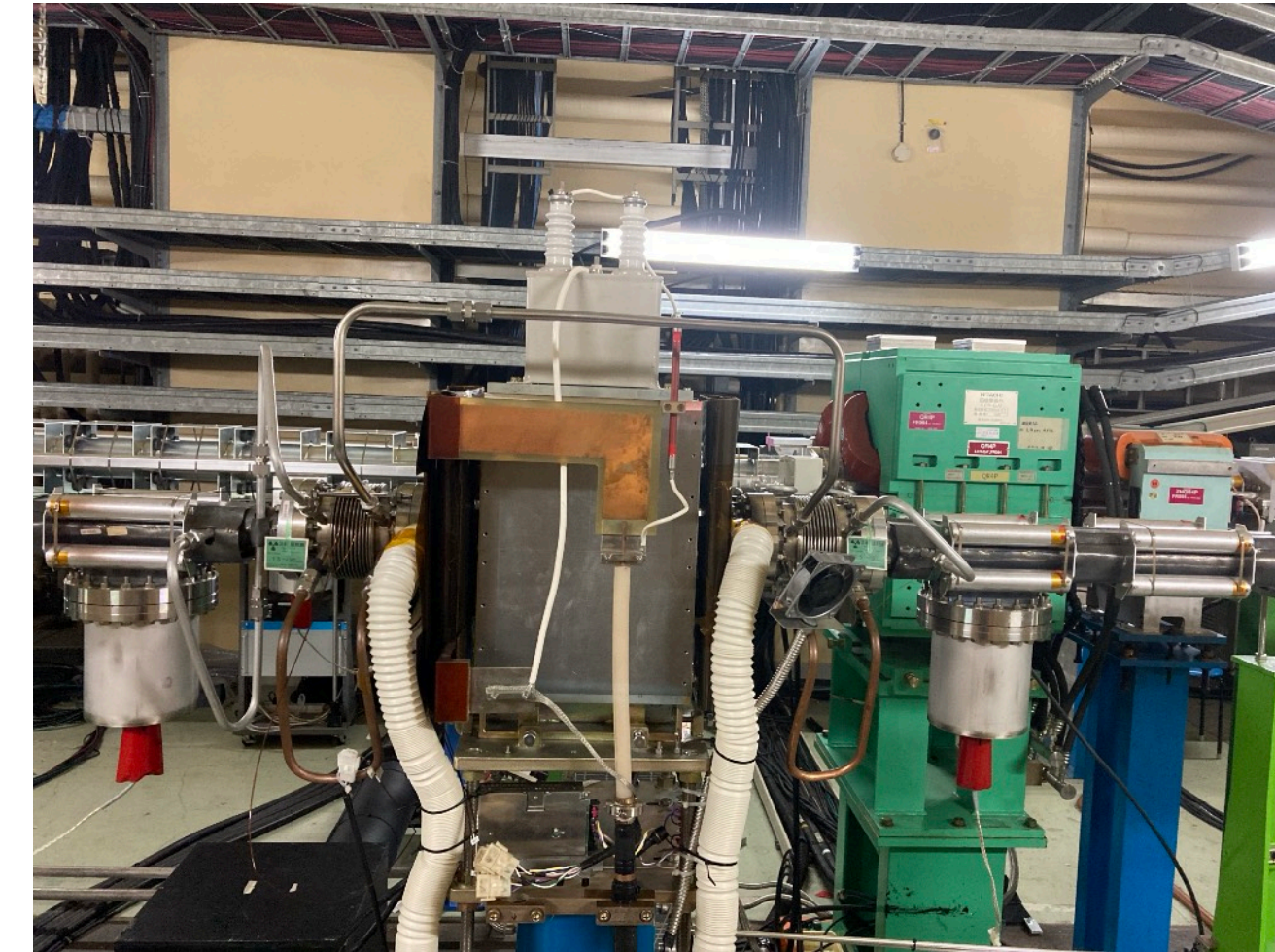
Vertical Tune Dependence of "CW ON" Is Weaker than "CW OFF".

Beam-Beam Parameter (CW ON): $\xi_{y-} = 0.031$ at $I_{b+} = 0.72$ mA \leftrightarrow 0.026 (CW OFF)

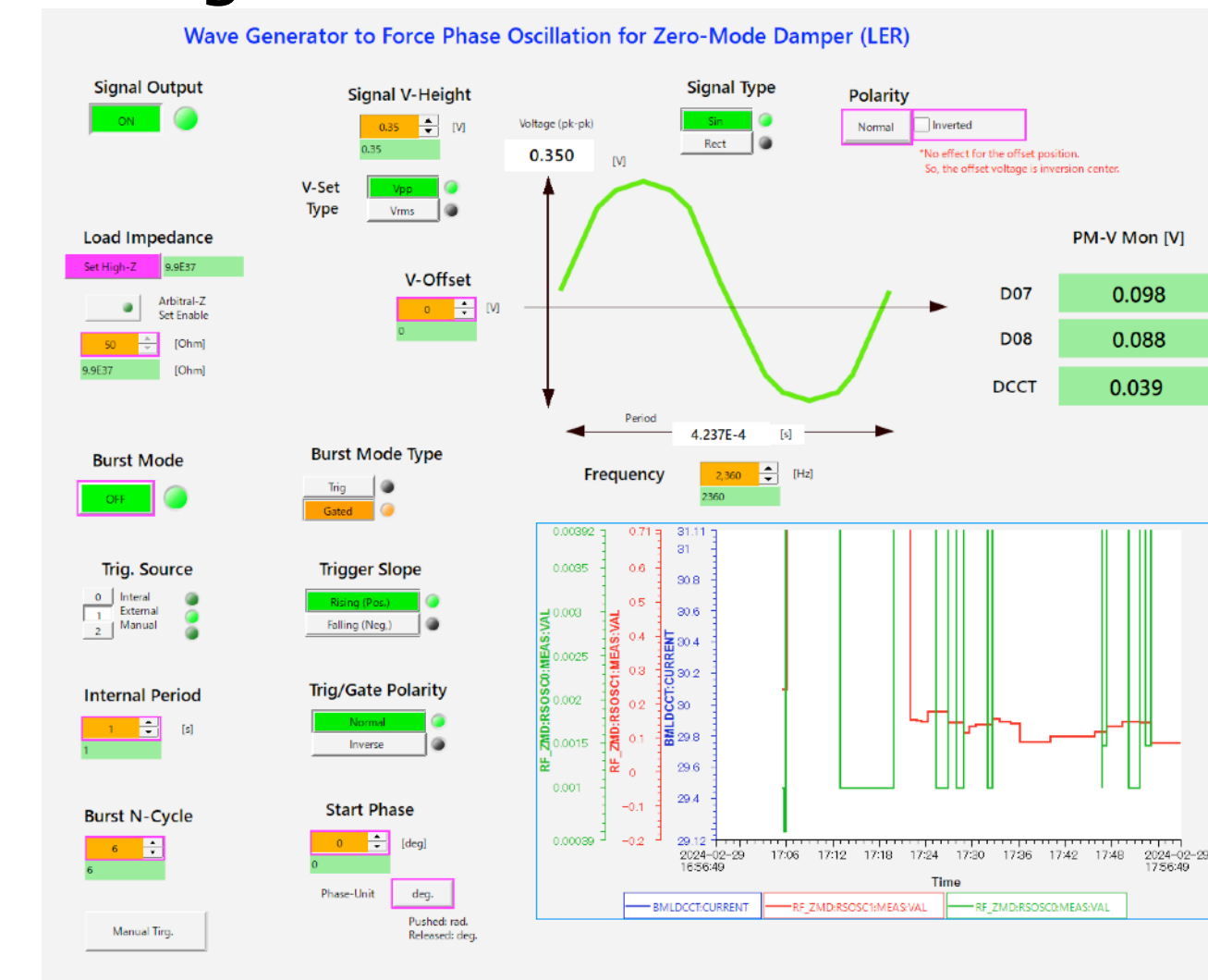
2024a Data (CW ON) Is Consistent with 2022a Data (CW ON).

- New Tools:
- Horizontal Aperture Measurement
- Injection Kickers (Balance of Two Kickers)
- Vertical Aperture Measurement
 - Vertical Kicker
 - HER Only
- Momentum Acceptance Measurement
 - RF Longitudinal Kicker
 - LER or HER

Vertical Kicker in HER K. Kodama, T. Naito, H. Kaji, et al.



RF Longitudinal Kicker K. Kobayashi, S. Ogasawara, et al.

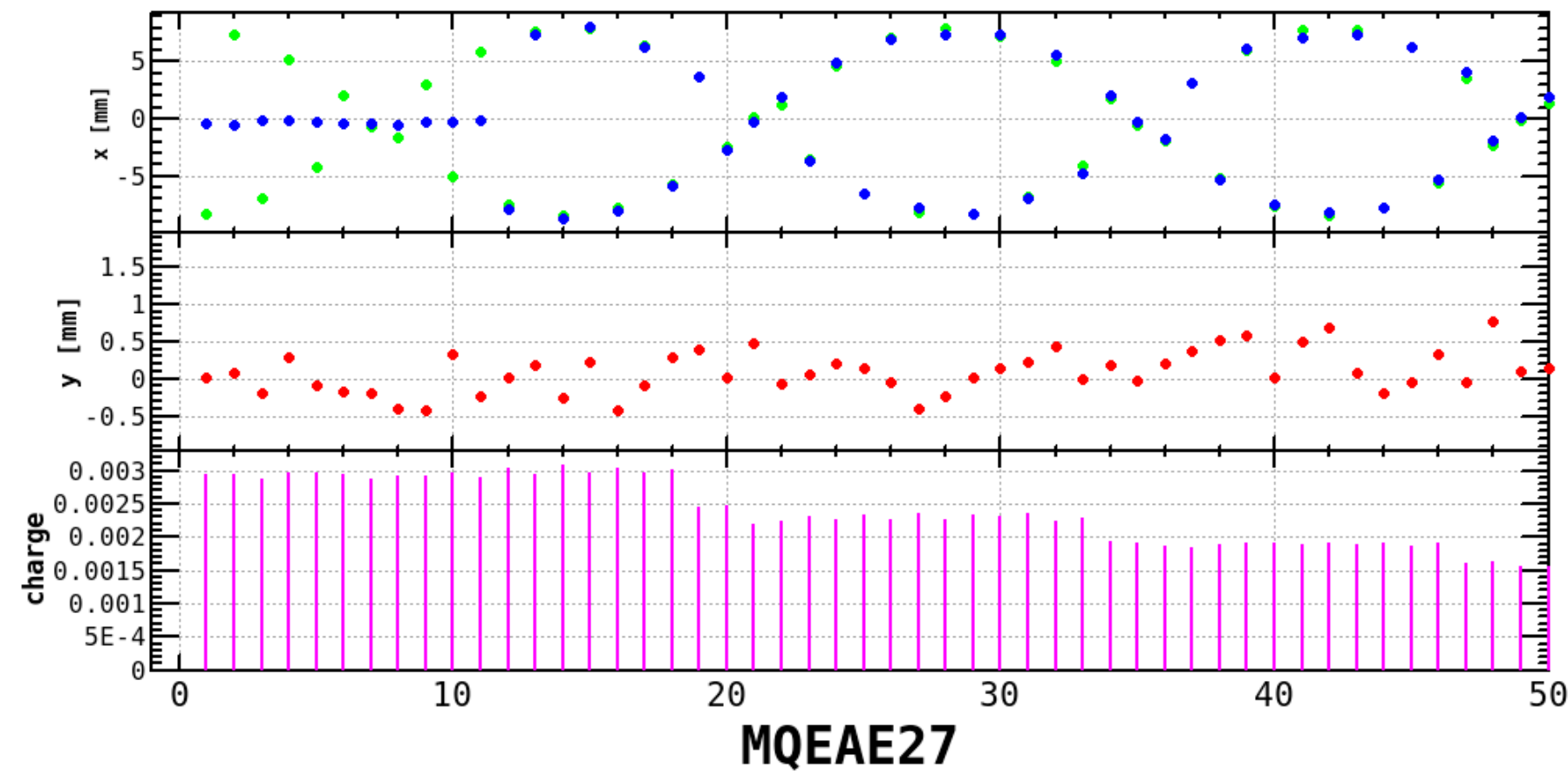


Fit Horizontal/Vertical Oscillation

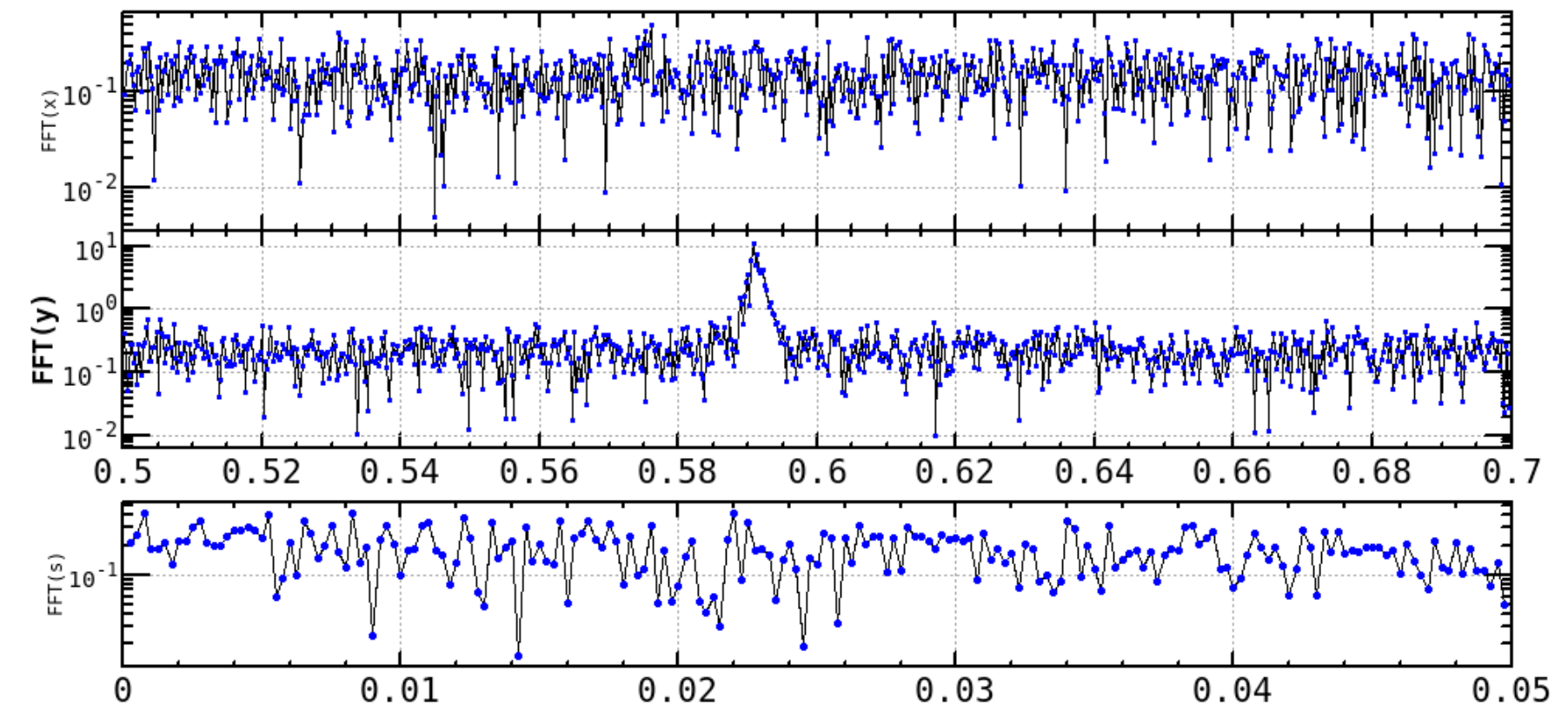
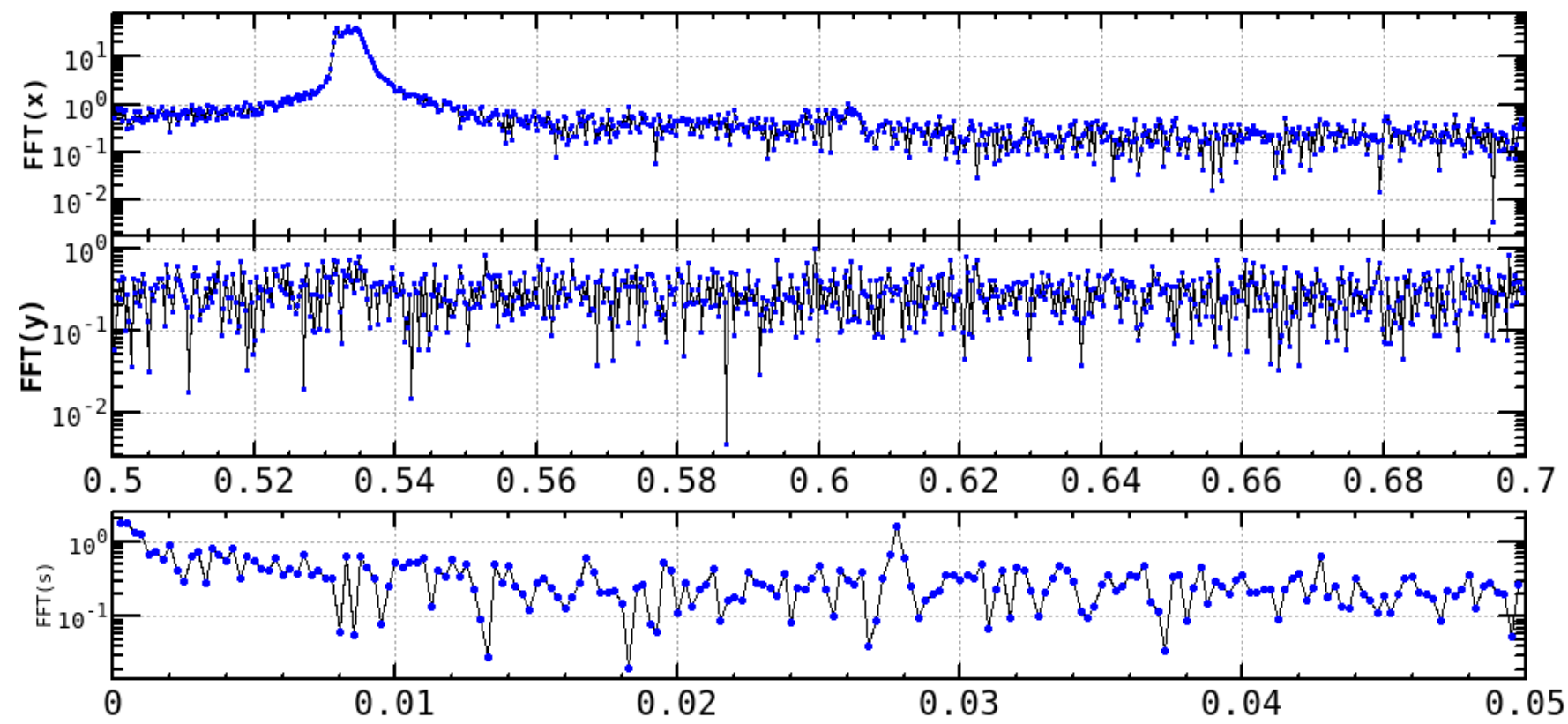
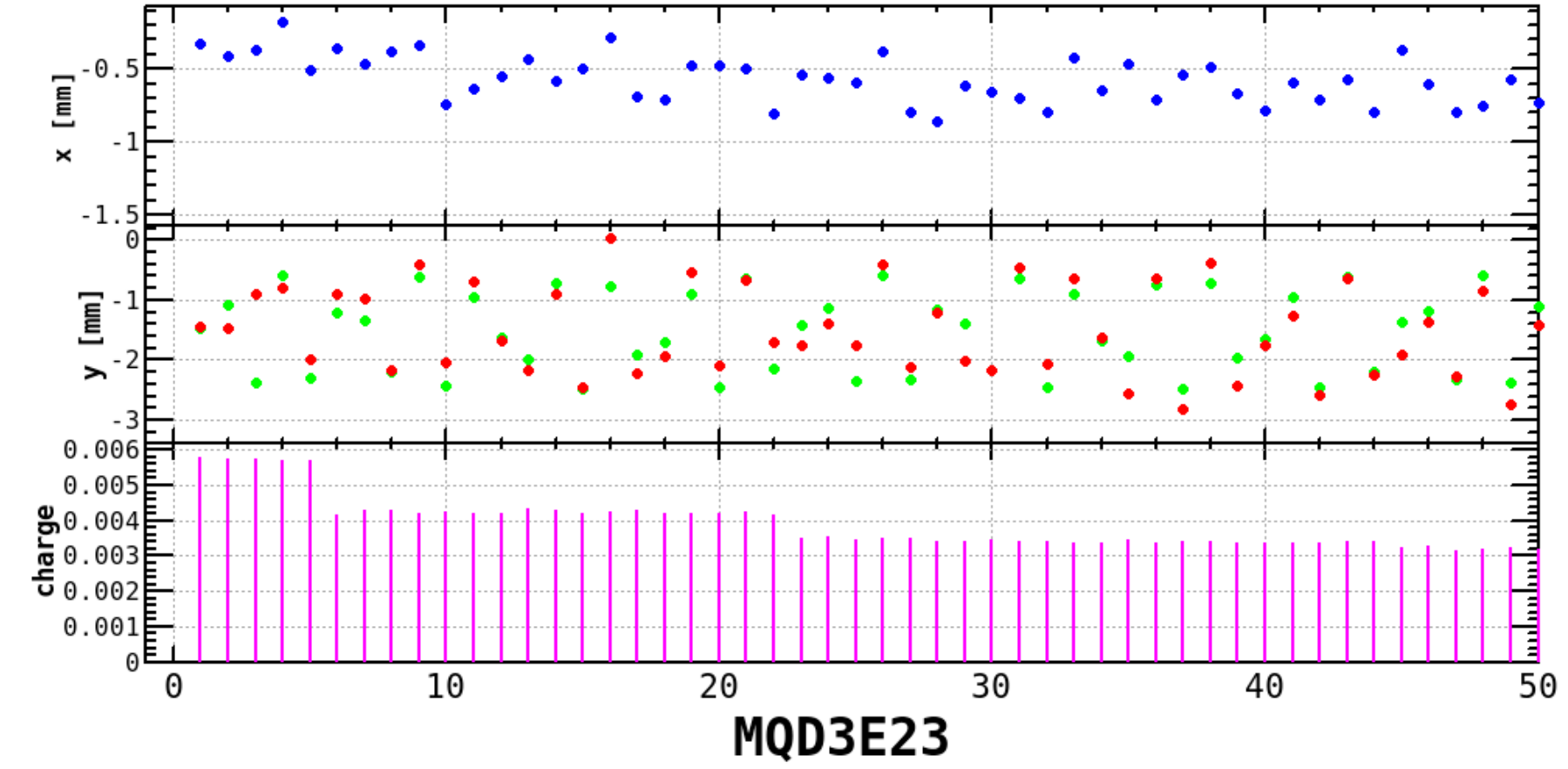
$$x(n) = \sqrt{2J_x\beta_x} \cos(2\pi\nu_x n + \phi_0)$$

β_x : Model

Horizontal

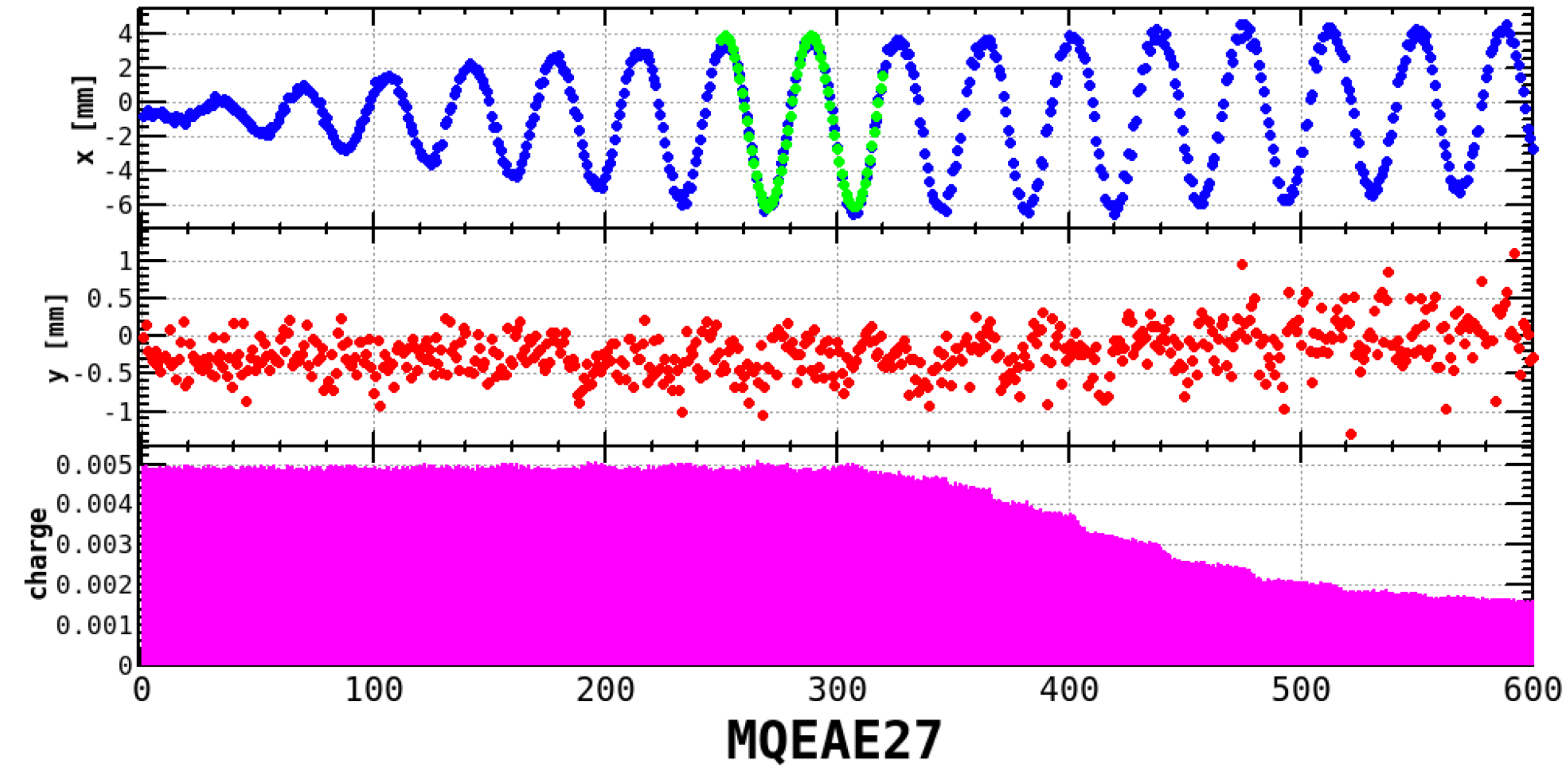


Vertical



HER RF Kick

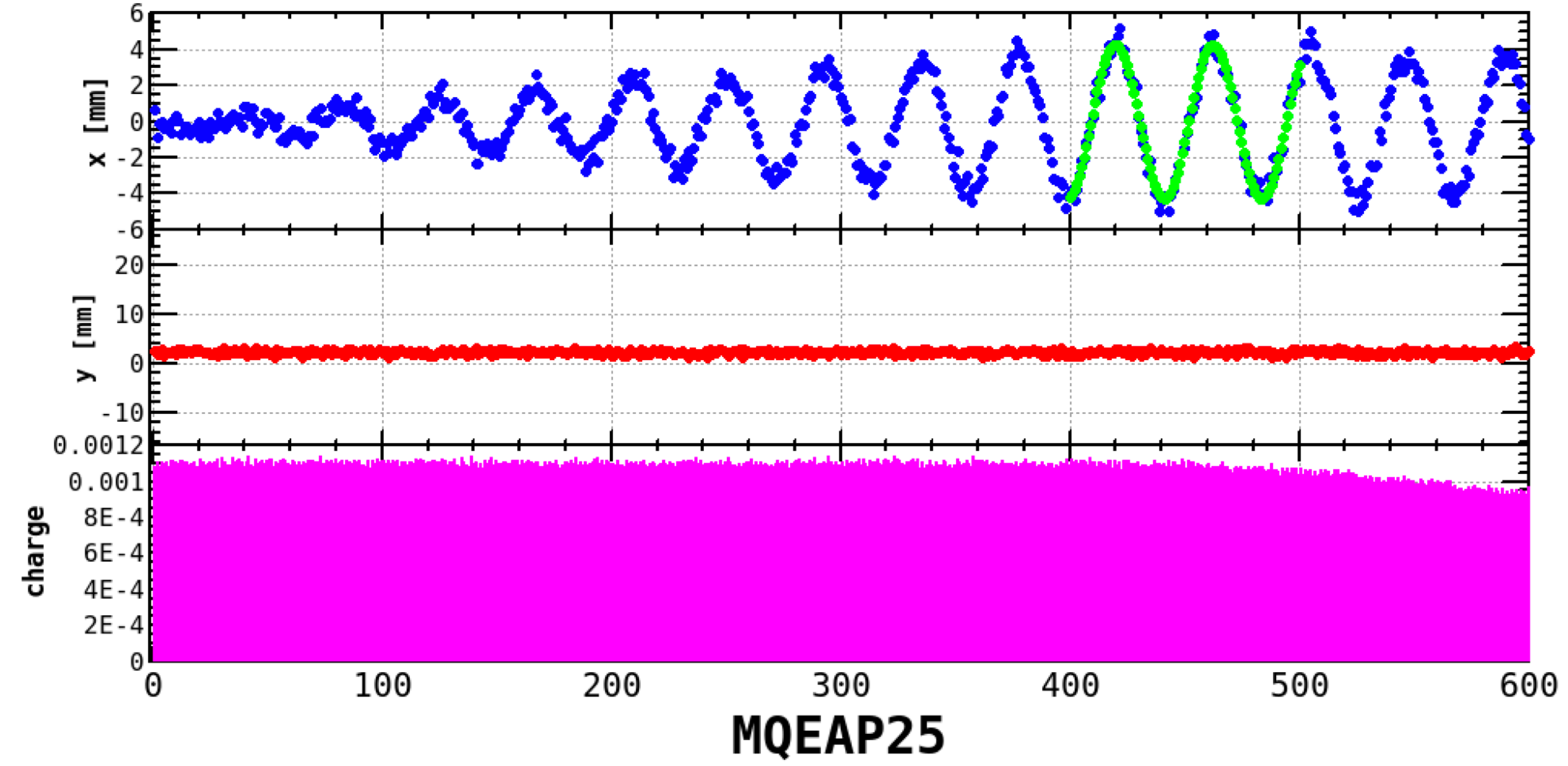
$$\beta_y^* = 8 \text{ mm}$$



$$\Delta p/p_0 = 0.69 \%$$

LER RF Kick

$$\beta_y^* = 1 \text{ mm}$$



$$\Delta p/p_0 = 0.61 \%$$

LER Aperture

β_y^*	8 mm	3 mm	1 mm: CW OFF	1 mm: CW 80 %
	Feb. 19, 2024	March 4, 2024	March 6, 2024	March 18, 2024
$2J_x$ (m)	2.5×10^{-6} $25 \sigma_x$ 9.49×10^{-7} $15 \sigma_x$	2.24×10^{-6} $23.6 \sigma_x$ 4.88×10^{-6} $35 \sigma_x$	1.13×10^{-6} $16.8 \sigma_x$ 3.37×10^{-6} $29 \sigma_x$	8.99×10^{-7} $15.0 \sigma_x$ 3.37×10^{-6} $29 \sigma_x$
$\gamma 2J_y$ (μm)	-	-	-	-
	Feb. 27, 2024	Feb. 29, 2024	March 6, 2024	March 18, 2024
$\Delta p/p_0$ (%)	0.58 1.03	0.38 1.26	0.53 1.33	0.61 1.11

green: Tracking Simulation with Collimator Aperture

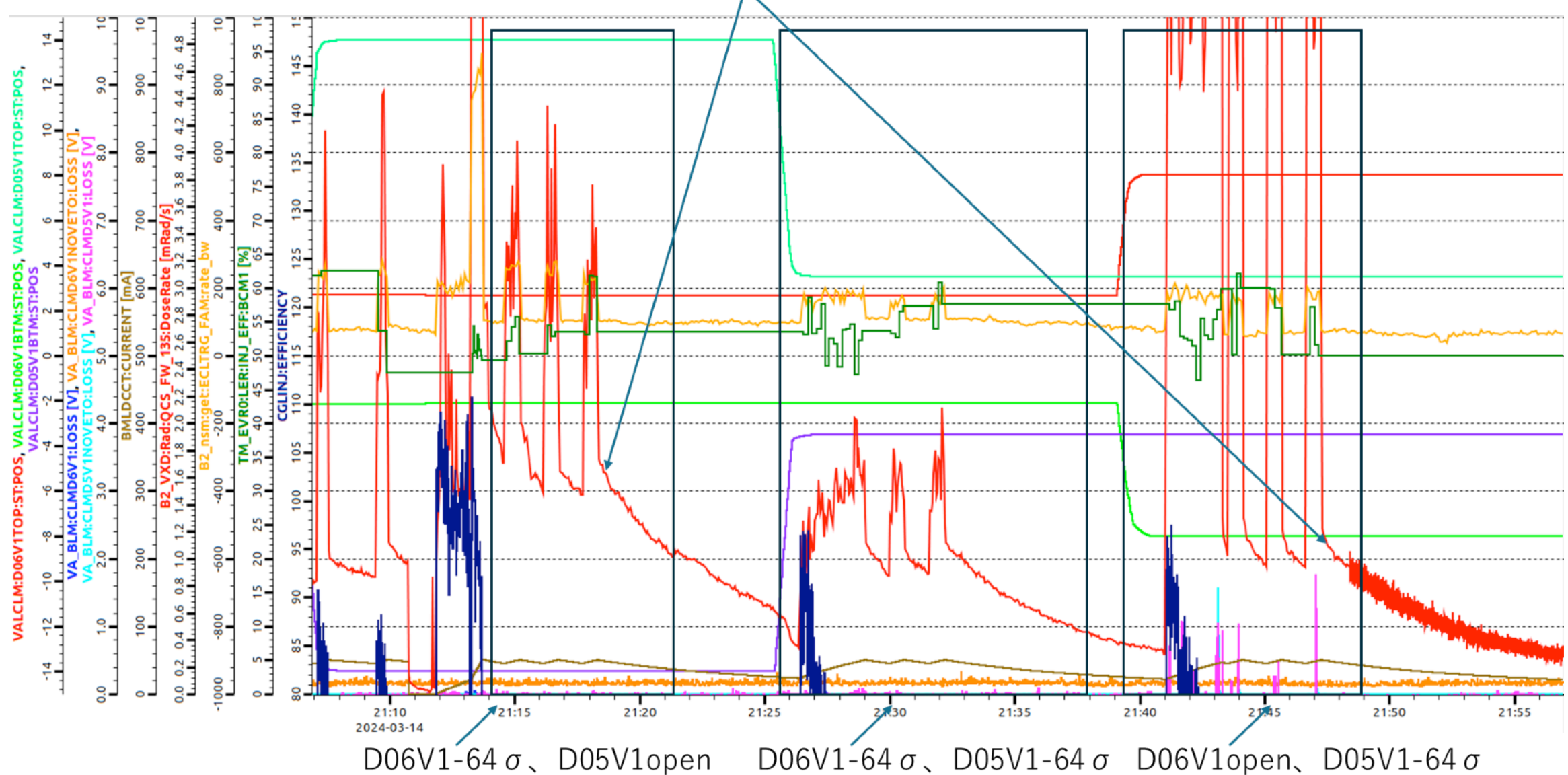
HER Aperture

β_y^*	8 mm	3 mm	1 mm: CW OFF	1 mm: CW 40 %
	Feb. 20, 2024	March 4, 2024	March 5, 2024	March 18, 2024
$2J_x$ (m)	3.89×10^{-6} $28.9 \sigma_x$ 2.92×10^{-6} $25 \sigma_x$	2.11×10^{-6} $21.8 \sigma_x$ 3.31×10^{-6} $27 \sigma_x$	1.34×10^{-6} $17.4 \sigma_x$ 2.77×10^{-6} $25 \sigma_x$	1.13×10^{-6} $16.0 \sigma_x$ 2.77×10^{-6} $25 \sigma_x$
	Feb. 26, 2024	Feb. 29, 2024	March 14, 2024	March 18, 2024
$\gamma 2J_y$ (μm)	1426 6413	1187 3982	649 973	712 973
	Feb. 20, 2024			
$\Delta p/p_0$ (%)	0.69 1.07	-	-	-

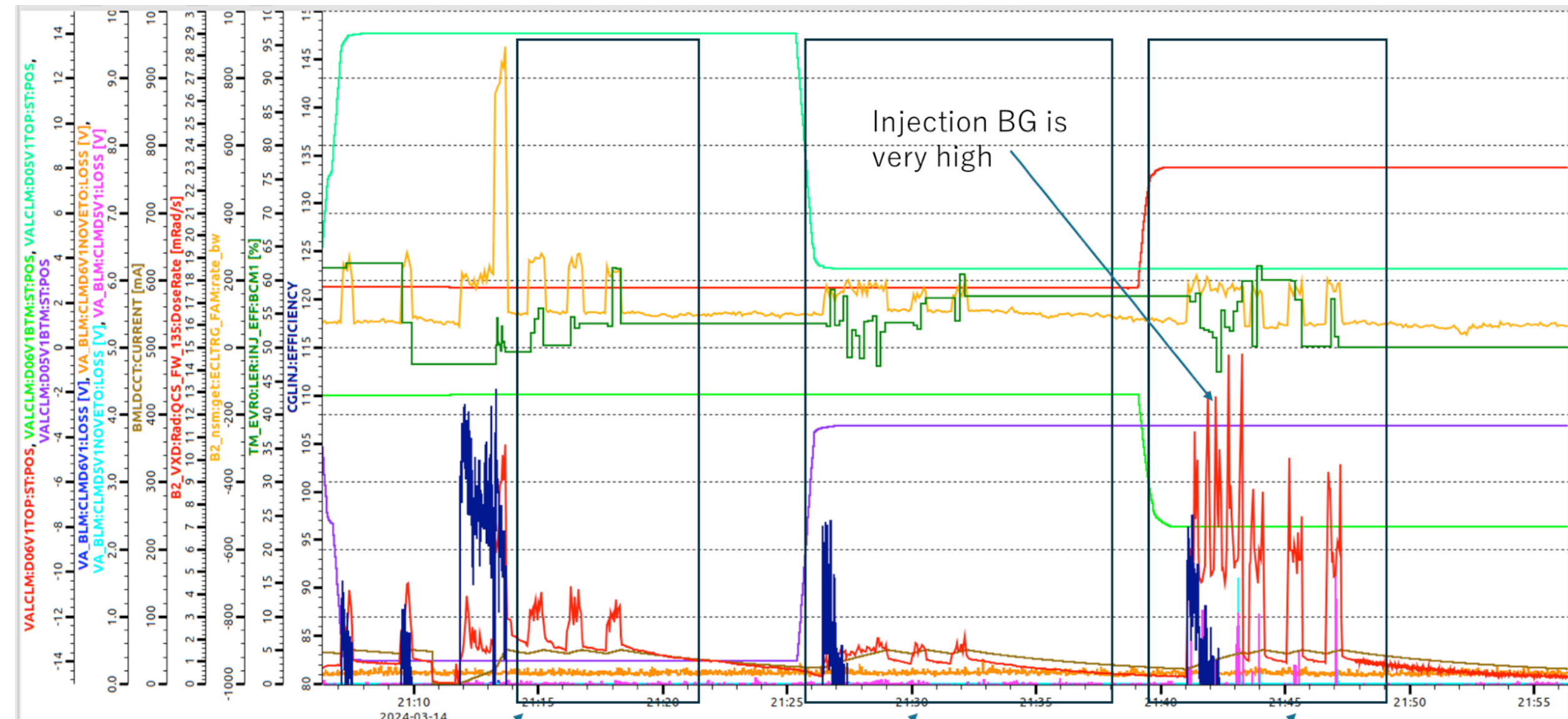
green: Tracking Simulation with Collimator Aperture

Measured Vertical Emittance of Injection Beam: $\gamma \epsilon_y = 120 - 360 \mu\text{m}$

D05V1 storage BG reduction is good



D06V1-64σ, D05V1open D06V1-64σ, D05V1-64σ D06V1open, D05V1-64σ



D06V1-64σ, D05V1open D06V1-64σ, D05V1-64σ D06V1open, D05V1-64σ

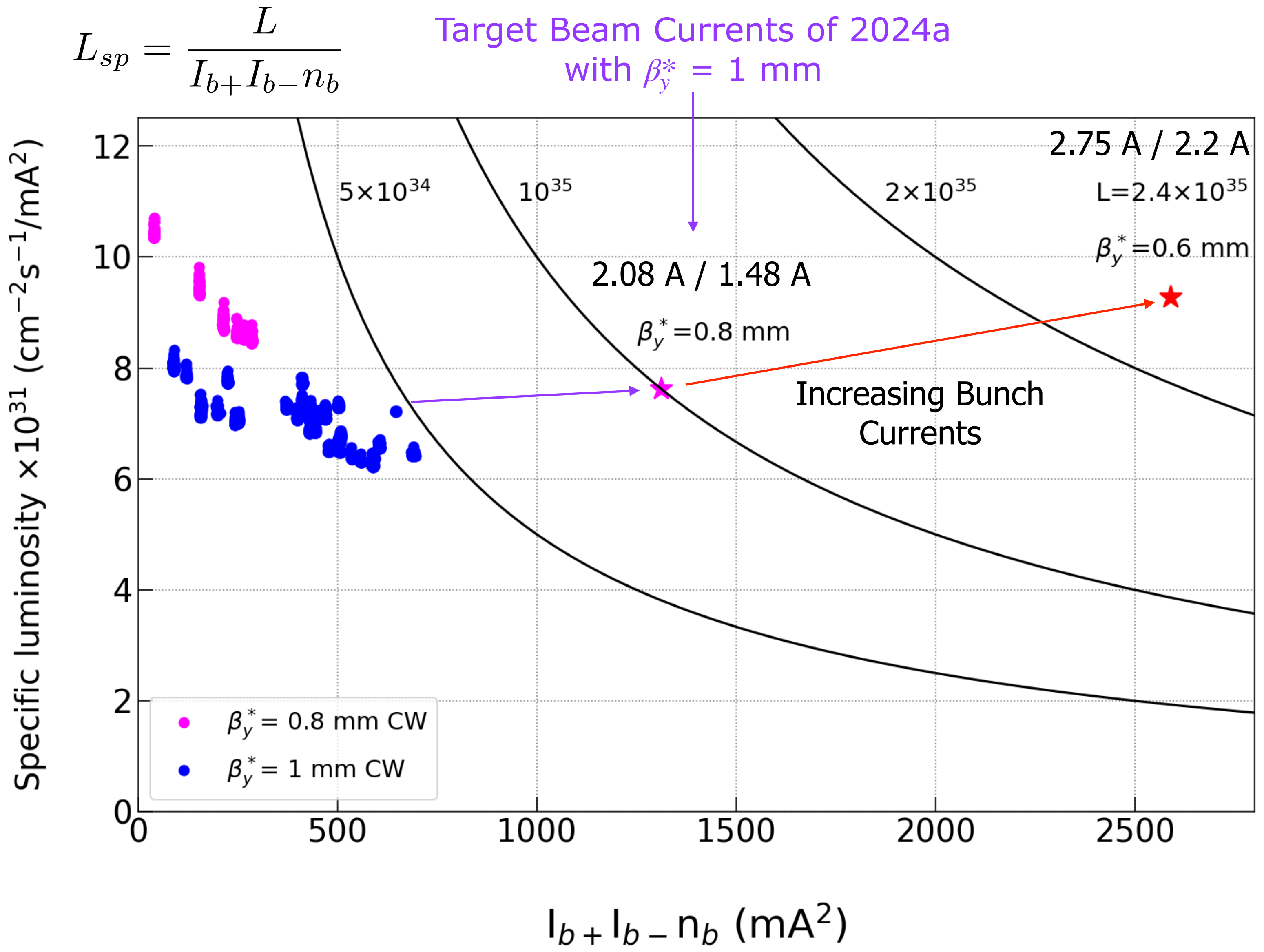
- Background Suppression of Storage Beam Is Good.
- Background Suppression of Injection Beam Is Not Sufficient. Because Horizontal Orbit Reduces the Collimator Performance. Injection Beam Has Large Horizontal Beam Oscillation. → β_x at Skew Sextupoles Can Be Small to Reduce Horizontal Amplitude.
- Still Under Commissioning

$$\Delta p_y = \frac{K_2^{(skew)}}{2} (y^2 - x^2) \quad (\beta_x = 7.08 \text{ m to } 2 \text{ m})$$

Plan of 2024b

Machine Parameters

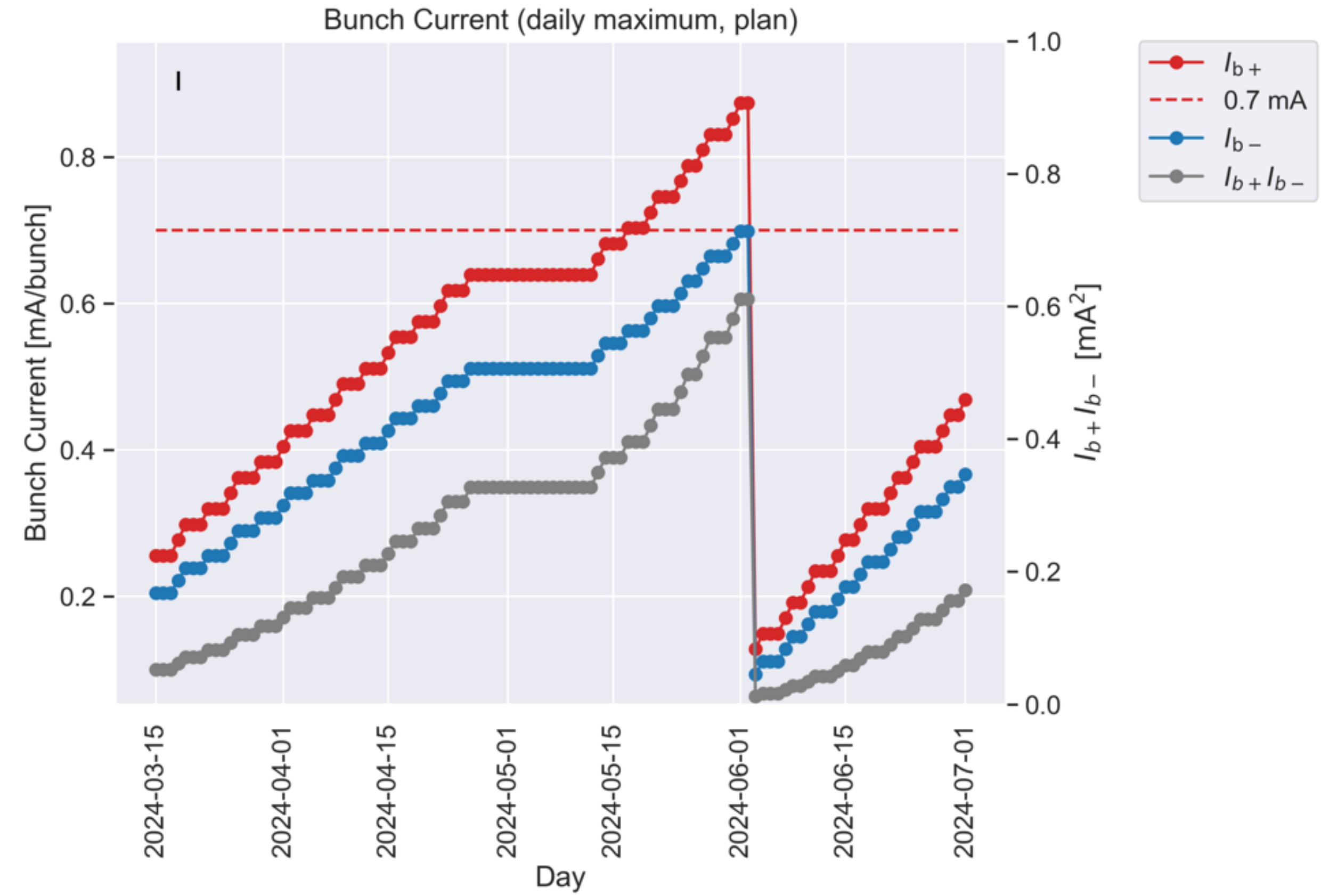
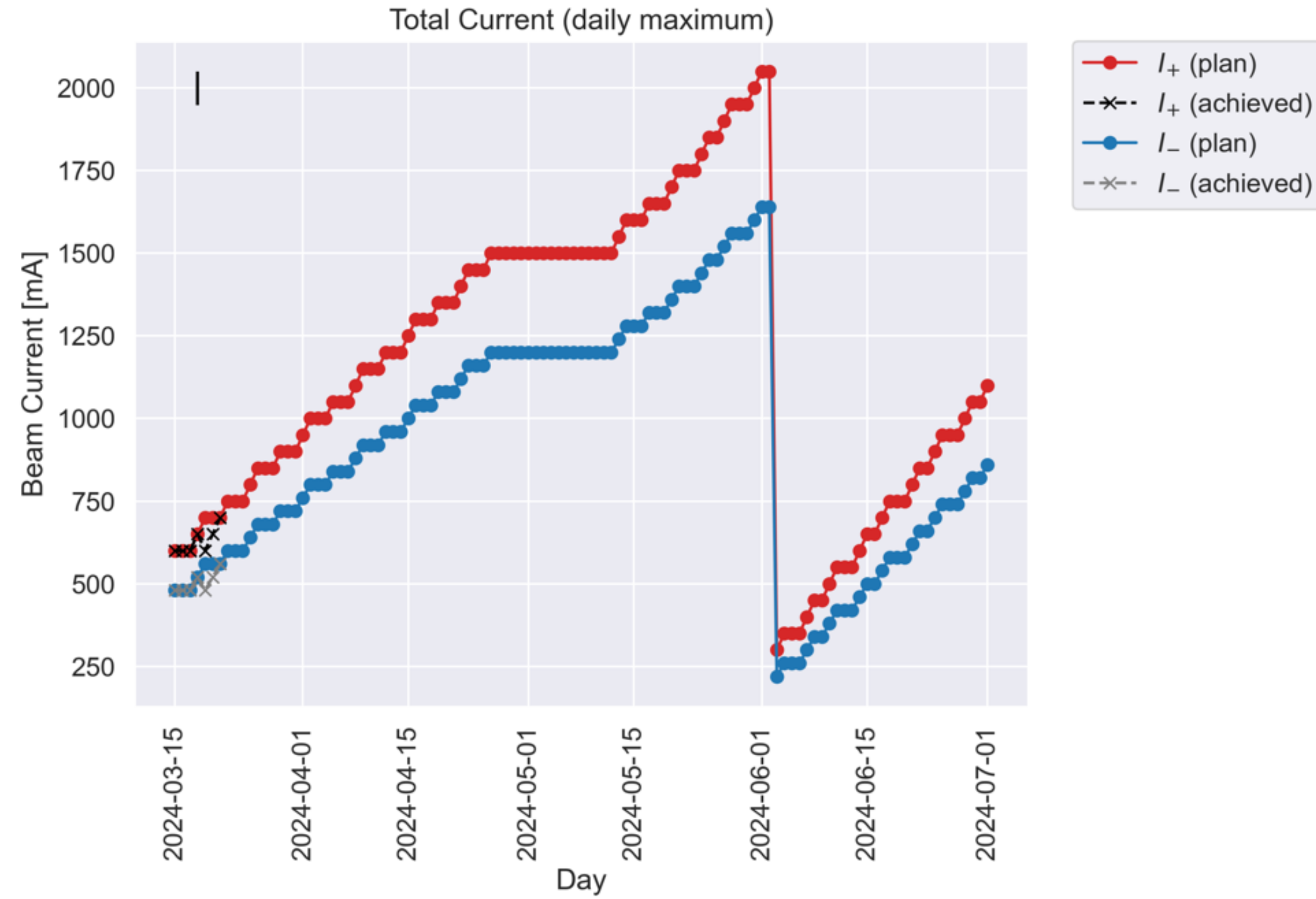
	June 8, 2022		Target at post-LS1 (1)		Target at post-LS1 (2)		Unit
Ring	LER	HER	LER	HER	LER	HER	
Emittance	4.0	4.6	4.0	4.6	4.0	4.6	nm
Beam Current	1321	1099	2080	1480	2750	2200	mA
Number of bunches	2249		2346		2346		
Bunch current	0.587	0.489	0.89	0.63	1.17	0.94	mA
Horizontal size σ_x^*	17.9	16.6	17.9	16.6	17.9	16.6	μm
Vertical cap sigma Σ_y^*	0.303		0.217		0.178		μm
Vertical size σ_y^*	0.215		0.154		0.126		μm
Betatron tunes ν_x / ν_y	44.525 / 46.589	45.532 / 43.573	44.525 / 46.589	45.532 / 43.573	44.525 / 46.589	45.532 / 43.573	
β_x^* / β_y^*	80 / 1.0	60 / 1.0	80 / 0.8	60 / 0.8	80 / 0.6	60 / 0.6	mm
σ_z	4.6	5.1	6.5	6.4	6.5	6.4	mm
Piwinski angle	10.7	12.7	10.7	12.7	10.7	12.7	
Crab waist ratio	80	40	80	80	80	80	%
Beam-Beam ξ_y	0.0407	0.0279	0.0444	0.0356	0.0604	0.0431	
Specific luminosity	7.21 x 10 ³¹		7.62 x 10 ³¹		9.31 x 10 ³¹		cm ⁻² s ⁻¹ /mA ²
Luminosity	4.65 x 10 ³⁴		1 x 10 ³⁵		2.4x 10 ³⁵		cm ⁻² s ⁻¹

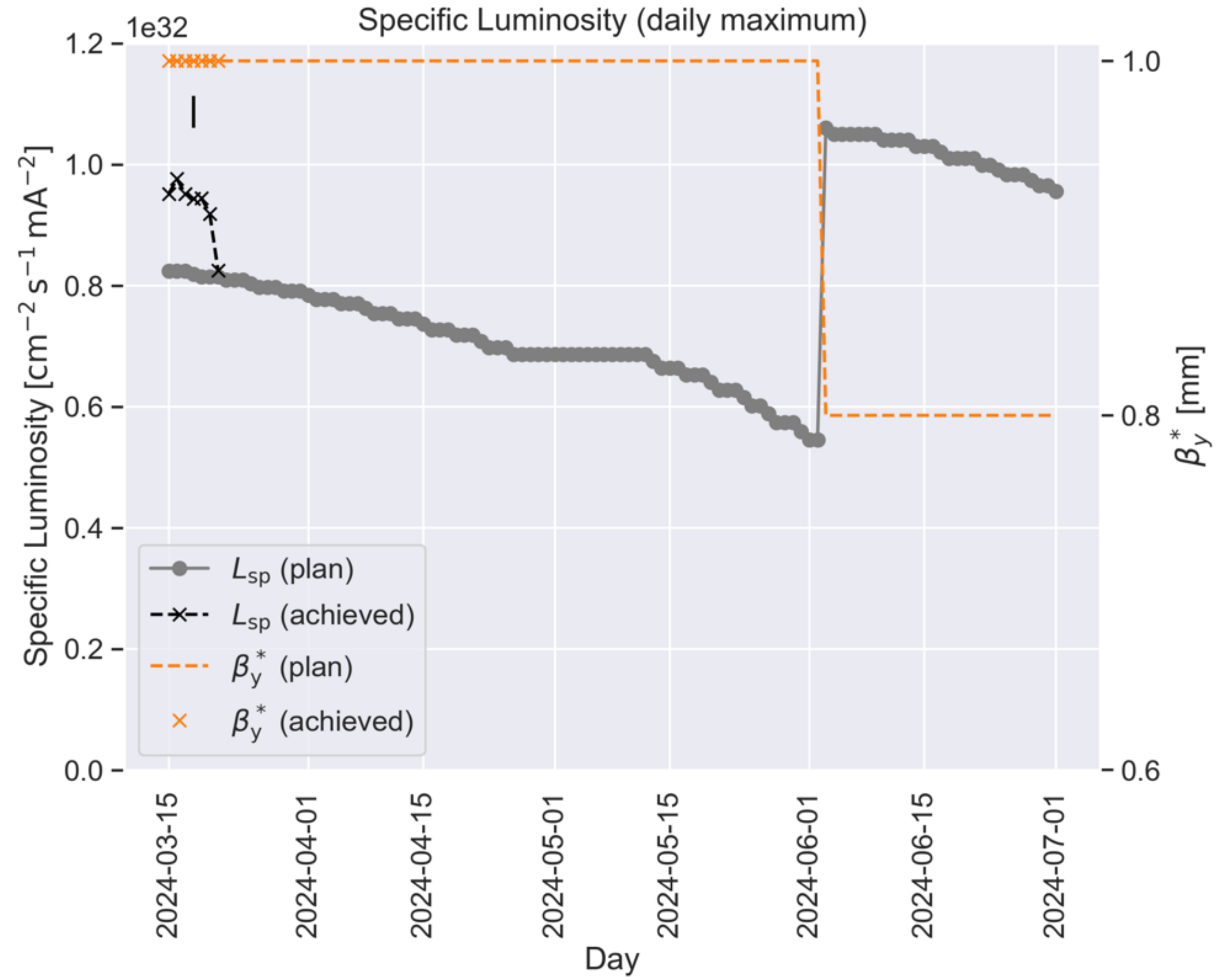
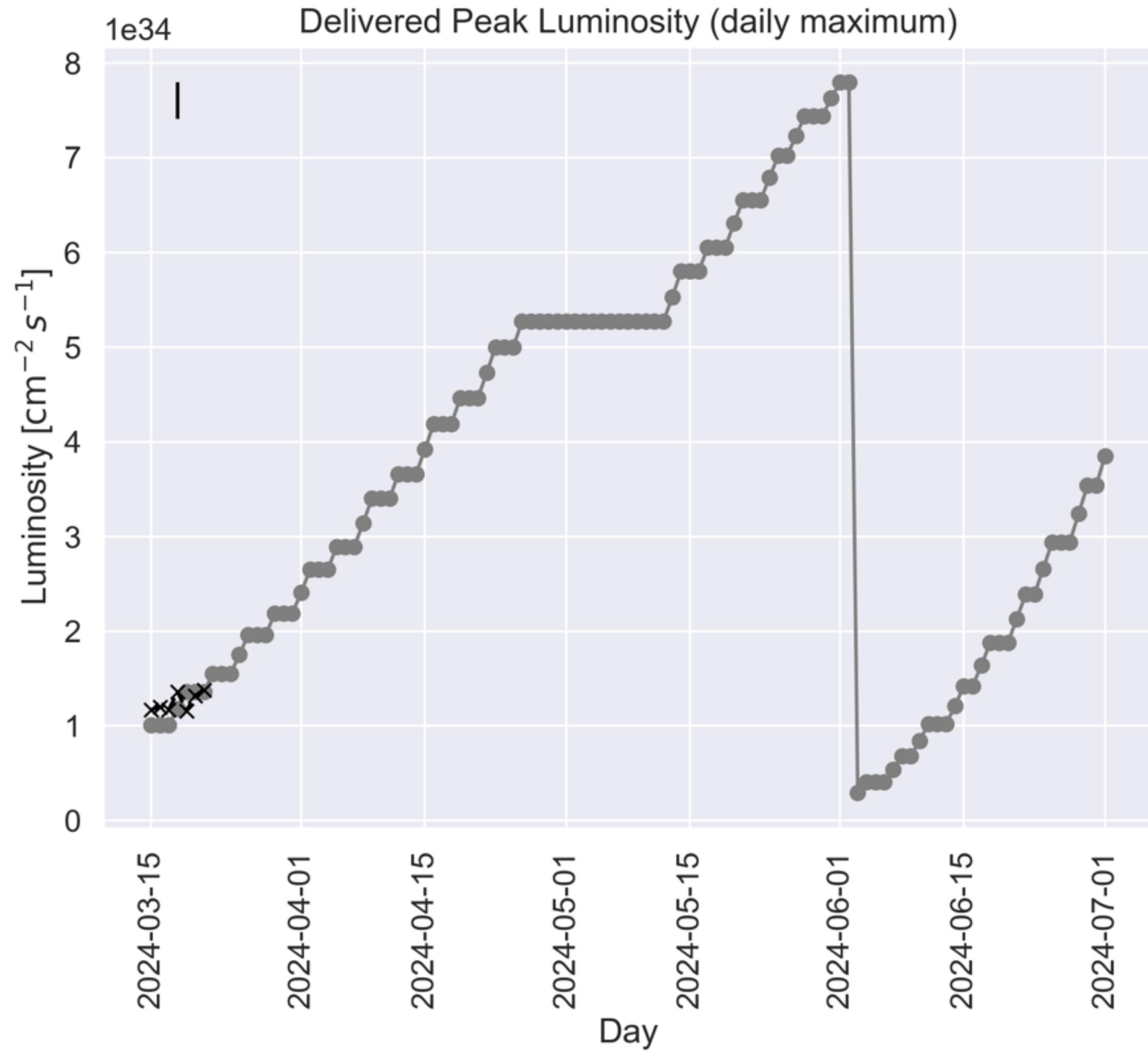


- Vertical Emittance of Single Beam Is Better than 2022ab Run.
- Luminosity Performance Reaches the Same Level as 2022ab Run.
 - $L_{sp} = 6.5 \times 10^{31} \text{ cm}^{-2}\text{s}^{-1}/\text{mA}^2$ at $I_{b+}I_{b-} = 0.41 \text{ mA}^2$ ($I_{b+} = 0.72 \text{ mA}$)

$L = 6.5 \times 10^{31} \times 0.41 \times 2346 = 6.25 \times 10^{34} \text{ cm}^{-2}\text{s}^{-1}$
- Plan of 2024b Run
 - $\beta_y^* = 1 \text{ mm}$ Operation Will Be Continued to Achieve $6-8 \times 10^{34} \text{ cm}^{-2}\text{s}^{-1}$.
 - LER: 2 A / HER: 1.4 A / 2346 Bunches
 - $\beta_y^* = 0.8 \text{ mm}$ Will Be Adopted in June After Above Achievement.
 - Injection Will Constrain Beam Currents.
 - Two-Bunch Injection, 25 Hz Repetition, Sextupole Optimization (Enlarge DA), Synchrotron Phase Space Injection (HER), Investigation of Narrow Vertical Aperture (HER), etc.

Number of Bunches Is Fixed at 2346 Bunches.





- Nonlinear Collimator (S. Terui)
- Injection (T. Yoshimoto)
- Optics (H. Sugimoto)
- Sudden Beam Loss (H. Ikeda)
- Overview of Collective Effects (D. Zhou)
- QCS (T. Oki)
- Vacuum (K. Shibata)
- Injector Overview (M. Satoh)

Appendix

Beam Kick by Skew Sextupole

- Multipole expansion

$$\phi(r, \theta) = \sum_{n=1}^{\infty} (a_n r^n \cos(n\theta) + b_n r^n \sin(n\theta))$$

$$\phi_{3,s}(r, \theta) = a_3 r^3 \cos(3\theta) = a_3 (x^3 - 3xy^2) \text{ (skew-sextupole)}$$

- Magnetic field of skew-sextupole

$$B_x = -\frac{\partial \phi}{\partial x} = -3a_3(x^2 - y^2), \quad B_y = -\frac{\partial \phi}{\partial y} = 6a_3xy$$

- SK₂

$$SK_2 = \frac{L}{B\rho} \frac{\partial^2 B_x}{\partial y^2} = \frac{L}{B\rho} 6a_3$$

V-kick does not depend on sign of v-position.
Only one side vertical collimator is needed (top or bottom).

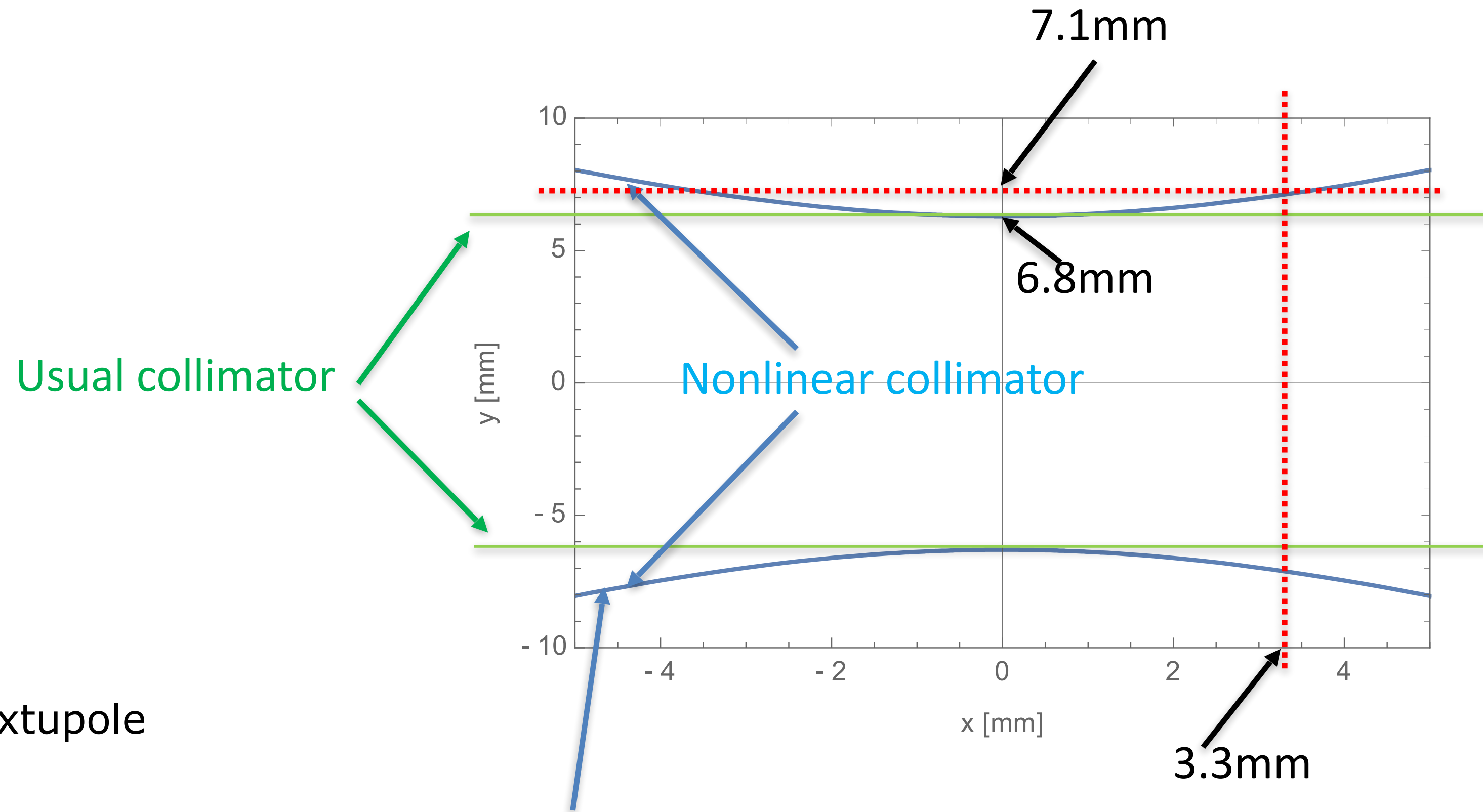
- Beam kick by skew-sextupole

$$\Delta p_y = \frac{B_x L}{B\rho} = \frac{SK_2}{2} (y^2 - x^2), \quad \Delta p_x = \frac{B_y L}{B\rho} = SK_2 xy$$

Horizontal offset reduces v-kick.

A particle with both x and y offset receives horizontal kick also.

Collimation in (x,y) Plane



Aperture:

$$y_1 = \sqrt{2J_y \beta_{y1}} \quad @ \text{ D06V1}$$

$$y_2 = \sqrt{2J_y \beta_{y2}} \quad @ \text{ Skew Sextupole}$$

$$y_2^2 = \frac{\beta_{y2}}{\beta_{y1}} y_1^2$$

$$y_3 = R_{34} \Delta p_{y2} = R_{34} \frac{SK_2}{2} y_2^2 = R_{34} \frac{SK_2}{2} \frac{\beta_{y2}}{\beta_{y1}} y_1^2$$

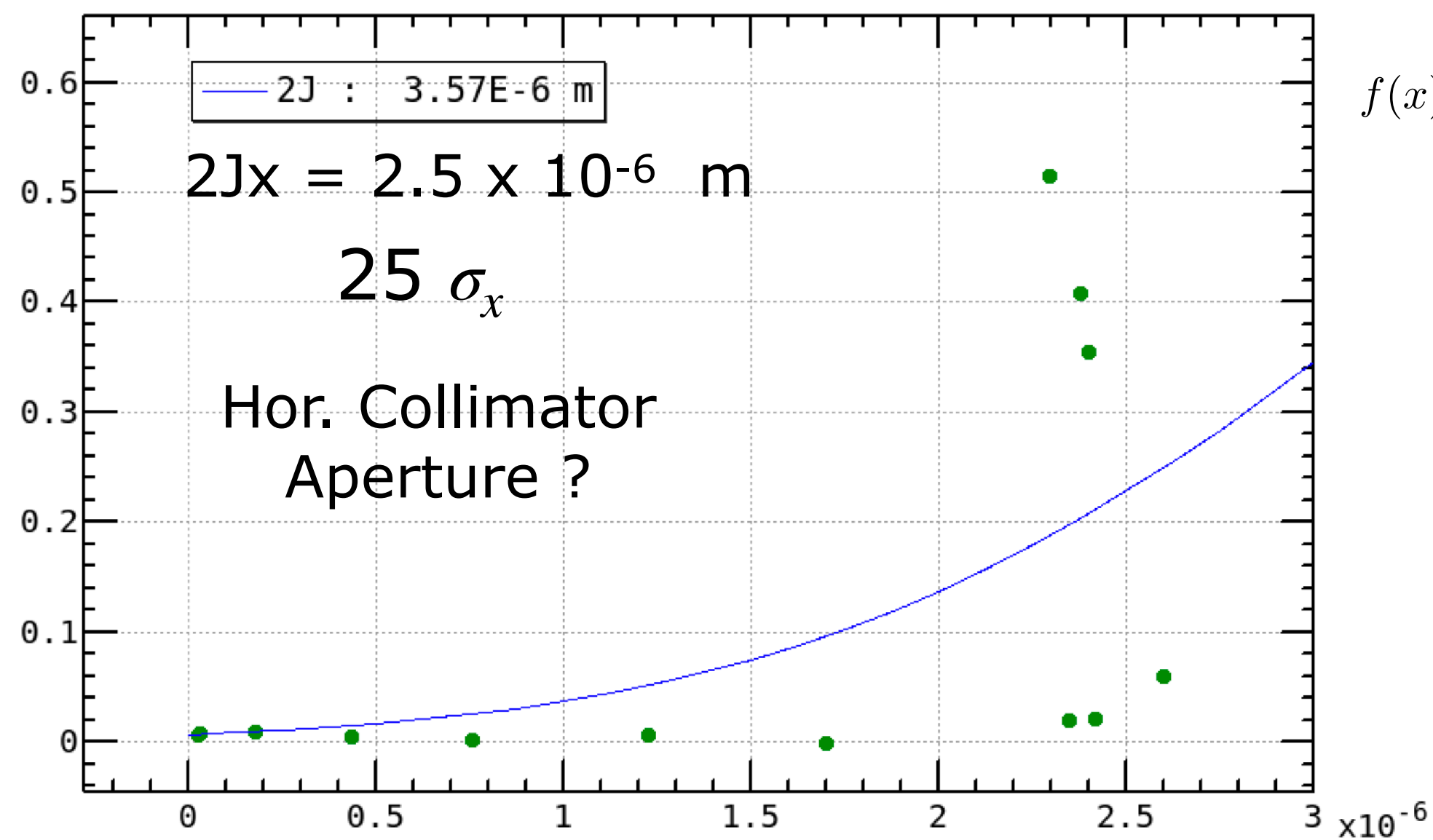
@ D05V1

This curvature can be reduced by reducing β_x at skew sextupoles.

LER $\beta_y^* = 8$ mm

Feb. 19, 2024

Loss Rate

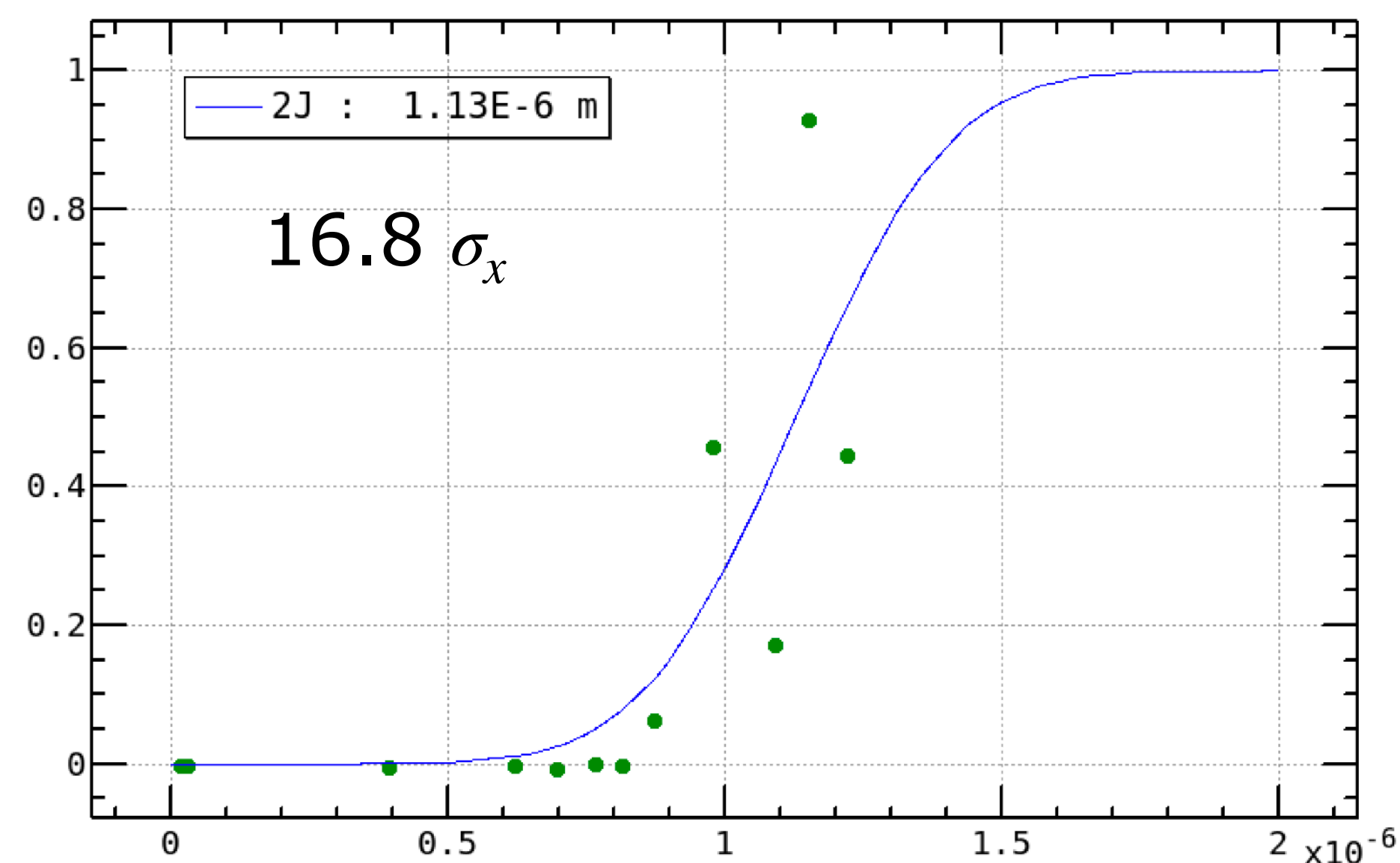


$$f(x) = \frac{1}{2} \left(1 + \frac{\text{Erf}(x - \mu)}{\sqrt{2}\sigma} \right)$$

LER $\beta_y^* = 1$ mm CW: 0%

March 6, 2024

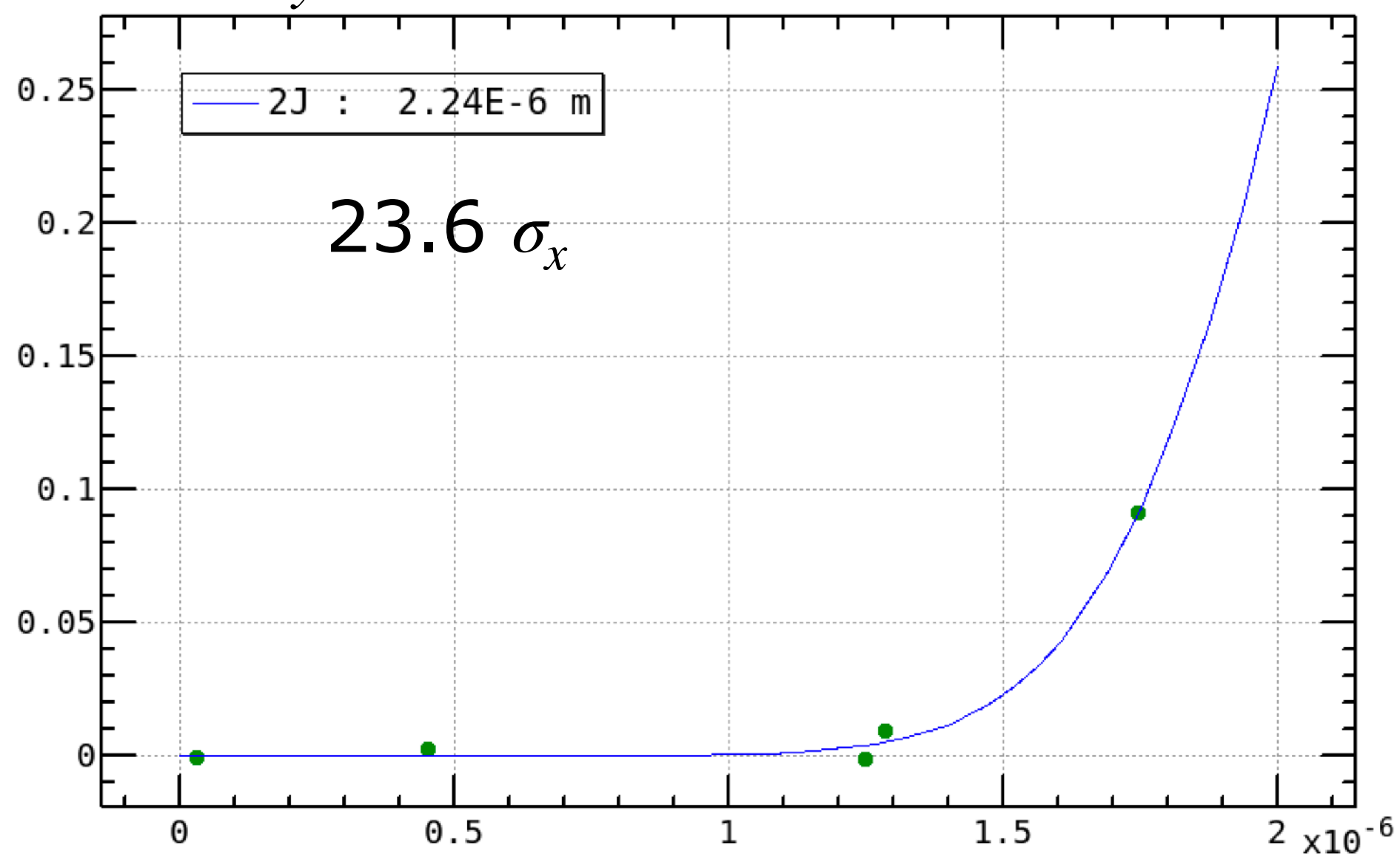
Loss Rate



LER $\beta_y^* = 3$ mm

2Jx (m)

Loss Rate



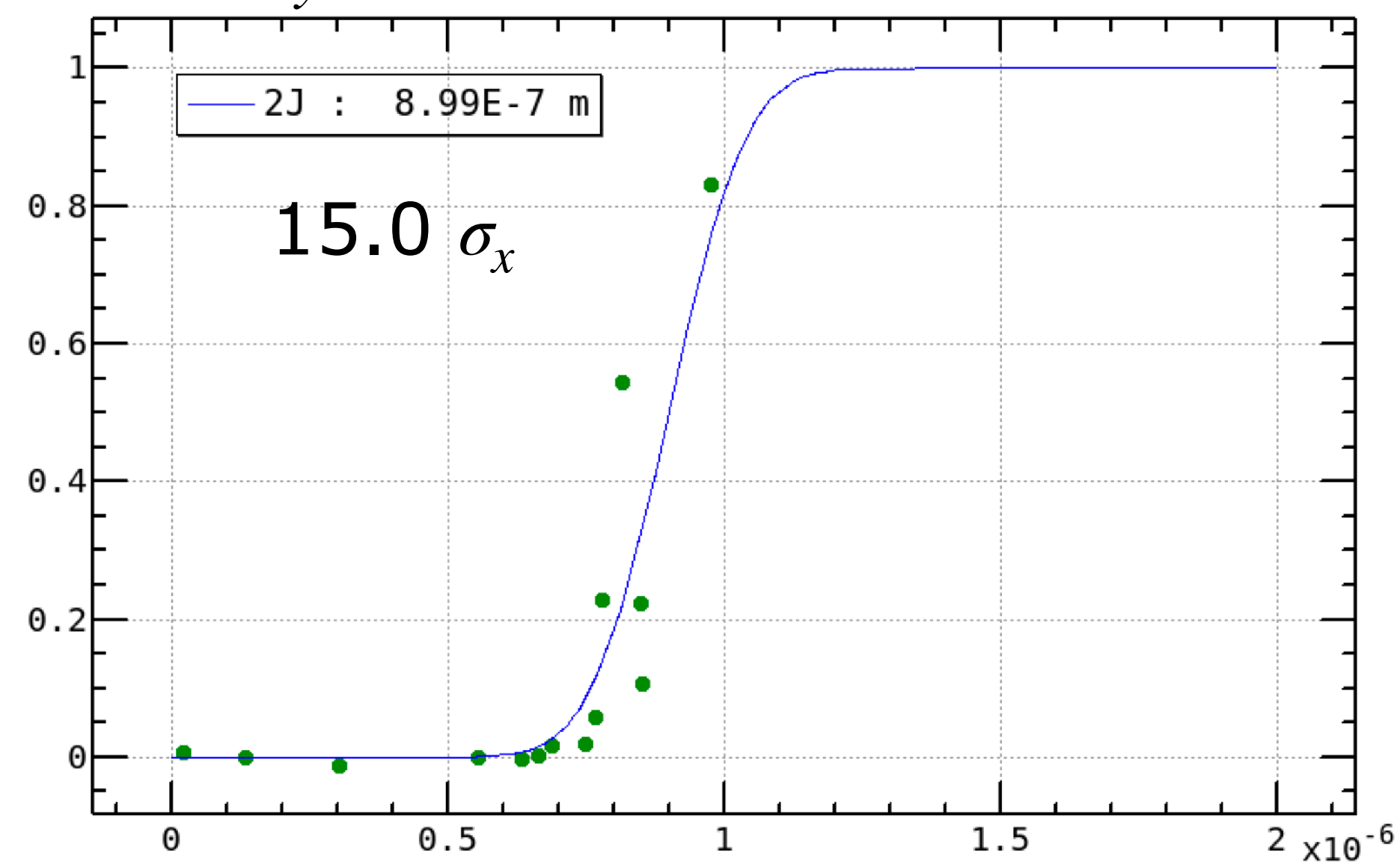
March 4, 2024

2Jx (m)

LER $\beta_y^* = 1$ mm CW: 80%

2Jx (m)

Loss Rate

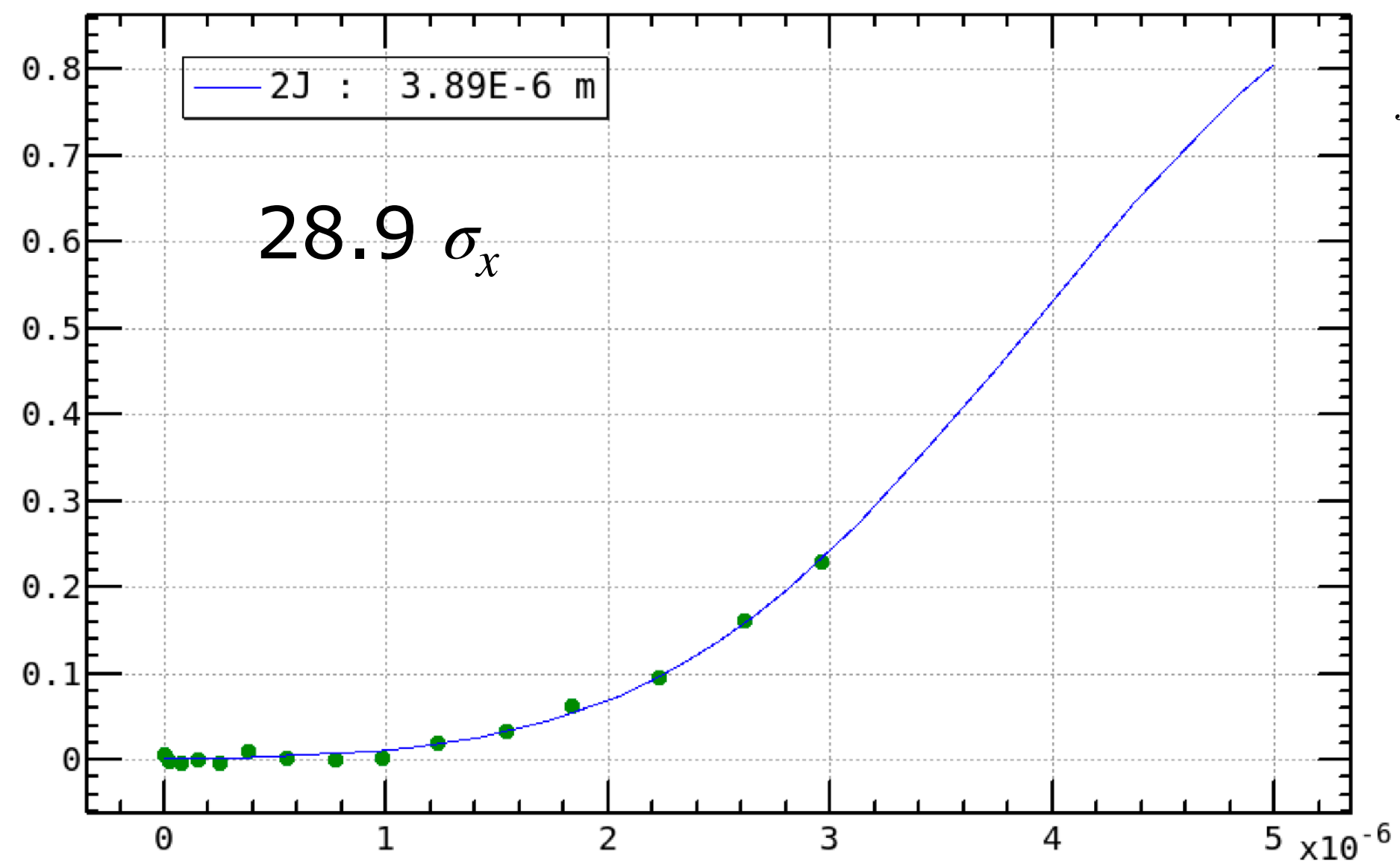


March 18, 2024

2Jx (m)

HER $\beta_y^* = 8$ mm

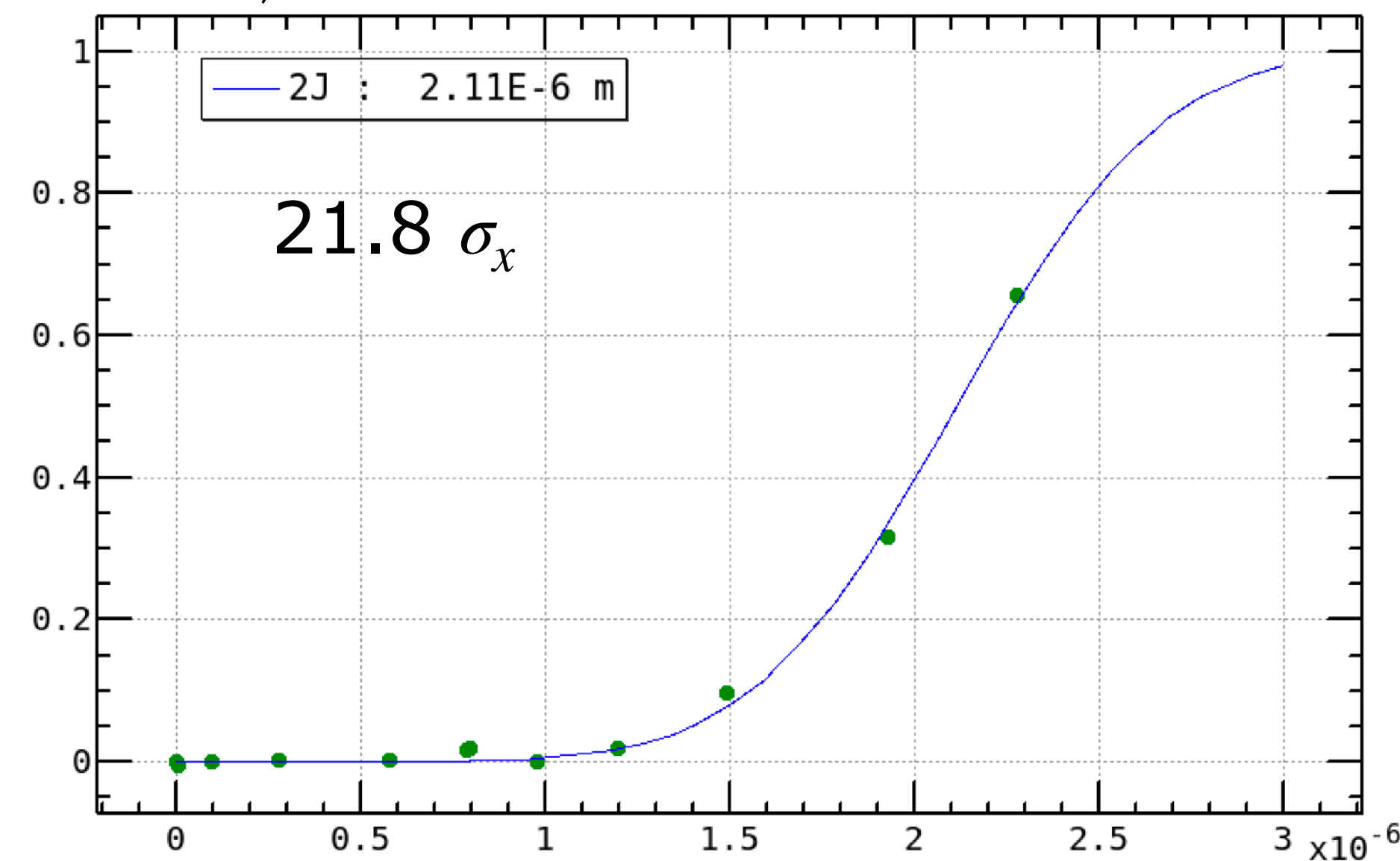
Feb. 20, 2024



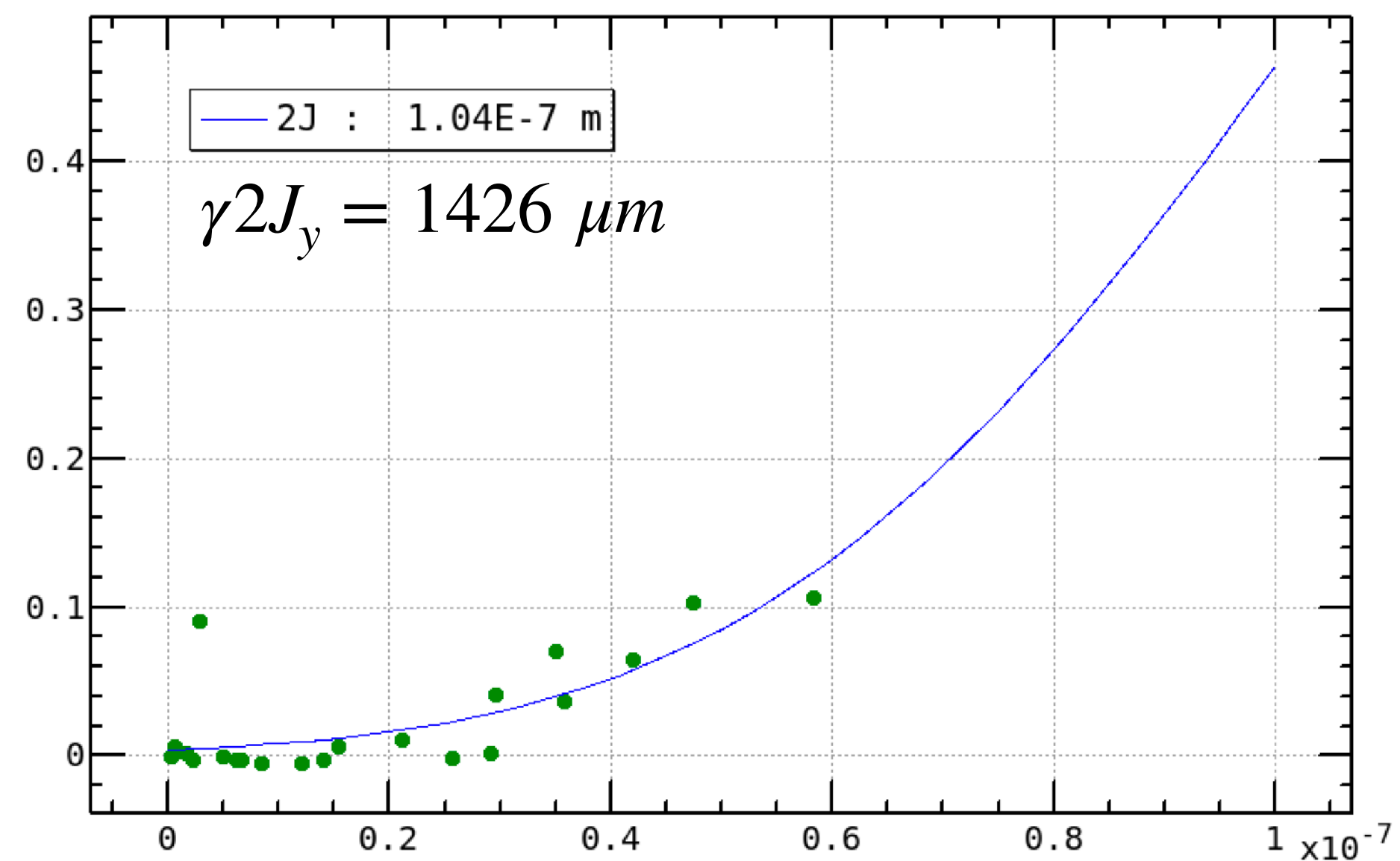
$$f(x) = \frac{1}{2} \left(1 + \frac{\text{Erf}(x - \mu)}{\sqrt{2}\sigma} \right)$$

HER $\beta_y^* = 3$ mm

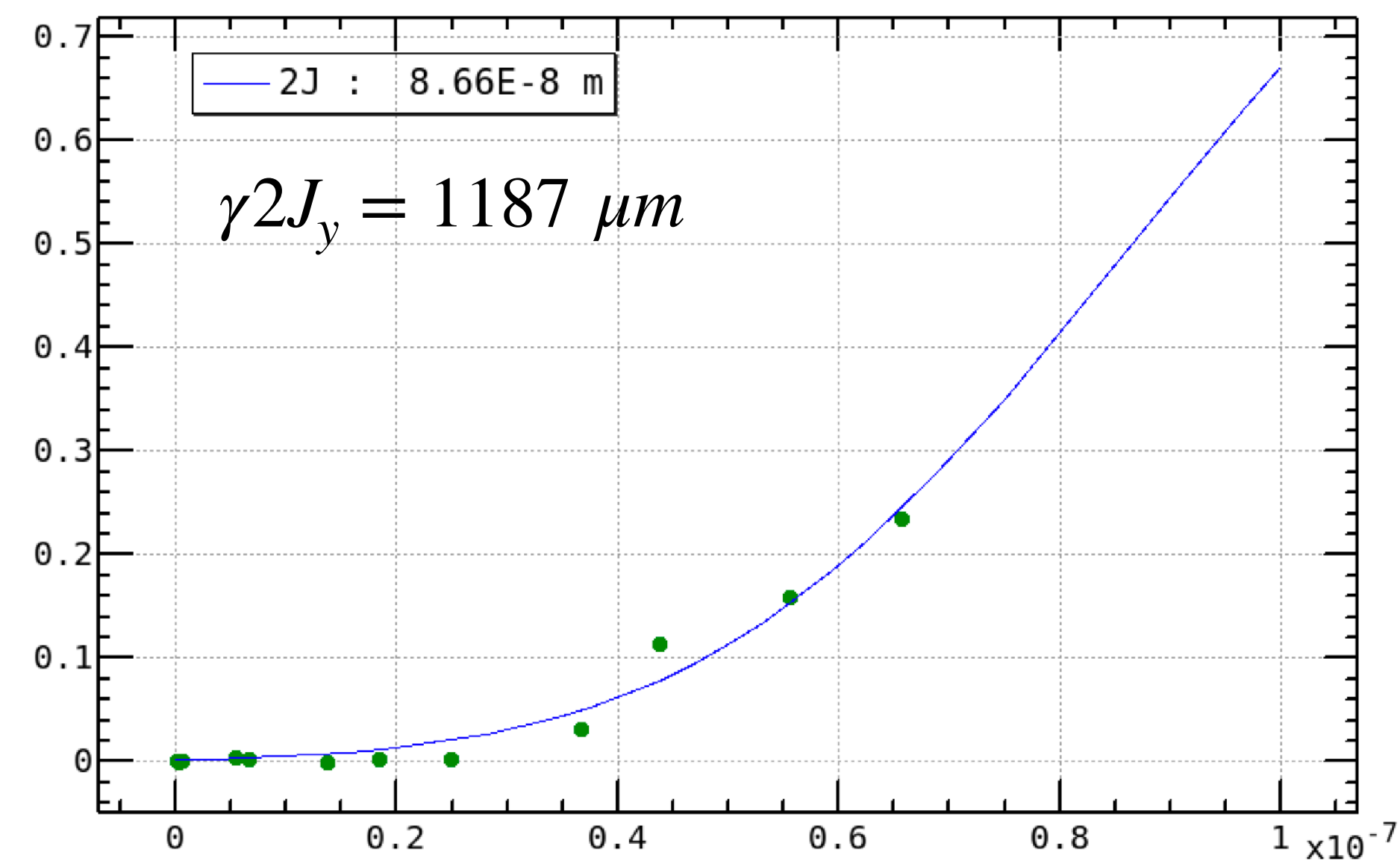
March 4, 2024



Feb. 26, 2024



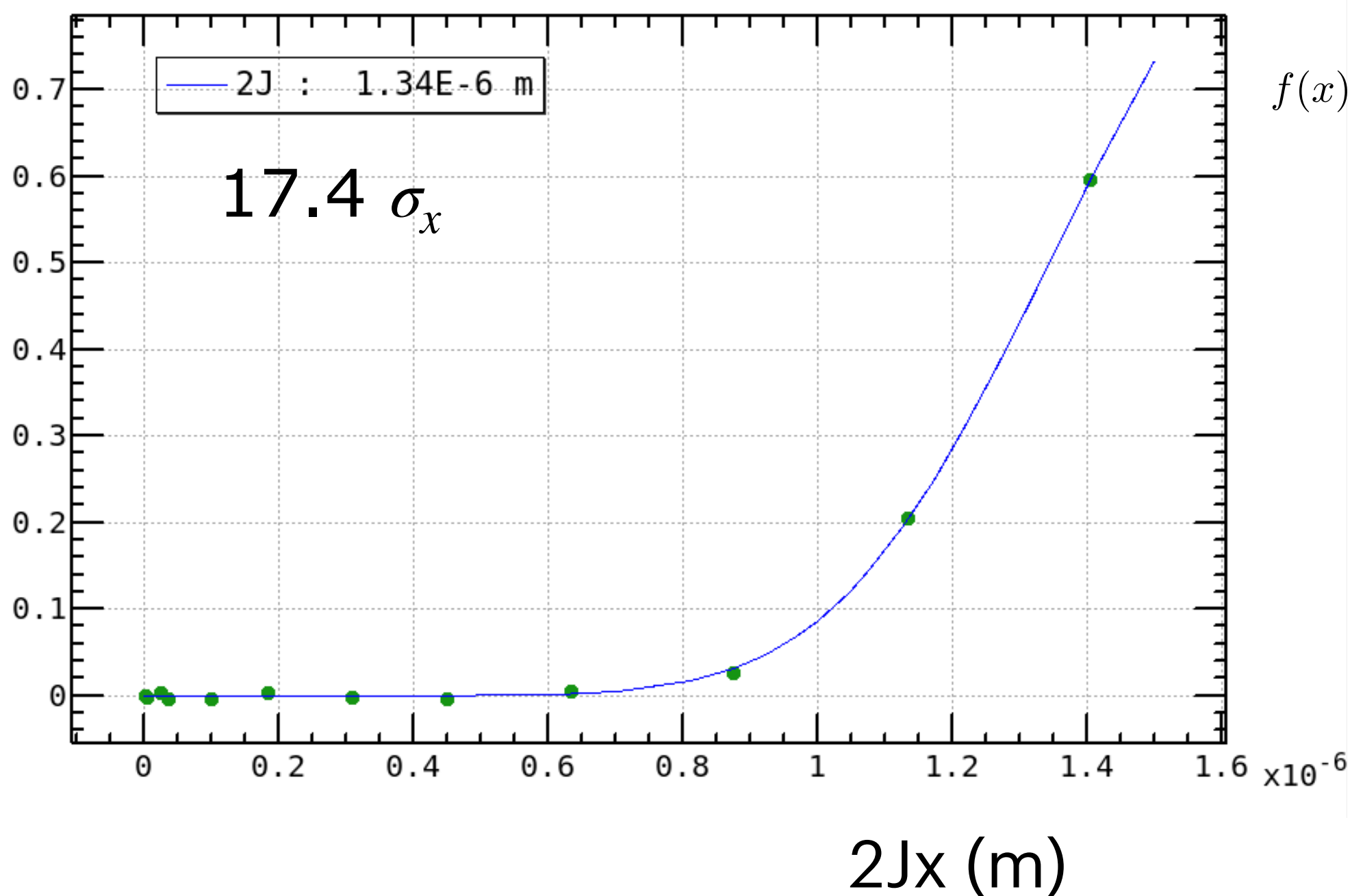
Feb. 29, 2024



HER $\beta_y^* = 1$ mm CW: 0%

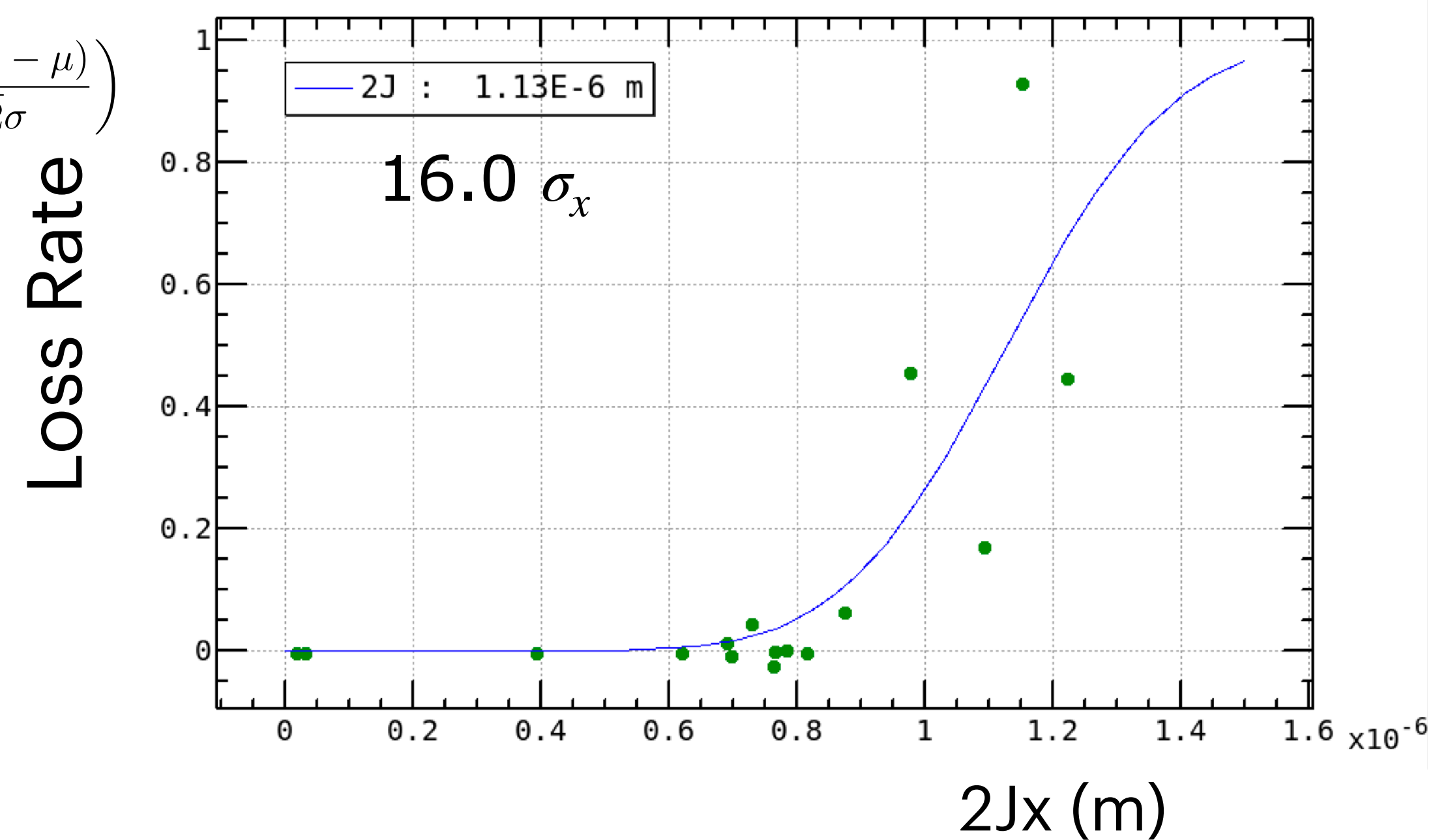
HER $\beta_y^* = 1$ mm CW: 40%

March 5, 2024

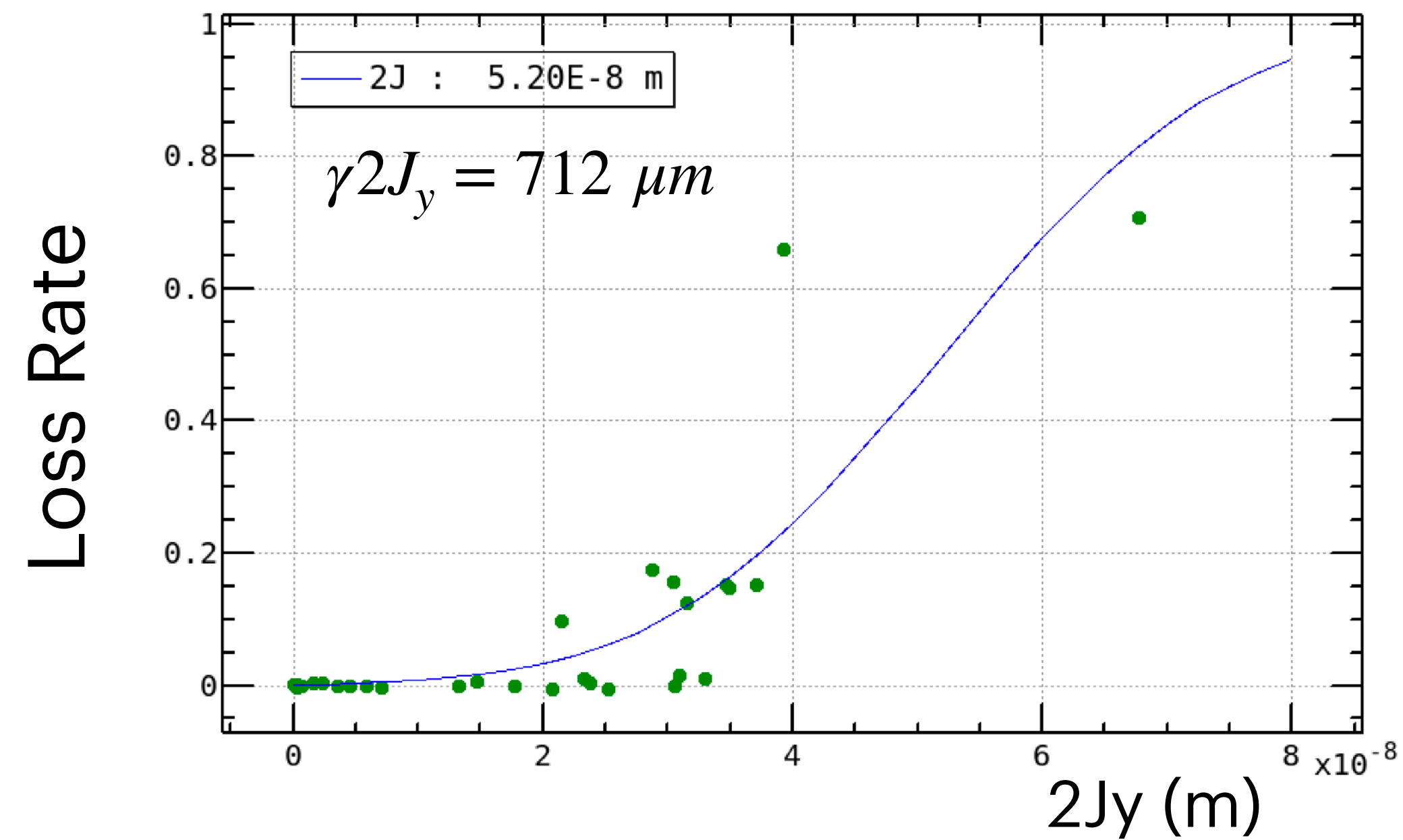
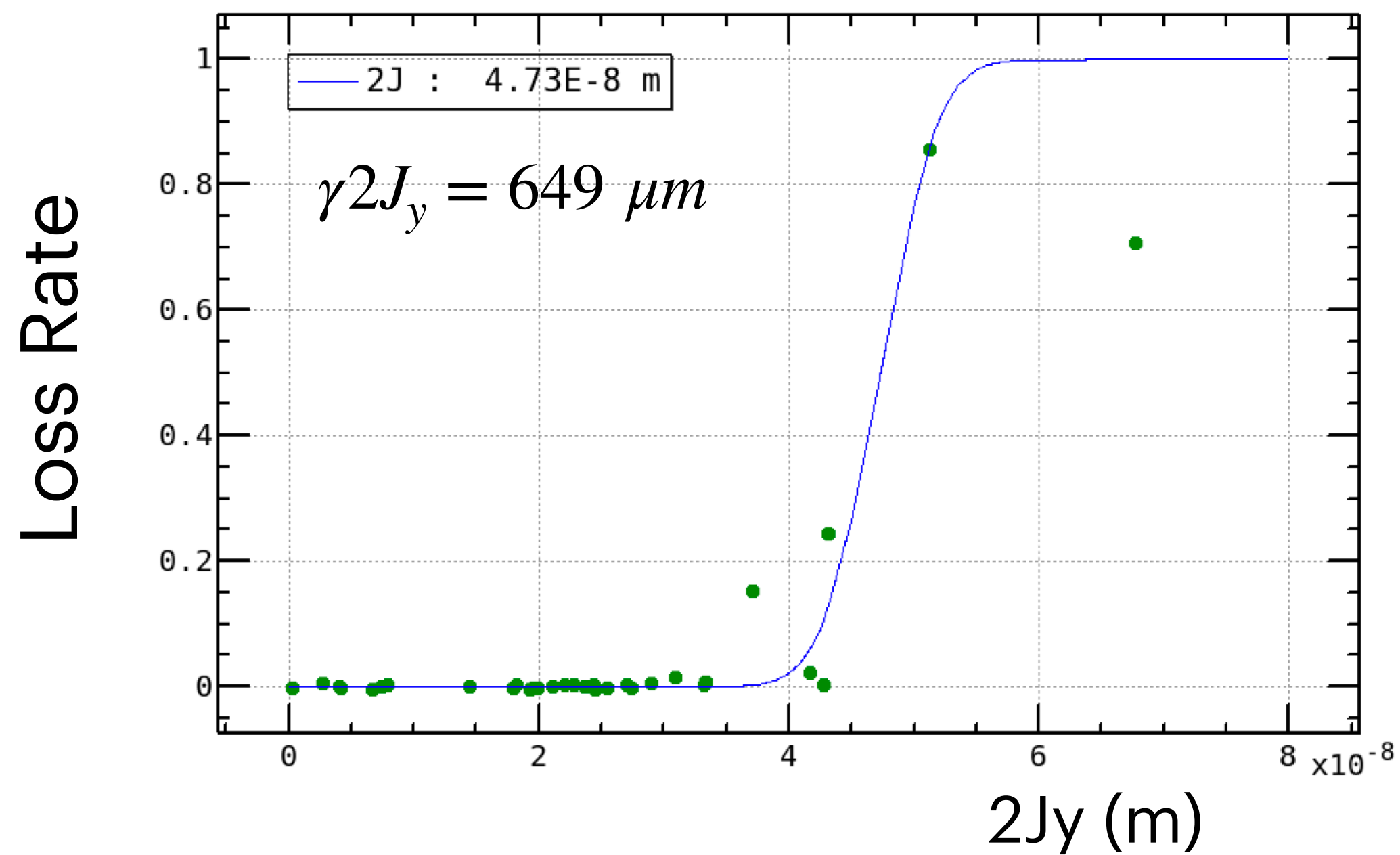


$$f(x) = \frac{1}{2} \left(1 + \frac{\text{Erf}(x - \mu)}{\sqrt{2}\sigma} \right)$$

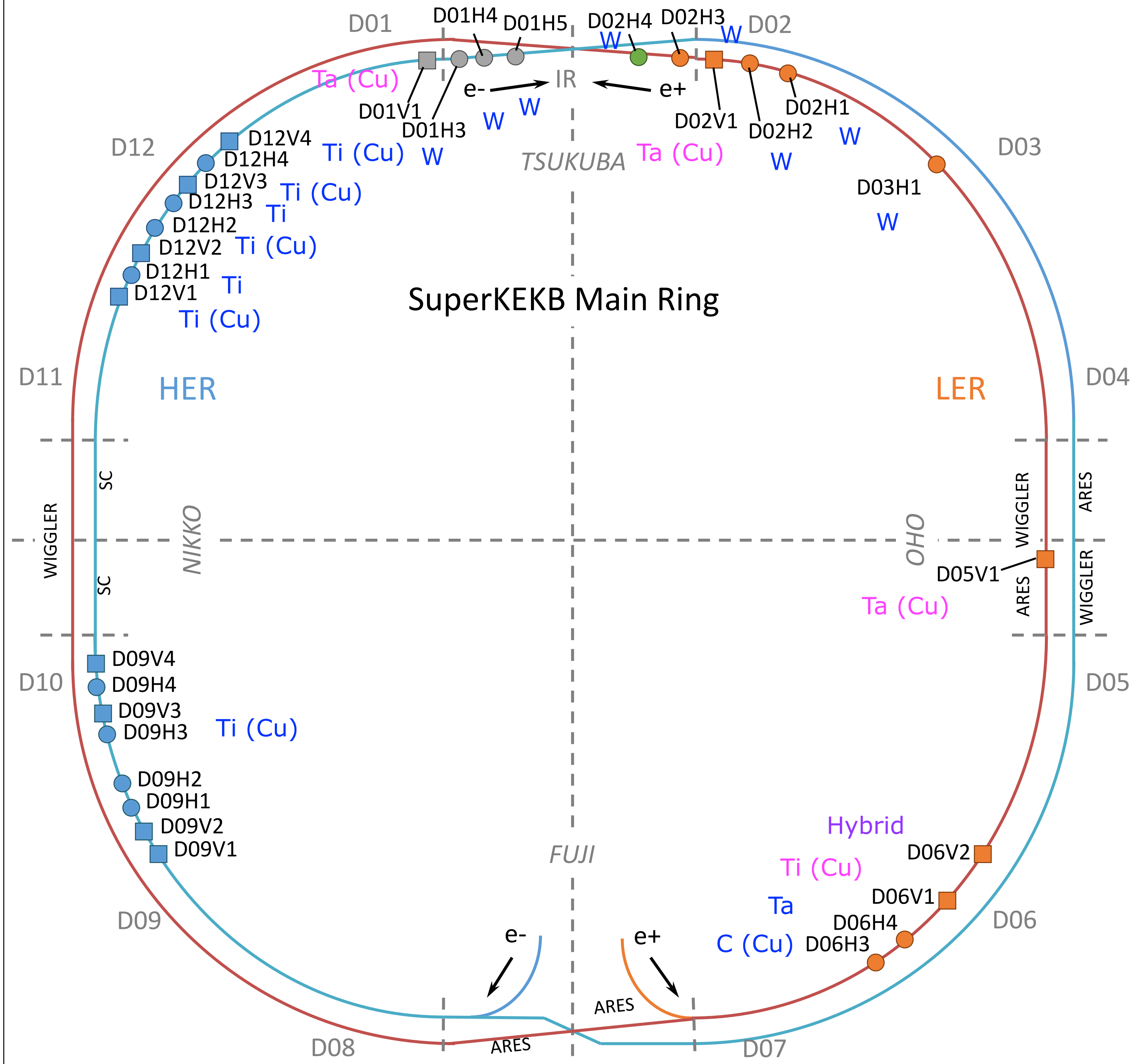
March 18, 2024



March 14, 2024



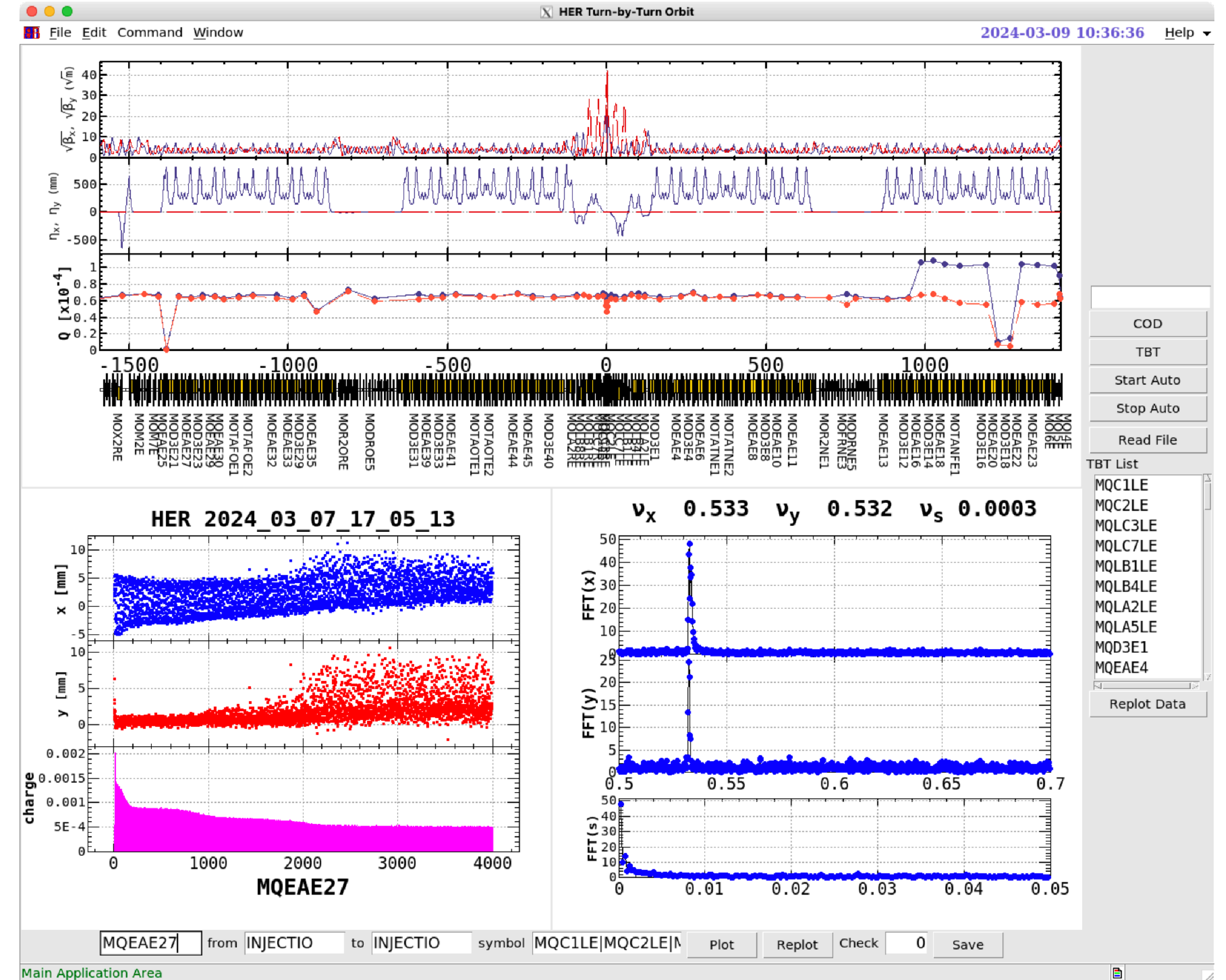
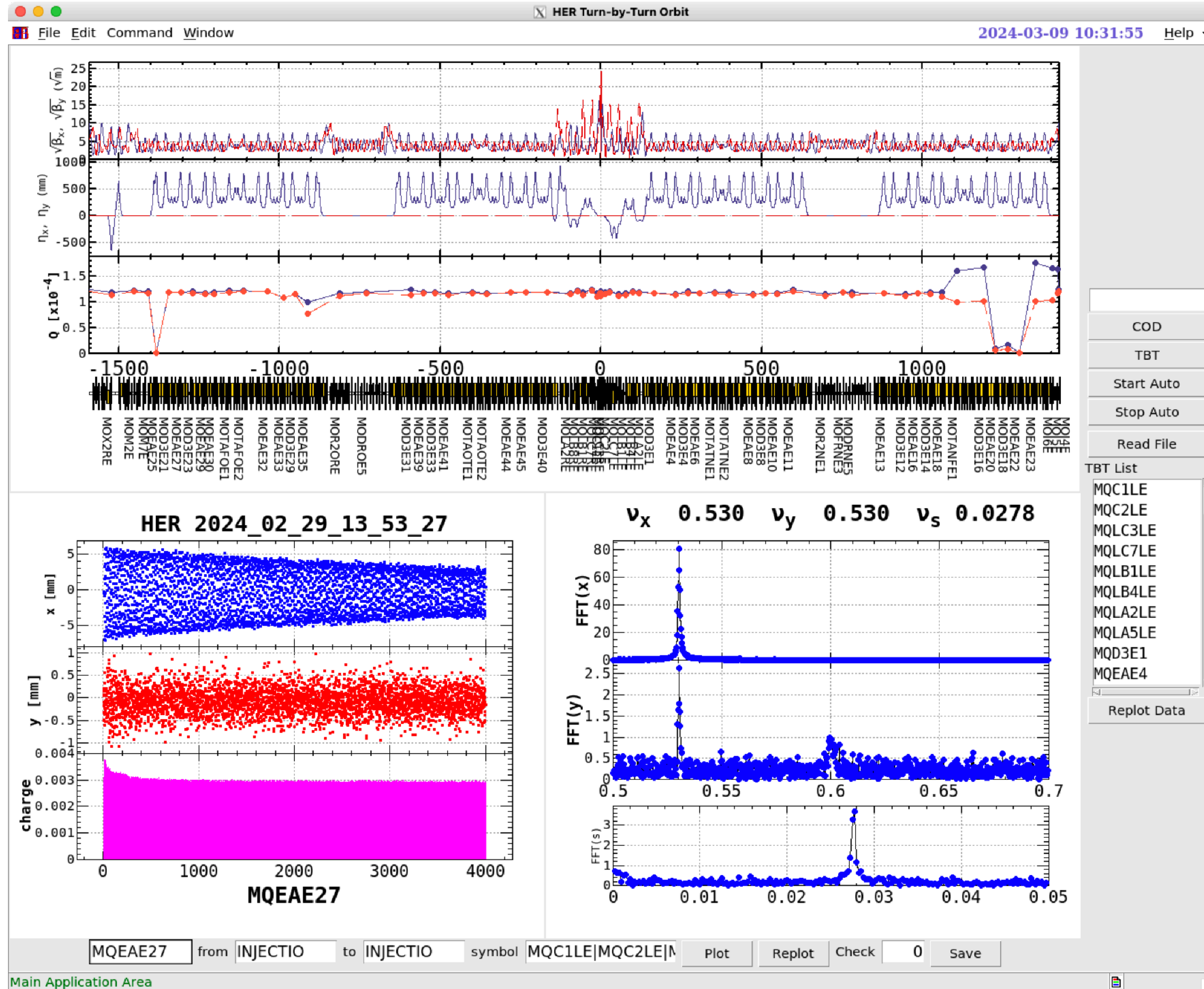
Collimators



Injection Beam

$$\beta_y^* = 3 \text{ mm}$$

$$\beta_y^* = 1 \text{ mm}$$



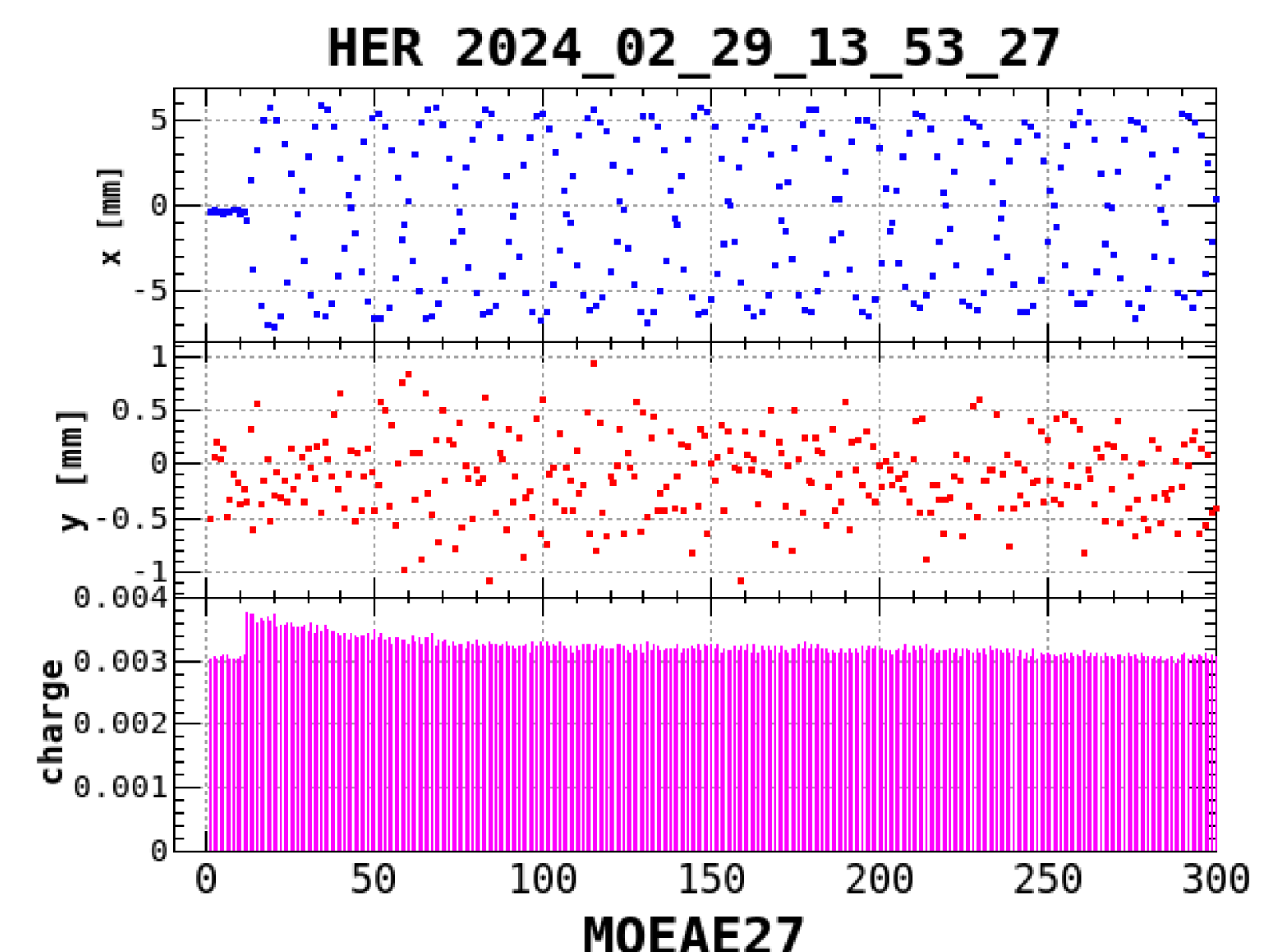
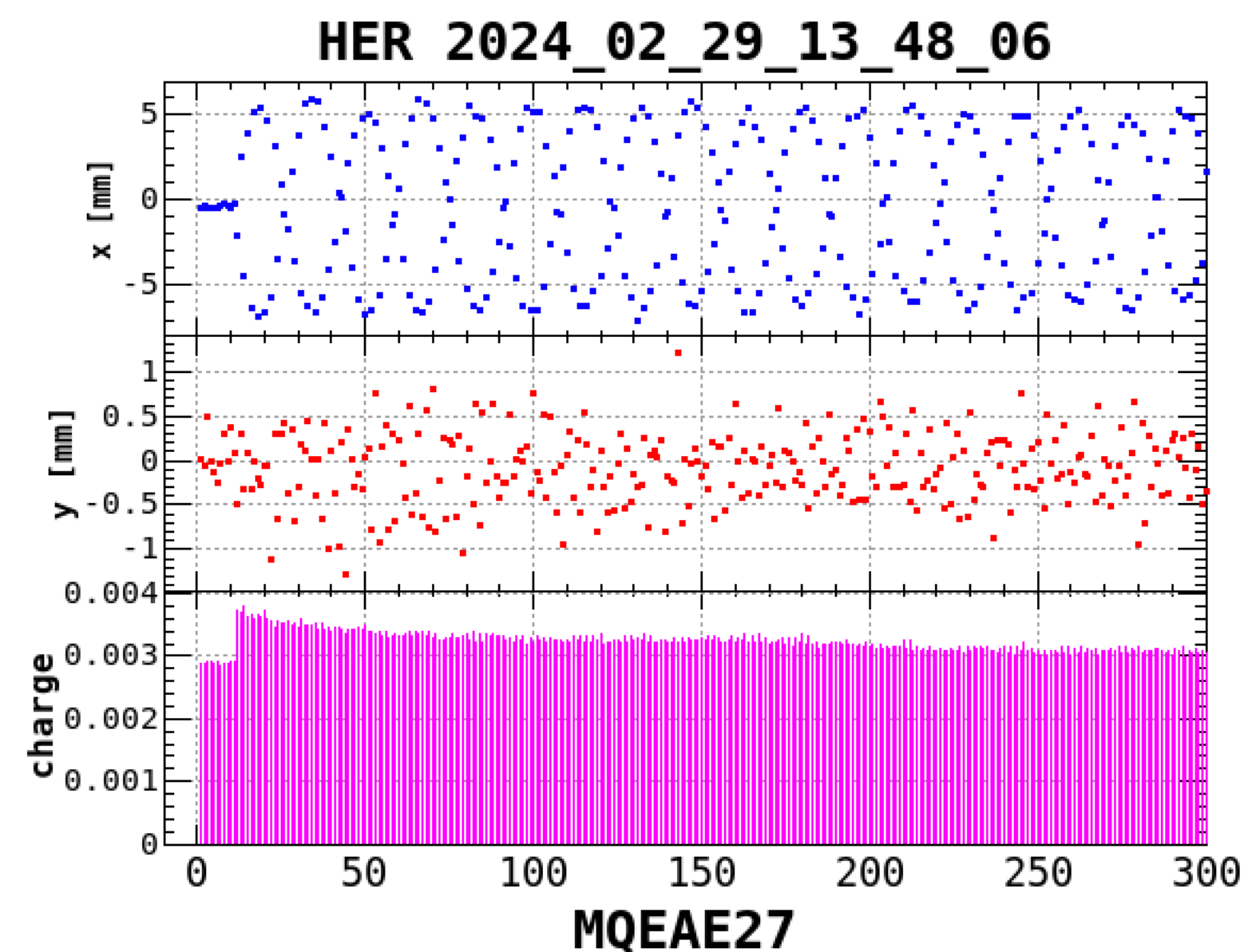
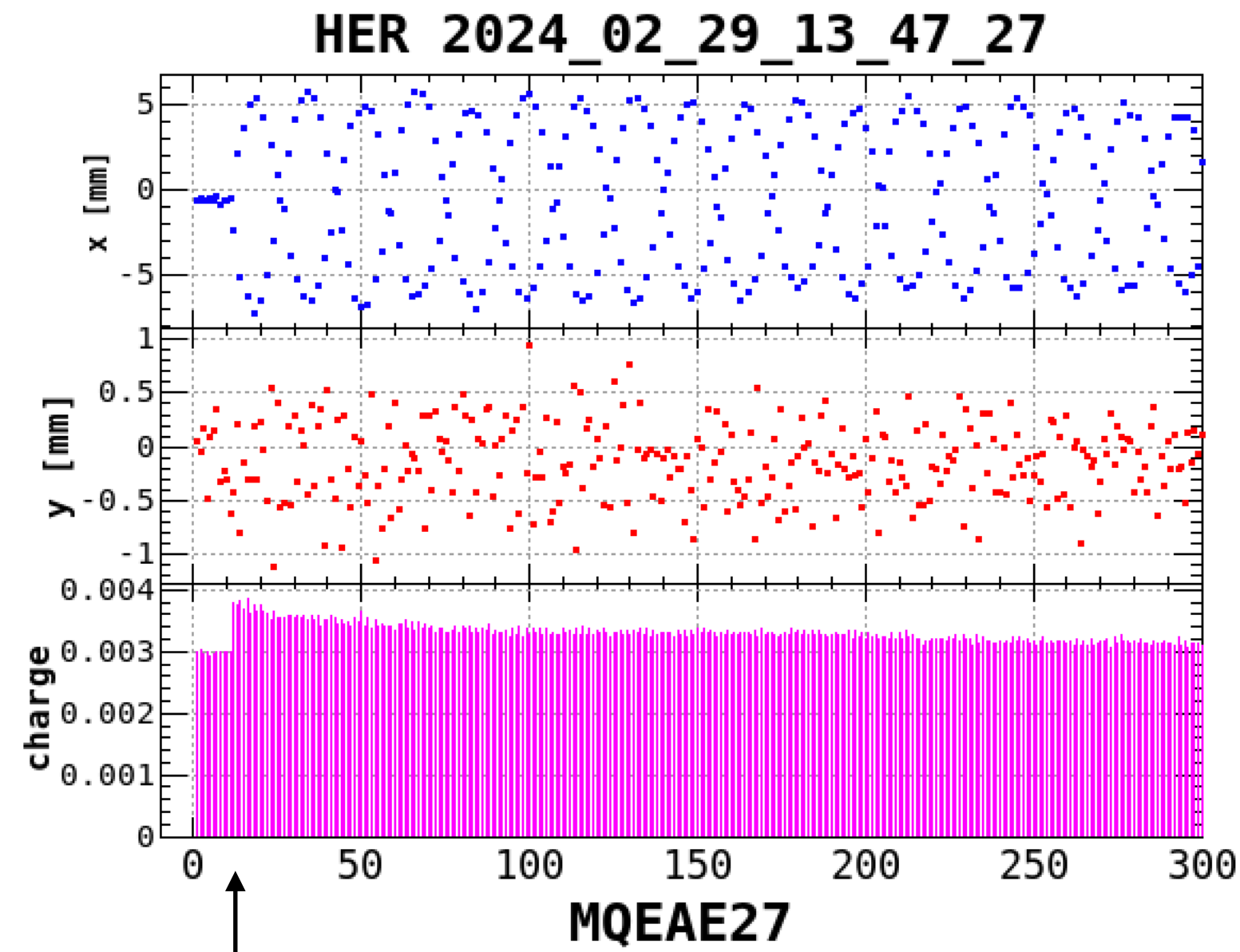
$$2J_x = 7.98 \times 10^{-7} \text{ m}$$

$$2J_x = 5.66 \times 10^{-7} \text{ m}$$

Horizontal Aperture Is OK ?

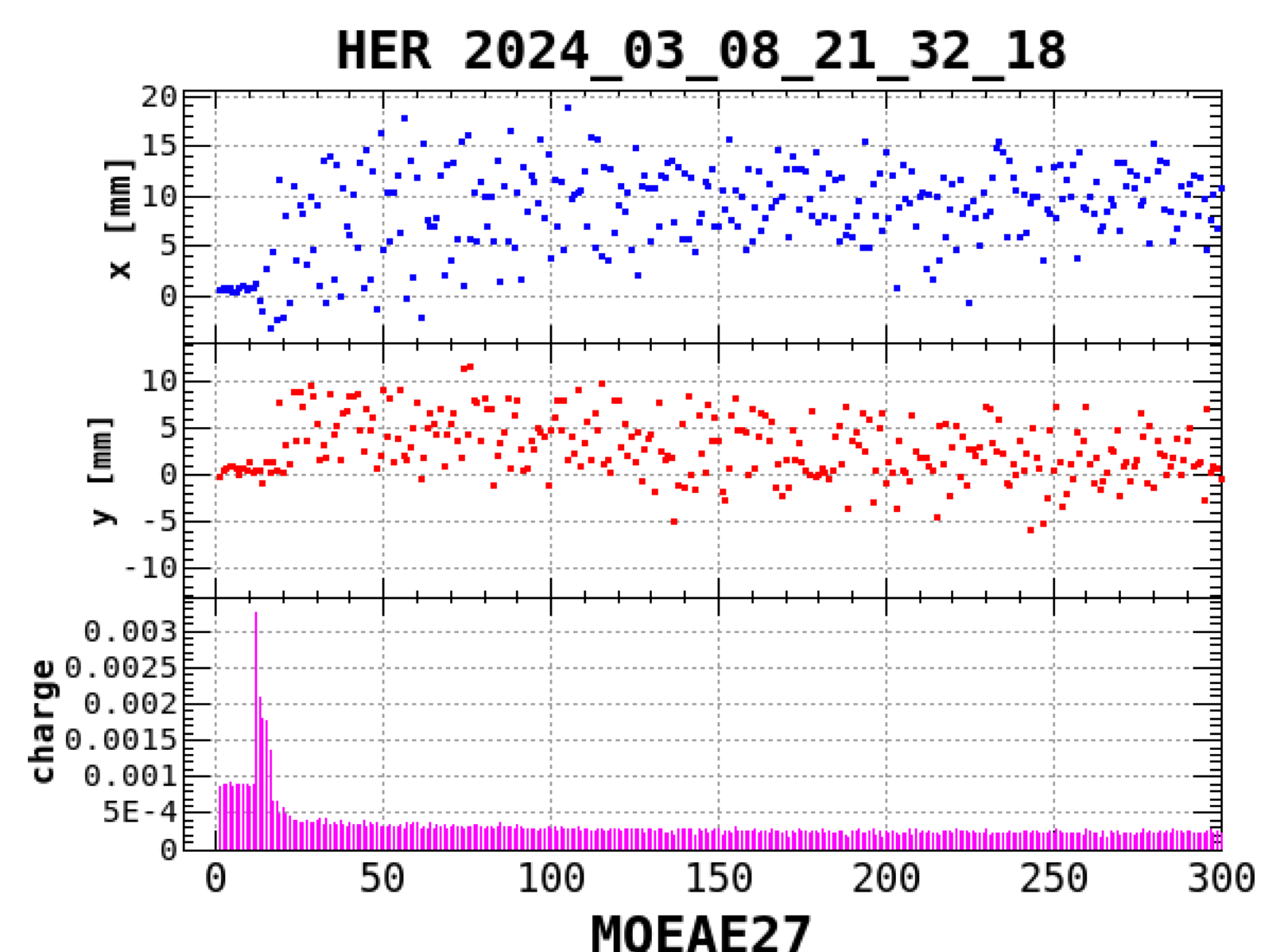
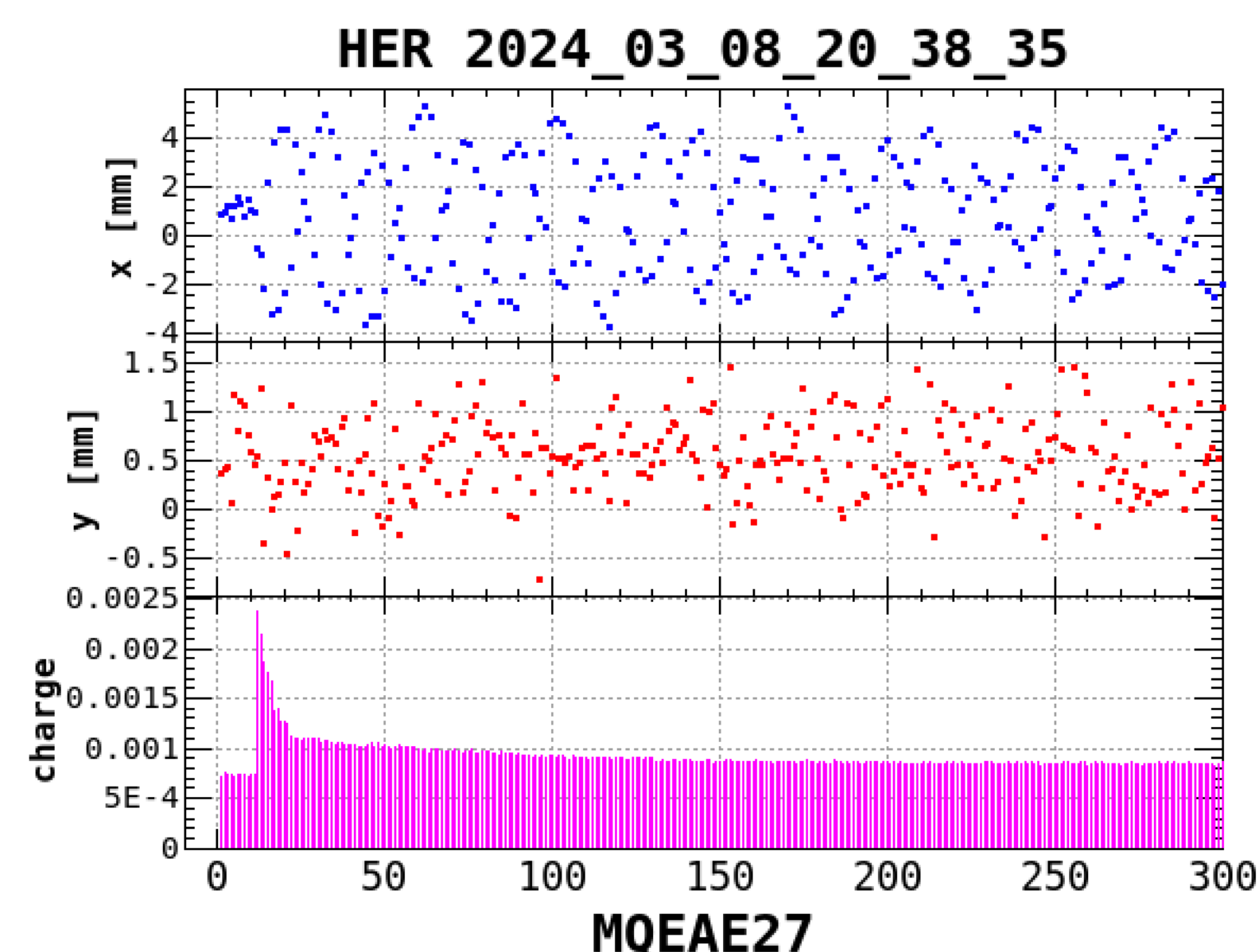
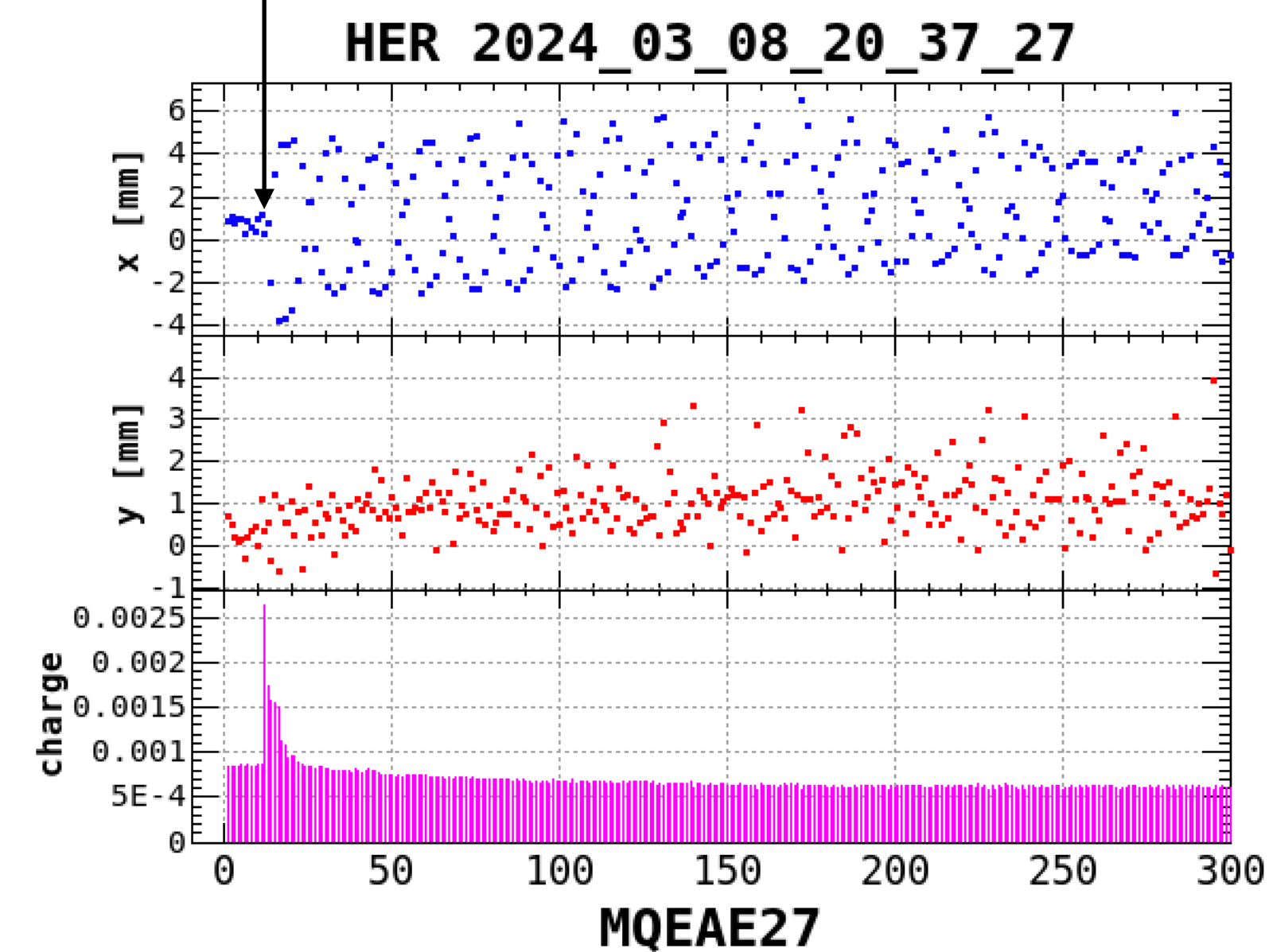
Injection Beam

$$\beta_y^* = 3 \text{ mm}$$



injection

$$\beta_y^* = 1 \text{ mm}$$



2024	January					February	
	27 (Sat)	28 (Sun)	29 (Mon)	30 (Tue)	31 (Wed)	1 (Thu)	2 (Fri)
C: Owl				HER Vacuum Scrubbing 3 mA	HER Vacuum Scrubbing 60 mA LER RF 10 kW Keep	HER Vacuum Scrubbing 100 mA LER Vacuum Scrubbing 100 mA	HER Vacuum Scrubbing 140 mA LER Vacuum Scrubbing 160 mA
A: Day			Tunnel Patrol (1 h) HER $\beta_y^* = 81.0$ mm Hardware Check	HER BCM HER BxB FB Adj.	HER BPM Gain Mapping	LER Abort Adj.	HER BxB FB Adj.
			Find HER COD HER RF OFF	HER X-Y Coupling Corr. HER Beta Corr. HER Ver. Dispersion Corr.	LER RF ON LER > 100 turns Stored Beam (6 mA) LER BCM LER BxB FB Adj.	LER D05V1 Orbit (Local Bump Adj.) LER X-Y Coupling Corr. LER Beta Corr. LER Ver. Dispersion Corr.	LER Tune Setting Trouble Acoustic Sensor (SBL)
B: Evening			Find HER COD HER RF OFF	HER vacuum scrubbing 60 mA	LER Skew Sextupole (SK2: -6 to -1 m ⁻²) LER Orbit at D05V1	HER Orbit Corr. LER Orbit Corr. LER X-Y Coupling Corr. LER Beta Corr. LER Ver. Dispersion Corr.	Acoustic Sensor (SBL)
			Find HER COD HER RF ON HER 30 turns HER Tune (H) Adj. Stored Beam (0.26 mA)	LER $\beta_y^* = 48.6$ mm (SNAP $\beta_y = 100$ m) Find LER COD LER RF OFF LER 4 turns	LER Orbit at D05V1 LER X-Y Coupling Corr.	LER Injection Tuning LER TBT BPM (Injection) LER BxB FB Adj.	Acoustic Sensor (SBL) HER Injection Tuning HER TBT BPM

2024	February						
	3 (Sat)	4 (Sun)	5 (Mon)	6 (Tue)	7 (Wed)	8 (Thu)	9 (Fri)
C: Owl	HER Vacuum Scrubbing 155 mA LER Vacuum Scrubbing 160 mA	HER Vacuum Scrubbing 330 mA LER Vacuum Scrubbing 330 mA	HER Vacuum Scrubbing 400 mA LER Vacuum Scrubbing 325 mA	HER Vacuum Scrubbing 400 mA LER Vacuum Scrubbing 330 mA	HER Vacuum Scrubbing 400 mA LER Vacuum Scrubbing 340 mA	HER Vacuum Scrubbing 500 mA LER Vacuum Scrubbing 400 mA	HER Vacuum Scrubbing 540 mA LER Vacuum Scrubbing 450 mA
A: Day	HER Vacuum Scrubbing 250 mA LER Vacuum Scrubbing 250 mA	HER Vacuum Scrubbing 400 mA LER Vacuum Scrubbing 340 mA	NEG Activation	Injection Kicker Tuning HER RF Kick Test	LER D05V1 Study HER Aperture Study	HER 540 mA LER 450 mA LER Chromaticity LER D05V1 Study	LER/HER Chromaticity LER Aperture Study (Hor. Inj. Kicker, TBT BPM)
			NEG Activation	Collision Bucket Timing LER Orbit Correction	LER D05V1 Study	LER Magnet Trouble (BLX4LP, QC1_2RP B3)	Injection Study BT (p) Study
B: Evening	HER Vacuum Scrubbing 300 mA LER Vacuum Scrubbing 300 mA	HER Vacuum Scrubbing 400 mA LER Vacuum Scrubbing 330 mA	HER BPM Gain Mapping HER Quad BPM LER BPM Gain Mapping LER Quad BPM	LER $\beta_y^* = 48.6$ mm (SNAP $\beta_y = 400$ m)	LER D05V1 Study	LER D05V1 Study HER RF Kick (Momentum Acceptance, TBT BPM)	Injection Study BT (p) Study HER RF Kick
			HER Orbit Correction LER Orbit Correction HER Optics Correction LER Optics Correction	LER Skew Sextupole (SK2: -1 to -6 m ⁻²) LER Orbit Correction LER Optics Correction	HER Vacuum Scrubbing 500 mA LER Vacuum Scrubbing 400 mA	LER D05V1 Study	HER Vacuum Scrubbing 600 mA LER Vacuum Scrubbing 550 mA

2024	February						
	10 (Sat)	11 (Sun)	12 (Mon)	13 (Tue)	14 (Wed)	15 (Thu)	16 (Fri)
C: Owl	HER Vacuum Scrubbing 600 mA LER Vacuum Scrubbing 550 mA	HER Vacuum Scrubbing 600 mA LER Vacuum Scrubbing 550 mA	HER Vacuum Scrubbing 600 mA LER Vacuum Scrubbing 550 mA	HER Vacuum Scrubbing 600 mA LER Vacuum Scrubbing 550 mA	HER Vacuum Scrubbing 6 mA LER Vacuum Scrubbing 500 mA	HER Vacuum Scrubbing 50 mA LER Vacuum Scrubbing 100 mA	LER Vacuum Scrubbing 200 mA HER RF D04A KLY COLLECTOR WATER LEVEL
A: Day	Vacuum Scrubbing	Vacuum Scrubbing	Vacuum Scrubbing	HER $\beta_y^* = 81 \rightarrow 8$ mm HER $\beta_y^* = 8 \rightarrow 3$ mm HER $\beta_y^* = 3 \rightarrow 2$ mm HER $\beta_y^* = 2 \rightarrow 1$ mm	HER Optics Correction HER Injection Tuning	LER BPM gain mapping LER Quad BPM	HER $\beta_y^* = 1 \rightarrow 8$ mm HER Quad BPM LER Quad BPM
				HER Optics Correction	HER Injection Tuning HER Optics Correction	LER Quad BPM LER Orbit Tuning LER Optics Correction Find Collision Bucket	HER Quad BPM
B: Evening	Vacuum Scrubbing	Vacuum Scrubbing	Vacuum Scrubbing	HER BxB FB Tuning	HER Injection Tuning HER Aperture Meas. HER Kicker Tuning	HER 120 mA HER RF Kick (Momentum Acceptance, TBT BPM)	HER Orbit Correction
				HER Injection Tuning HER Collimator Tuning	HER Injection Tuning HER Collimator Tuning LER $\beta_y^* = 48.6 \rightarrow 8$ mm HER Kicker Calibration	HER Kicker Calibration HER RF D04A KLY COLLECTOR WATER LEVEL	HER Optics Correction Vacuum Scrubbing HER 200 mA LER 200 mA

2024	February						
	17 (Sat)	18 (Sun)	19 (Mon)	20 (Tue)	21 (Wed)	22 (Thu)	23 (Fri)
C: Owl	HER Vacuum Scrubbing 200 mA LER Vacuum Scrubbing 200 mA	HER Vacuum Scrubbing 500 mA LER Vacuum Scrubbing 500 mA	HER Vacuum Scrubbing 500 mA LER Vacuum Scrubbing 500 mA	HER Vacuum Scrubbing HER 500 mA LER Vacuum Scrubbing LER 500 mA	Test of Physics Run HER 180 mA LER 260 mA	RF D08E KPS WATER FLOW HER Vacuum Scrubbing HER 500 mA LER Vacuum Scrubbing LER 300 mA	Physics Run HER 180 mA LER 260 mA
A: Day			Horizontal Beam-Beam Scan (RF Phase)	BOR Calibration Belle II diamond thres.	Maintenance (regular)	LER Optics Measurement HER Ver. Aperture Meas.	Physics Run HER 180 mA LER 290 mA
			Bucket Selection Trigger Tuning LER TBT BPM Tuning LER Hor. Aperture Meas. LER Injection Tolerance Meas.	HER Hor. Aperture Meas. LER Injection Tolerance Meas.		LER Injection Tolerance Meas.	Simple BOR Calibration HER BOR Calibration
B: Evening			Vertical Beam-Beam Scan	HER RF Kick LER Injection Tolerance Meas. Start of Physics Run	Restart of Operation BCM / BxB FB Tuning BPM Gain Mapping Quad-BPM Detuned $\rightarrow \beta_y^* = 8$ mm	Collision Tuning	
			Collision Tuning	Collision Tuning	LER/HER Orbit Correction LER/HER Optics Correction	ECL Online Lum. Trouble Physics Run HER 180 mA LER 260 mA	Physics Run HER 360 mA LER 450 mA

2024	February						March
	24 (Sat)	25 (Sun)	26 (Mon)	27 (Tue)	28 (Wed)	29 (Thu)	1 (Fri)
C: Owl	Physics Run HER 360 mA LER 450 mA HER QFROE PS	Physics Run HER 360 mA LER 450 mA	Physics Run HER 410 mA LER 500 mA	LER 500 mA HER SD3ORE PS Trouble HER QFROE PS	Physics Run HER 375 mA LER 470 mA HER QFROE PS	Physics Run HER 200 mA LER 280 mA 5:00 LER Beam OFF	Physics Run HER 250 mA LER 350 mA
A: Day		13:57 LER Inj. Kicker Accidental Fire 14:30 LER Inj. Kicker Accidental Fire	Collision Tune Scan	Acoustic Sensor (D02V1) Linac KL3-4 LER RF D07B (Detuned)	Nikko Cooling Water Pump (Magnet) Linac Machine Study Magnet Initialization	LER D07B KLY Exchange HER Optics Study e- Linac/BT Study	Injection Study (Bayesian Optimization) e- Linac/BT Study
			Injection Tolerance Meas. (HER) HER Ver. Kicker Study LER Collimator Study	LER IP Knob LER Z-Position (meas. +3.91 mm) LER Optics Meas.	13:30 Beam ON HER SD3ORE PS Trouble LER $\beta_y^* = 8 \rightarrow 3$ mm e- BT Study	LER D07B KLY Exchange HER Optics Study e- Linac/BT Study	Radiation Measurement (LER D05V1) HER Machine Study
B: Evening		Physics Run HER 420 mA LER 500 mA	Injection Tolerance Meas. (HER) LER Collimator Study LER Tune Shift Meas.	HER Beam ON HER Optics Check HER TBT BPMs (Inj.)	HER $\beta_y^* = 8 \rightarrow 3$ mm LER/HER Orbit Correction Optics Correction	e- Linac/BT Study LER Optics Study	Collision Tuning
			HER SD3ORE PS Trouble LER 500 mA	Collision Tuning	Collision Tuning Collimator Tuning	Collision Tuning Physics Run HER 200 mA LER 280 mA	Physics Run HER 400 mA LER 500 mA

2024	March						
	2 (Sat)	3 (Sun)	4 (Mon)	5 (Tue)	6 (Wed)	7 (Thu)	8 (Fri)
C: Owl	Physics Run HER 380 mA LER 520 mA Collimator Tuning (LER) MQLC3RP (Bad BPM) Belle II CLAWS Abort	Physics Run HER 380 mA LER 520 mA HER QFROE PS Trouble BTe Energy FB Stop	Physics Run HER 380 mA LER 520 mA RF VODL CONTROL	Physics Run HER 380 mA LER 520 mA 7:00 am Beam OFF Belle II Investigation	HER 60 mA LER 150 mA Linac/BT Study	Physics Run HER 110 mA LER 260 mA	Physics Run HER 180 mA LER 260 mA
A: Day	HER RF D04H PLC CPU	Chiller Trouble (OHO) Tunnel Air Temp. HER RF D04G Tune-Phase LER RF D05A Coupler Temp due to OHO Temp.	Radiation Measurement (Nuclear Regulatory Agency) HER 380 mA LER 520 mA < 5 µSV/h	HER $\beta_y^* = 3 \rightarrow 2$ mm HER $\beta_y^* = 2 \rightarrow 1$ mm HER Orbit Correction	LER $\beta_y^* = 3 \rightarrow 2$ mm LER $\beta_y^* = 2 \rightarrow 1$ mm LER Orbit Correction	Injection Study	Collimator Tuning
			Linac Pulsed Magnet cRIOs Linac/BT Study HER Aperture Mes.	HER Optics Correction	LER Optics Correction	Injection Study	Collimator Tuning Linac/BT Tuning
B: Evening	Belle II CLAWS Abort		Physics Run HER 380 mA LER 520 mA	HER Optics Correction	LER Optics Correction	Collision Tuning	Collision Tuning
			Physics Run HER 380 mA LER 520 mA	Machine Tuning	Collision Tuning	Physics Run HER 180 mA LER 260 mA	Physics Run HER 250 mA LER 360 mA

2024	March						
	9 (Sat)	10 (Sun)	11 (Mon)	12 (Tue)	13 (Wed)	14 (Thu)	15 (Fri)
C: Owl	Physics Run HER 300 mA LER 400 mA	LER RF D08E Chiller Water (Detuned) 4:01 LER Inj. Kicker Accidental Fire Reserver Voltage Adj. RF VODL CONTROL	Physics Run HER 300 mA LER 400 mA Oho Chiller/Water Pump Trouble	Physics Run HER 300 mA LER 400 mA LER RF D08E Chiller Water (Detuned)	Physics Run 1:05, 2:55, 4:58 LER Inj. Kicker Accidental Fire	Physics Run	Physics Run HER 300 mA LER 400 mA
A: Day	Physics Run	Physics Run HER 300 mA LER 400 mA	Linac/BT Study LER D08E Chiller Reset (D08E recovered)	Beam-Beam Study	maintenance (minimum) Linac Study LER RF D08CD Chiller Replacement	Physics Run	Physics Run
			Linac/BT Study LER RF D08CD Chiller Down (Reset ON)	Beam-Beam Study	Linac Study LER RF D08CD Chiller Replacement LER Kicker Reserver Voltage Adj.	Physics Run HER 300 mA LER 400 mA Tsukuba Cooling Water Adjustment	Baking Run (2346) LER 600 mA HER 480 mA Linac/BT Study
B: Evening	Physics Run	Physics Run	Linac/BT Study	Physics Run	Linac/BT Study	LER D05V1 Study	Linac/BT Tuning Matching at 5 sector
			Physics Run HER 300 mA LER 400 mA	Physics Run	Physics Run	LER D05V1 Study Physics Run	Physics Run HER 460 mA LER 600 mA

2024	March						
	16 (Sat)	17 (Sun)	18 (Mon)	19 (Tue)	20 (Wed)	21 (Thu)	22 (Fri)
C: Owl	Physics Run HER 480 mA LER 600 mA LER QN8OP MG NA IL Nikko MG Cooling Water Pump (3:54 - 4:00)	Physics Run HER 480 mA LER 600 mA LER RF D05F Trouble	Physics Run HER 480 mA LER 600 mA HER QFROE_4 Trouble Baking Run	Physics Run HER 300 mA LER 400 mA	Physics Run HER 480 mA LER 600 mA	Physics Run HER 520 mA LER 650 mA	Physics Run HER 560 mA LER 700 mA
A: Day		LER XRM Trouble HER Ver. Emittance Blowup (Slow Drift)	Physics Run HER 520 mA LER 650 mA	Physics Run HER 480 mA LER 600 mA z-Position Adjustment	Physics Run HER 520 mA LER 650 mA	Baking Run HER 560 mA LER 700 mA Physics Run Earthquake HER Optics Correction	Baking Run HER 600 mA LER 750 mA Tune Scan
			LER Crab Waist ON	14:00, 14:15 LER Inj. Kicker Accidental Fire (K1-3) LER Thyatron Replacement		LER RF D05A Trouble LER Optics Correction Physics Run	Beam-Beam Study
B: Evening	18:12 Belle II CLAWS Abort	HER Ver. Tune Scan (43.582 to 43.587)	HER Crab Waist ON Aperture Measurement	Chromaticity Measurement Injection Tolerance Meas	Physics Run HER 520 mA LER 650 mA	Beam-Beam Study	Physics Run HER 600 mA LER 750 mA
			Physics Run HER 300 mA LER 400 mA	Physics Run		Beam-Beam Study Physics Run	

2024	March						
	23 (Sat)	24 (Sun)	25 (Mon)	26 (Tue)	27 (Wed)	28 (Thu)	29 (Fri)
C: Owl	Physics Run HER 600 mA LER 750 mA	Physics Run HER 600 mA LER 750 mA	Physics Run HER 600 mA LER 750 mA	Physics Run HER 640 mA LER 800 mA	Physics Run HER 680 mA LER 850 mA	Physics Run	Physics Run HER 640 mA LER 800 mA
A: Day			Baking Run HER 640 mA LER 800 mA Physics Run MAC (9:00 - 17:35)	Baking Run HER 680 mA LER 850 mA Physics Run MAC (9:00 - 16:40)	maintenance (regular) MAC (11:00 - 12:00)	HER $\beta_y^* = 3 \rightarrow 2$ mm HER $\beta_y^* = 2 \rightarrow 1$ mm HER Orbit Correction HER Optics Correction	Physics Run HER 680 mA LER 850 mA
						LER $\beta_y^* = 3 \rightarrow 2$ mm LER $\beta_y^* = 2 \rightarrow 1$ mm LER Orbit Correction LER Optics Correction	
B: Evening			Physics Run	Physics Run	Restart of Operation BPM Gain Mapping Quad-BPM Detuned $\rightarrow \beta_y^* = 8$ mm $\beta_y^* = 8 \rightarrow 3$ mm	Injection Tuning	Physics Run
					LER/HER Orbit Correction LER/HER Optics Correction Collision Tuning	Collision Tuning	