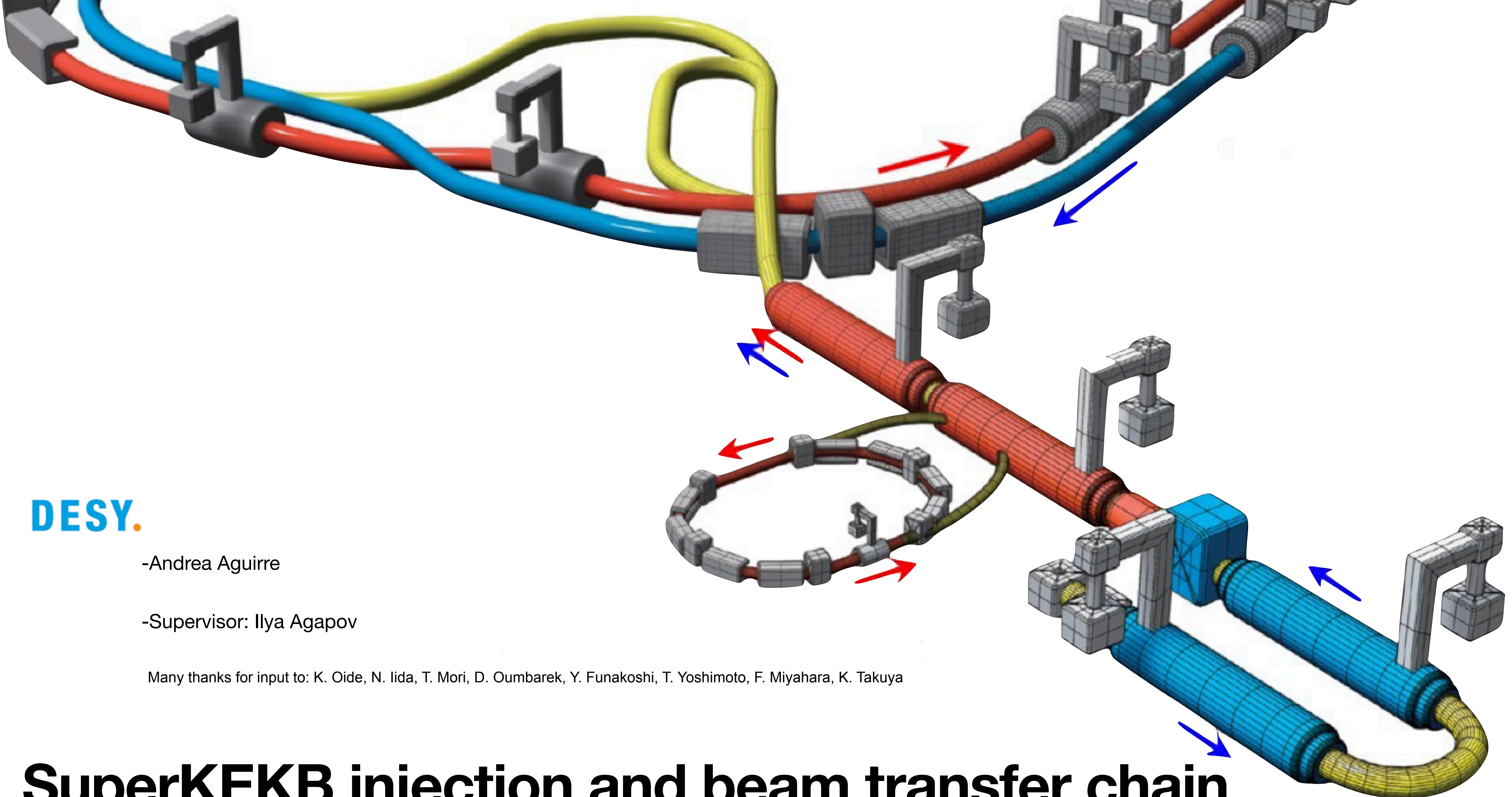




DESY.

-Andrea Aguirre

-Supervisor: Ilya Agapov

Many thanks for input to: K. Oide, N. Iida, T. Mori, D. Oumbarek, Y. Funakoshi, T. Yoshimoto, F. Miyahara, K. Takuya

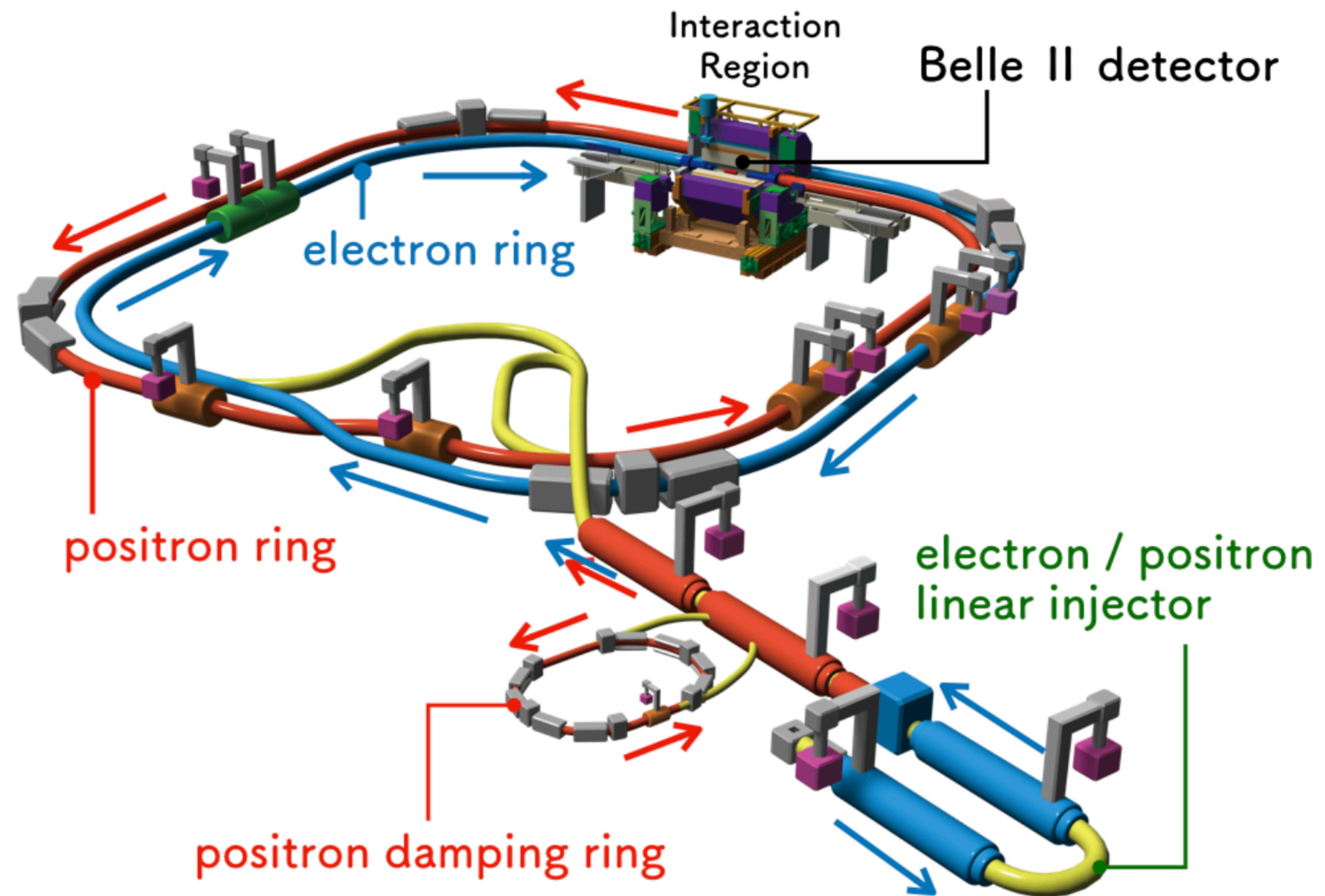
SuperKEKB injection and beam transfer chain

DESY.

-Andrea Aguirre

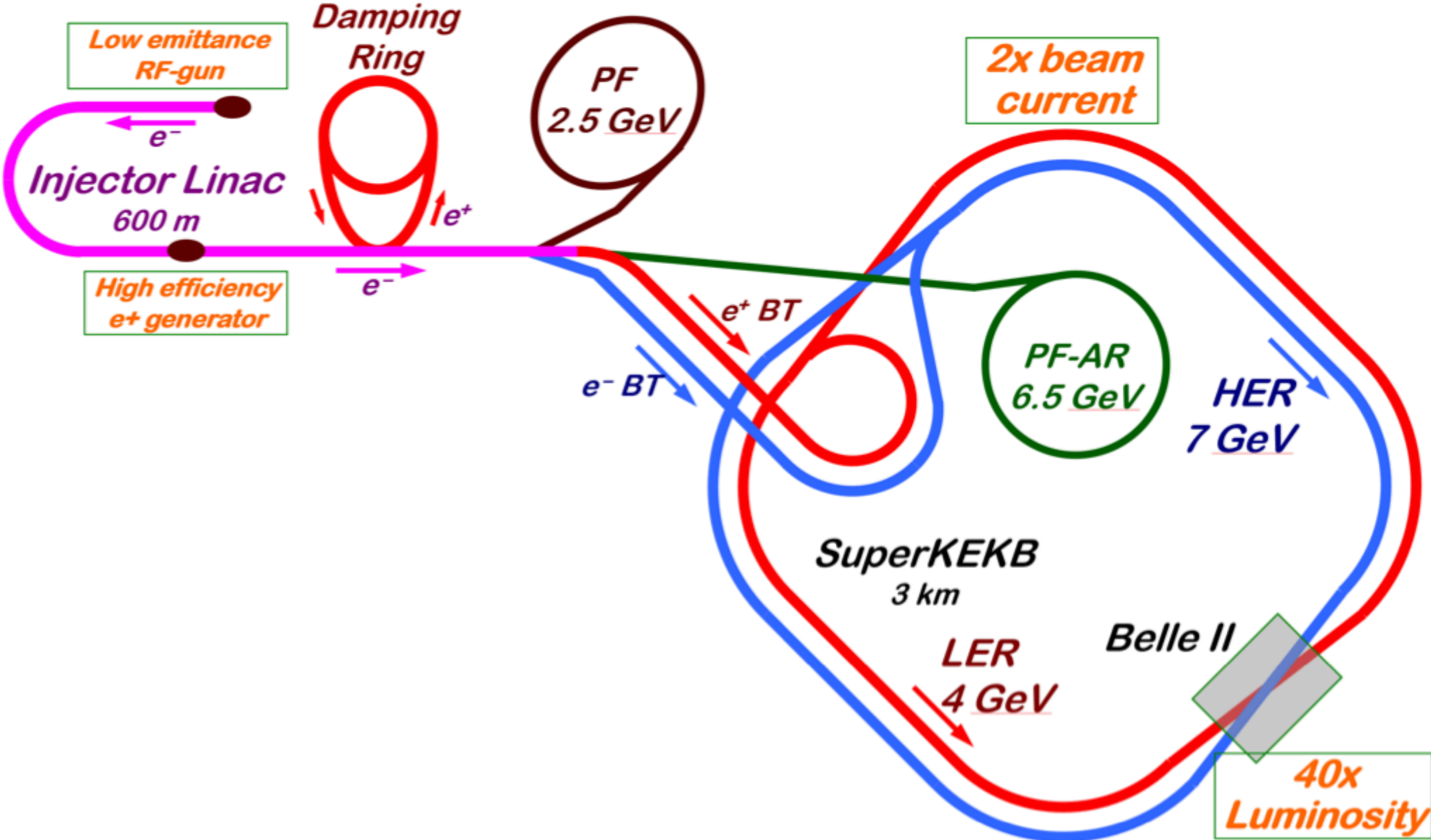
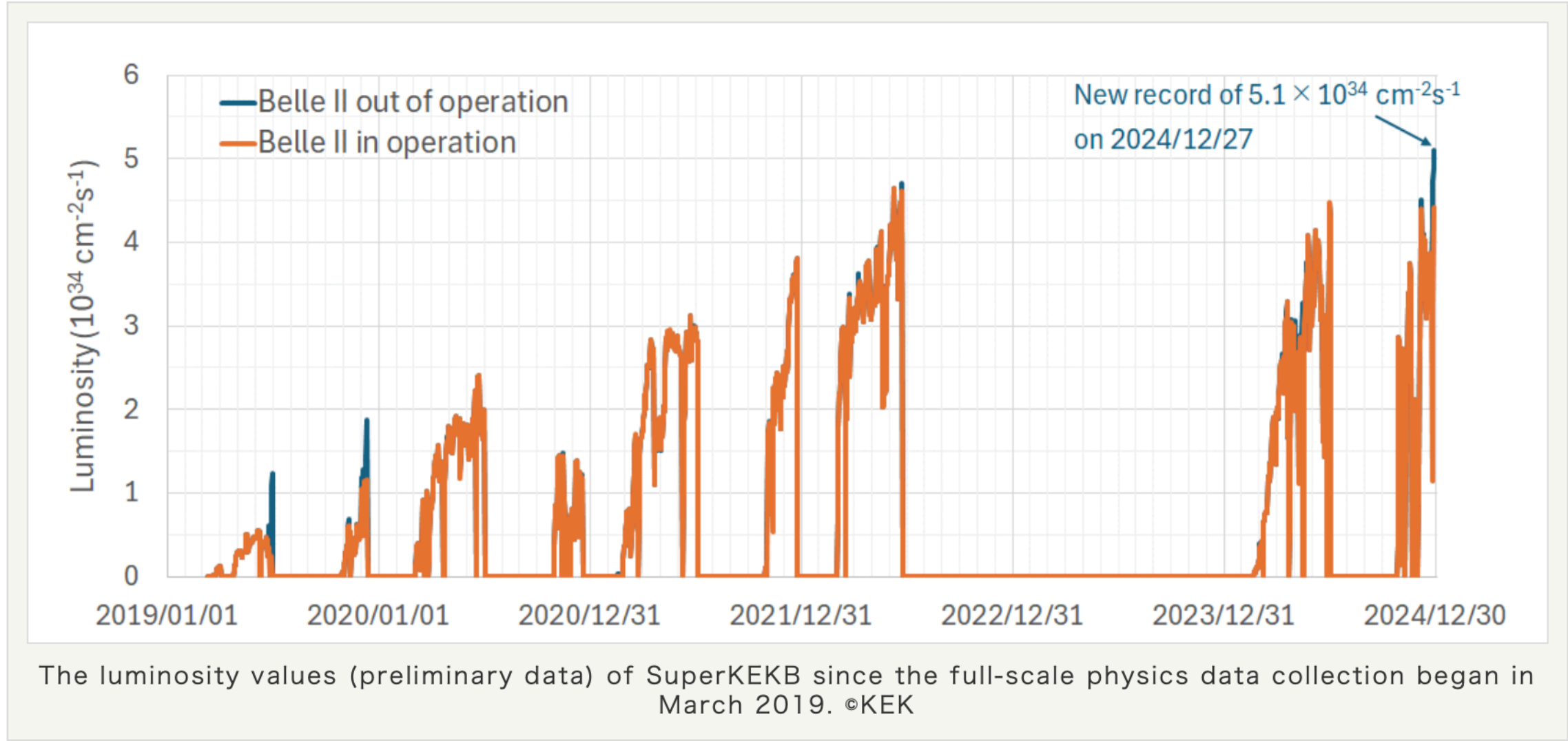
-Supervisor: Ilya Agapov

Many thanks for input to: K. Oide, N. Iida, T. Mori, D. Oumbarek, Y. Funakoshi, T. Yoshimoto, F. Miyahara, K. Takuya



SuperKEKB injection and beam transfer chain

world's highest instantaneous luminosity

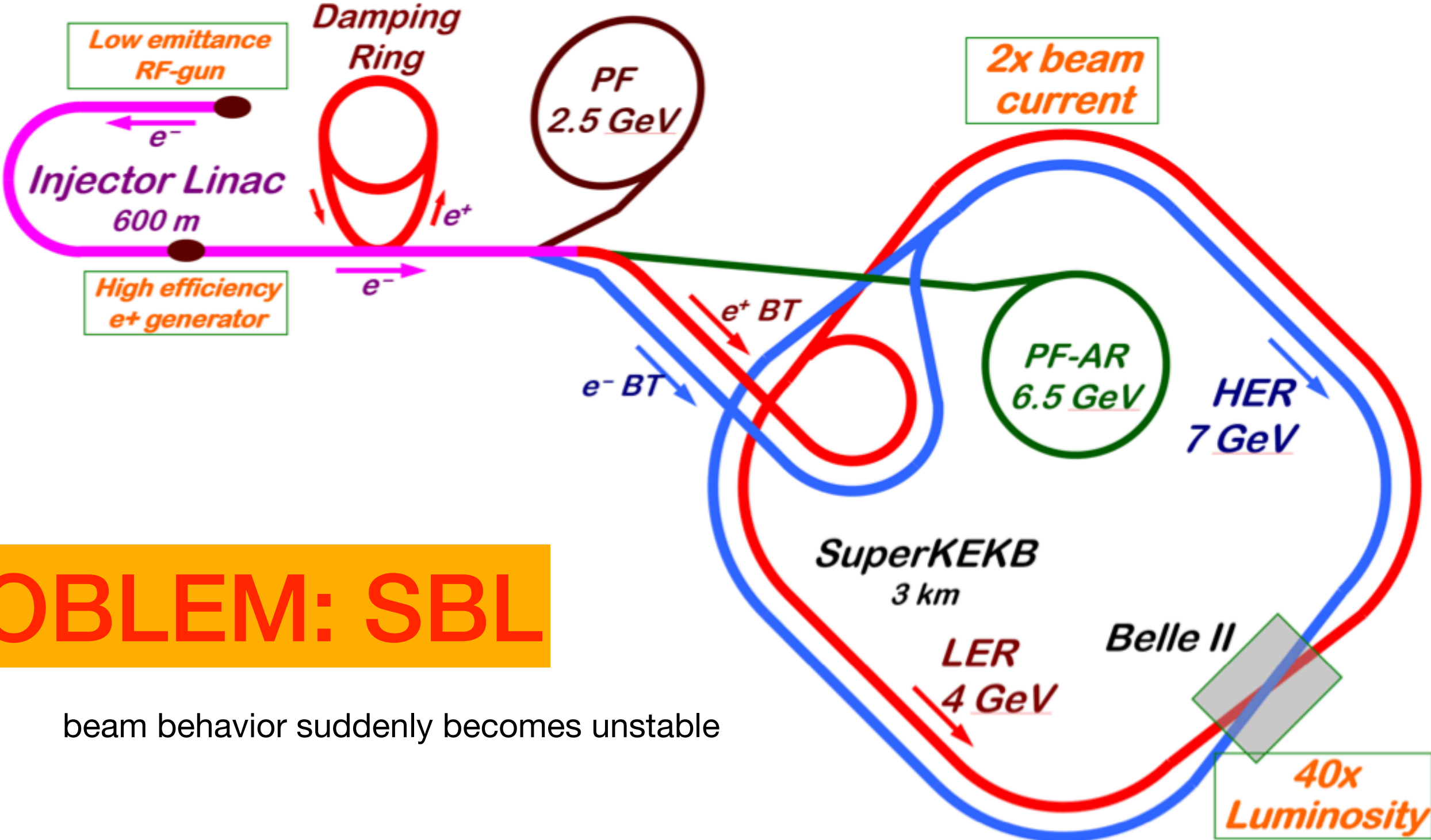
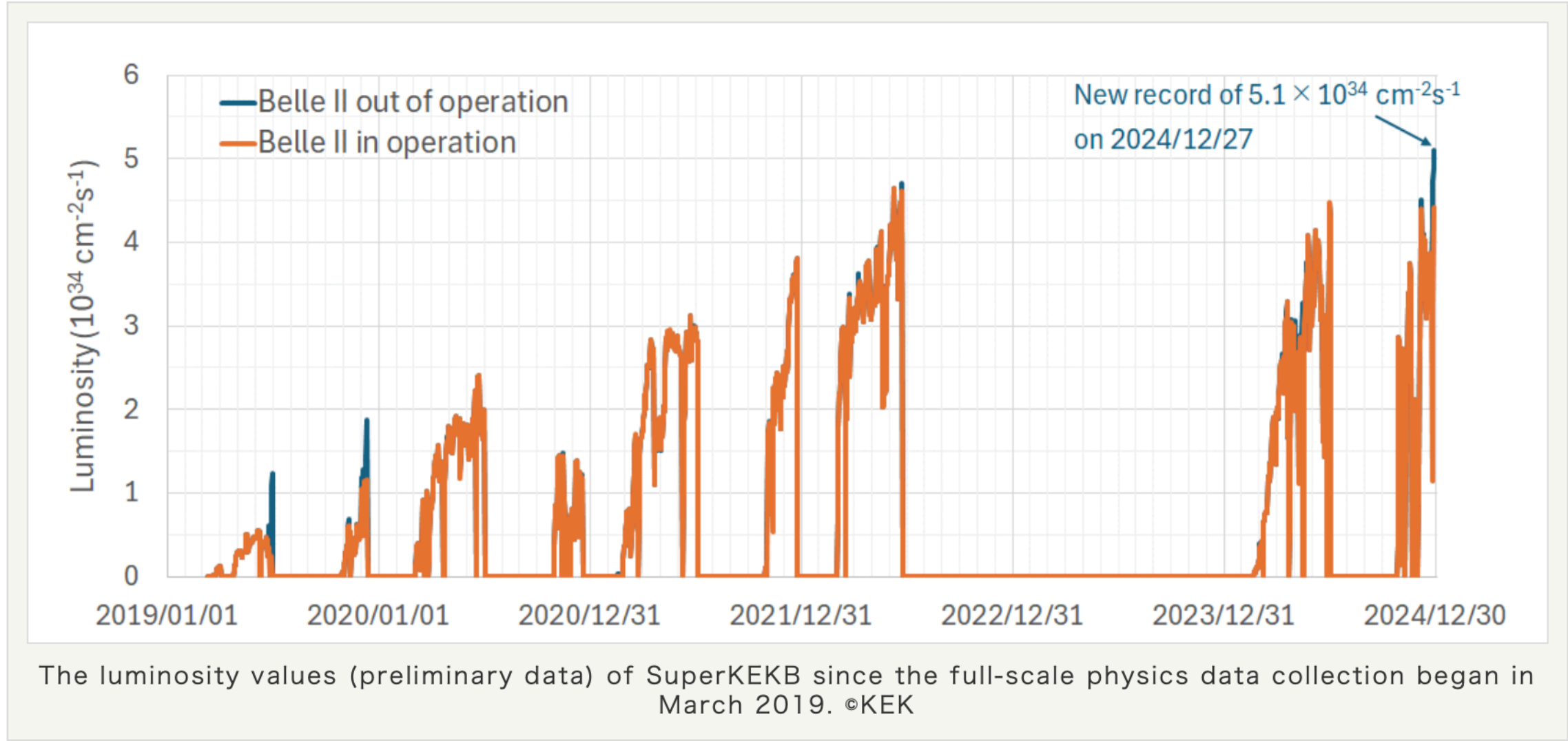


Designed: $8 \times 10^{35} \text{ cm}^{-2} \text{ s}^{-1}$

Next target: $1 \times 10^{35} \text{ cm}^{-2} \text{ s}^{-1}$

👑 $L=0.51 \times 10^{35} \text{ cm}^{-2} \text{ s}^{-1}$

world's highest instantaneous luminosity



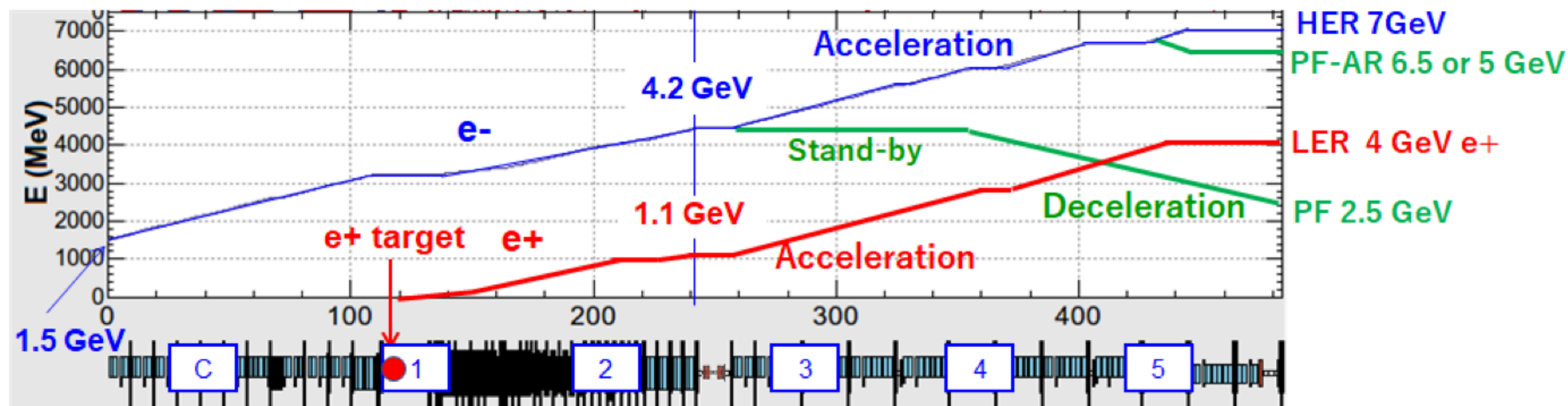
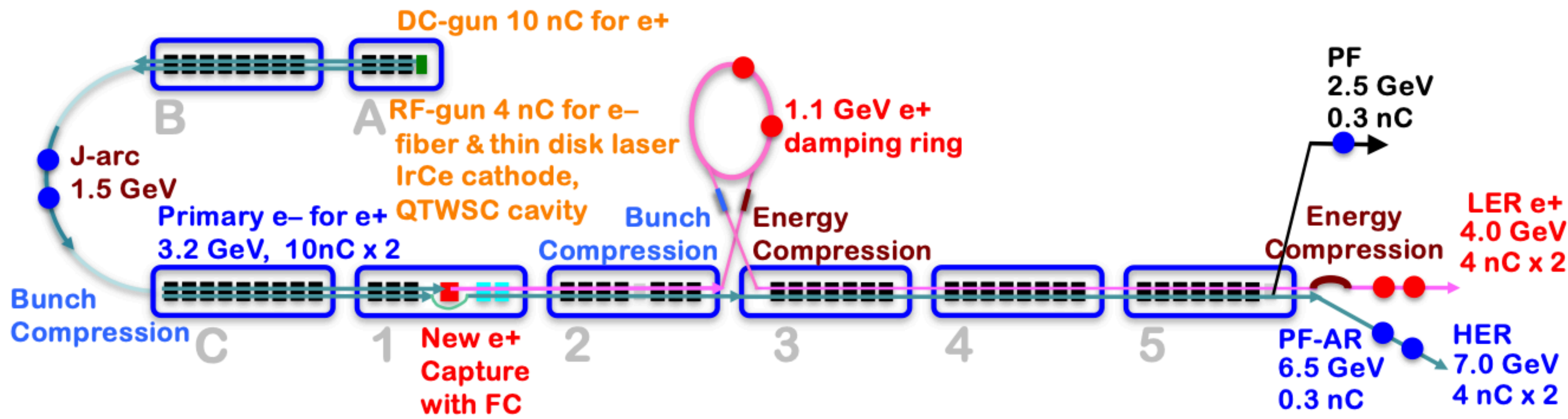
PROBLEM: SBL

beam behavior suddenly becomes unstable

Designed: $8 \times 10^{35} \text{ cm}^{-2} \text{ s}^{-1}$

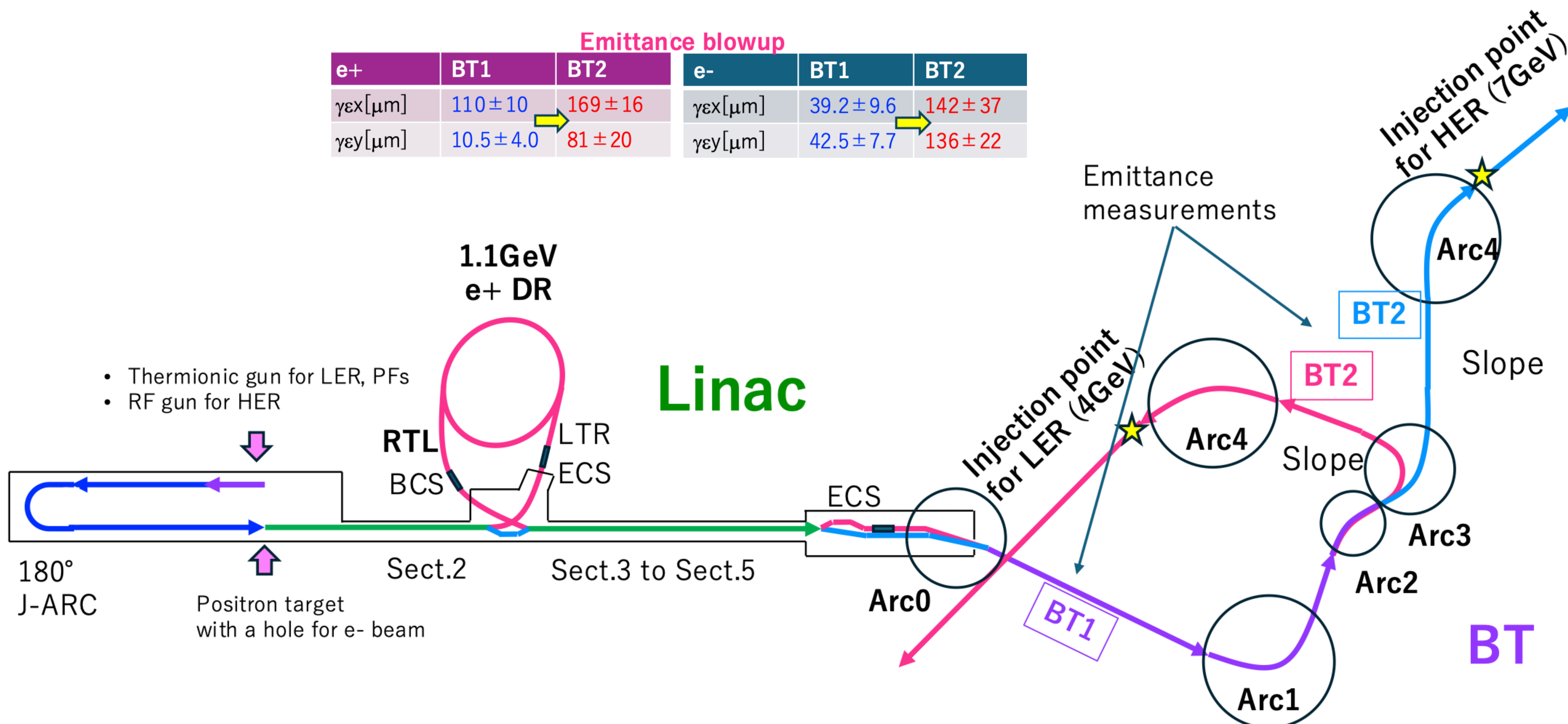
Next target: $1 \times 10^{35} \text{ cm}^{-2} \text{ s}^{-1}$

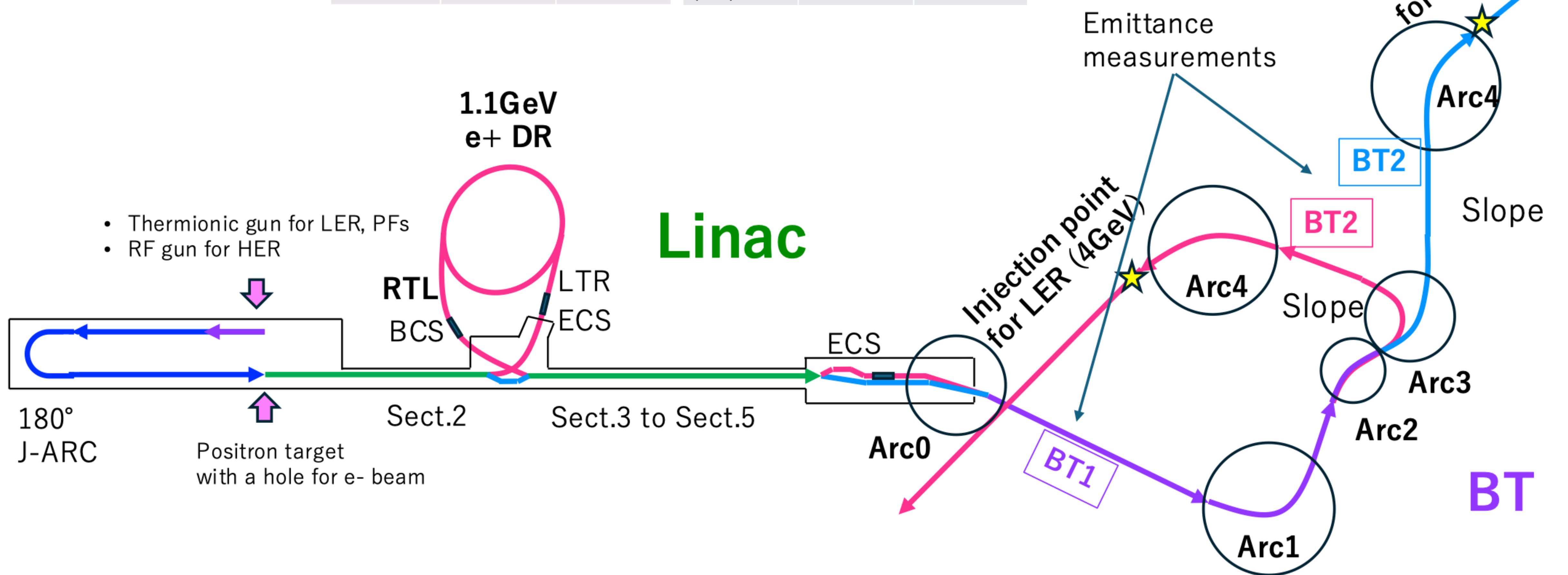
👑 $L=0.51 \times 10^{35} \text{ cm}^{-2} \text{ s}^{-1}$



Emittance blowup

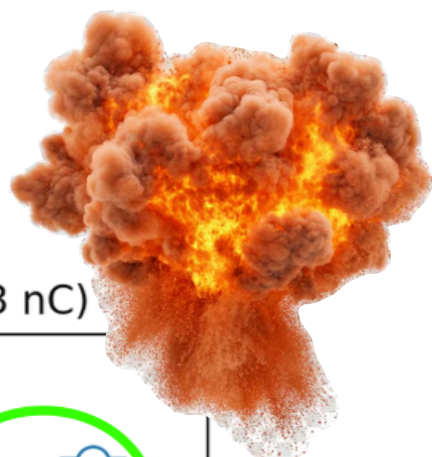
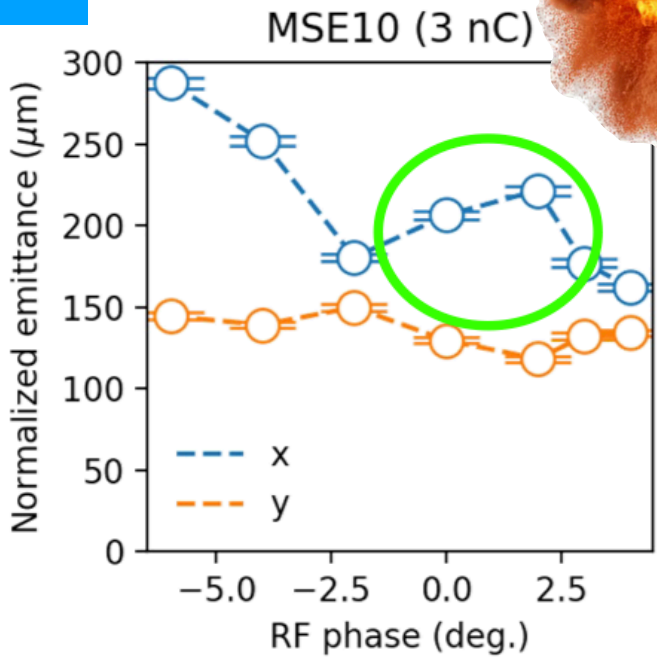
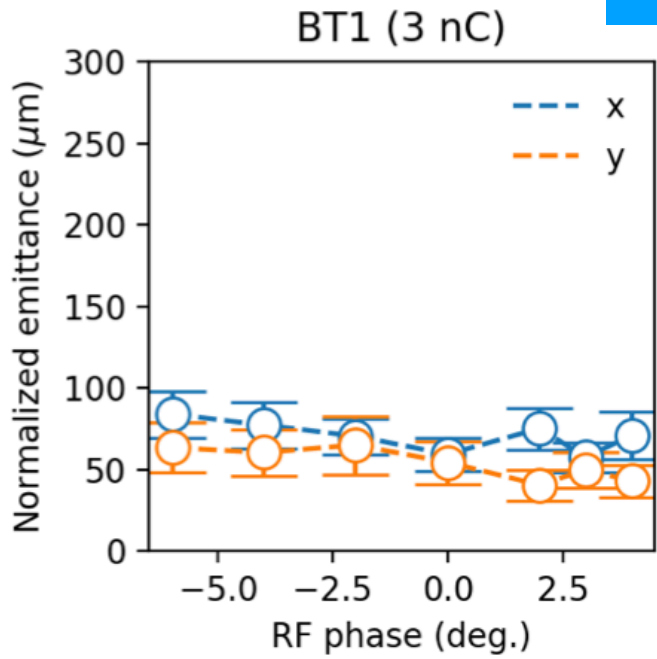
e+	BT1	BT2	e-	BT1	BT2
$\gamma\epsilon_x[\mu\text{m}]$	110 ± 10	169 ± 16	$\gamma\epsilon_x[\mu\text{m}]$	39.2 ± 9.6	142 ± 37
$\gamma\epsilon_y[\mu\text{m}]$	10.5 ± 4.0	81 ± 20	$\gamma\epsilon_y[\mu\text{m}]$	42.5 ± 7.7	136 ± 22





ICG summary
20250609
T. Yoshimoto

BTE



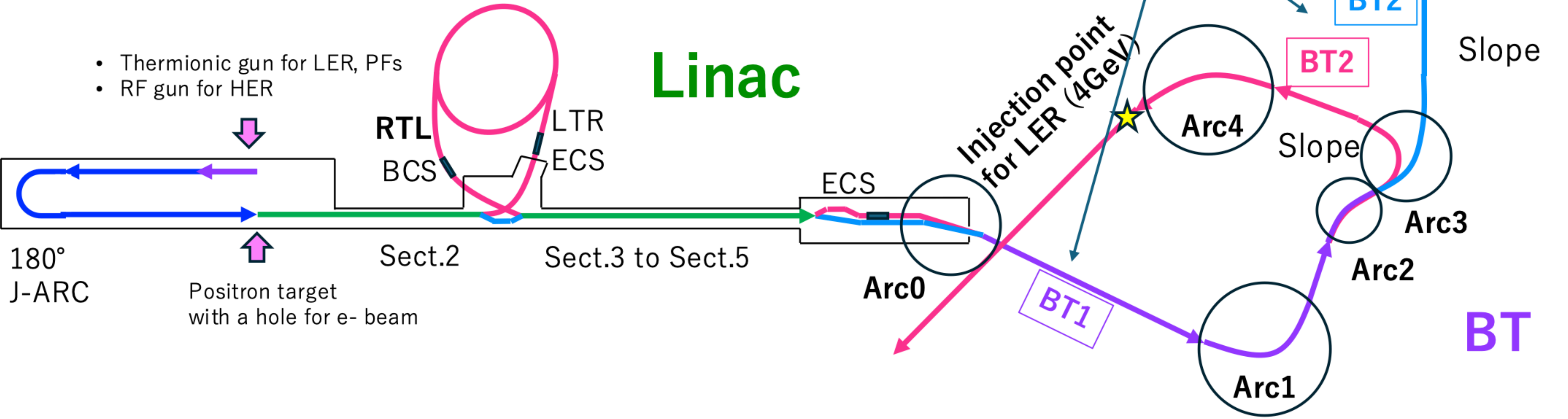
Last
measurements

CSR
effect

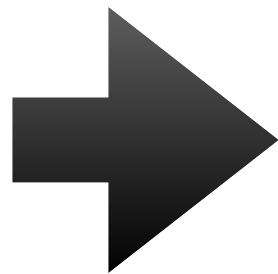
1.1GeV
e+ DR

Linac

- Thermionic gun for LER, PFs
- RF gun for HER



CONVERTER



Nuclear Instruments and Methods in Physics Research A 768 (2014) 151–156



Contents lists available at [ScienceDirect](#)

Nuclear Instruments and Methods in Physics Research A

journal homepage: www.elsevier.com/locate/nima



OCELOT: A software framework for synchrotron light source and FEL studies

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^b NRC Kurchatov Institute, Moscow, Russia
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ARTICLE INFO

Article history:
Received 18 June 2014
Received in revised form 22 September 2014
Accepted 22 September 2014
Available online 28 September 2014

ABSTRACT

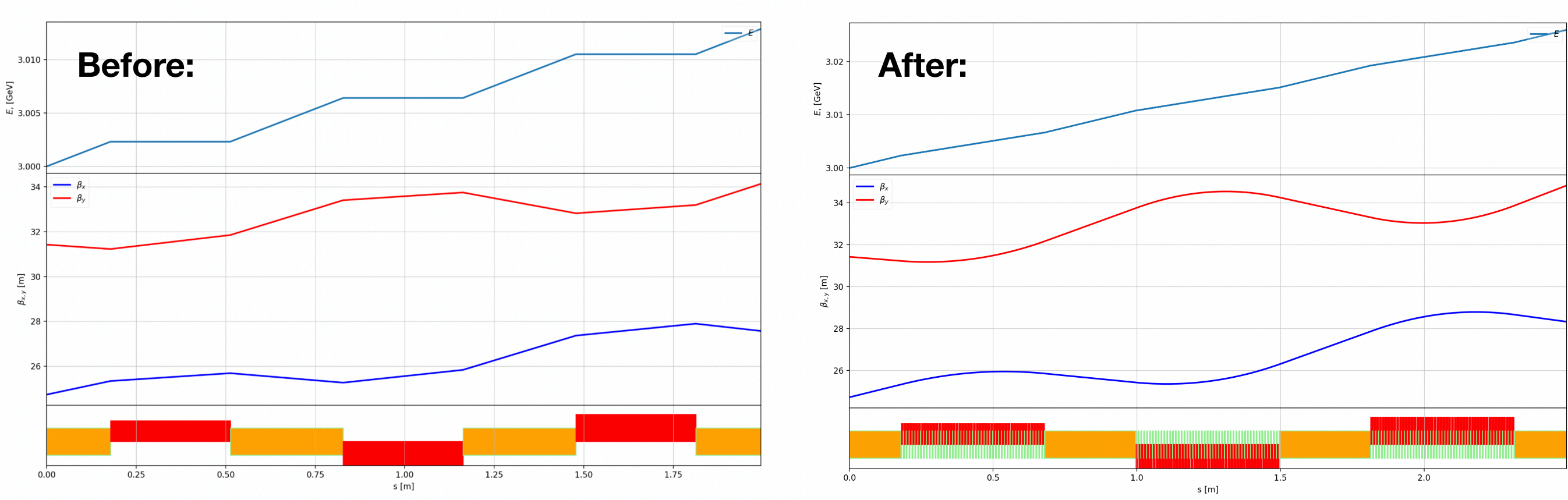
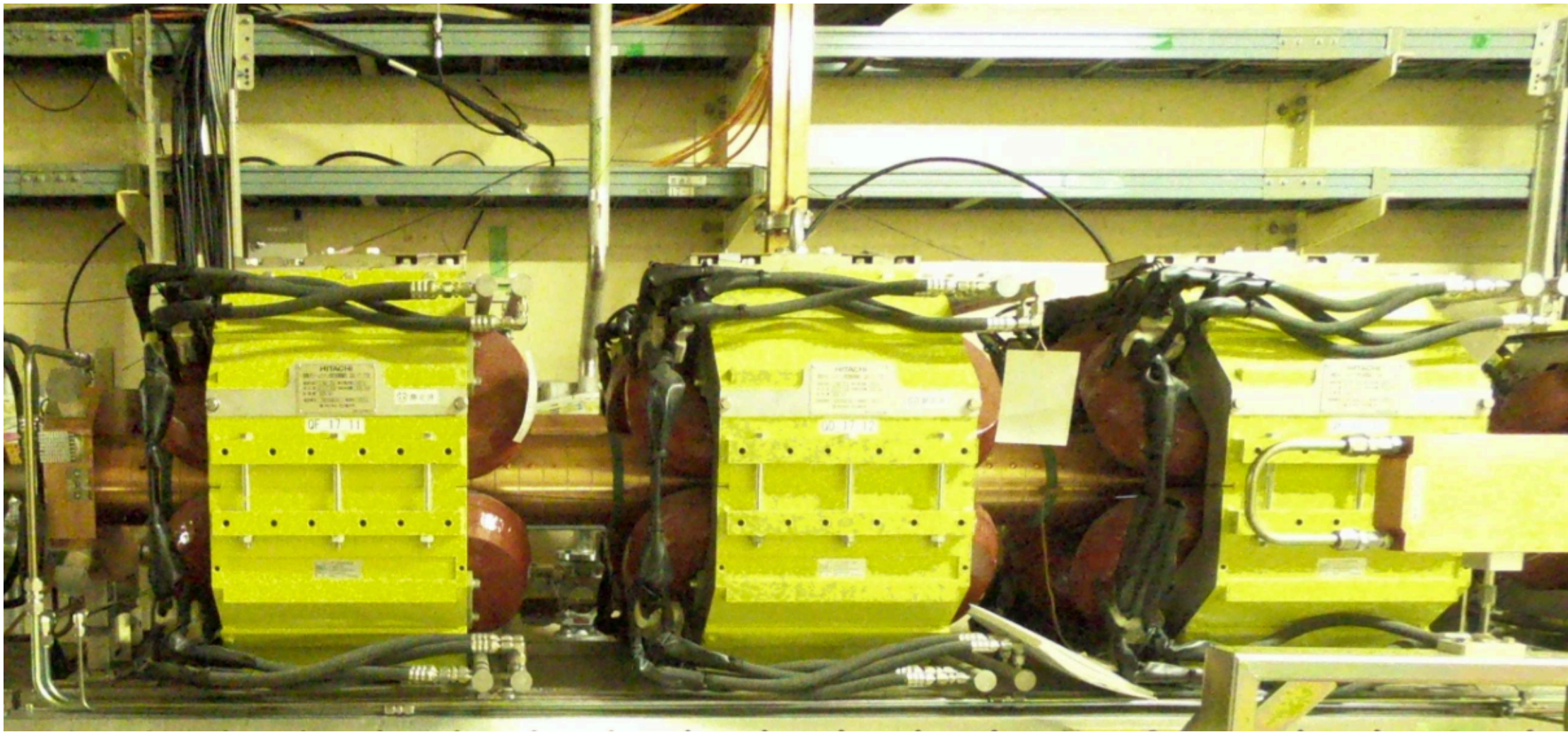
OCELOT is a novel multiphysics simulation toolkit, which has been in development at European XFEL in collaboration with NRC Kurchatov Institute and DESY since 2011. In this paper we describe its architecture, implementation, and applications in the area of synchrotron light sources and FELs.

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ELEMENTS OF SUPERKEKB

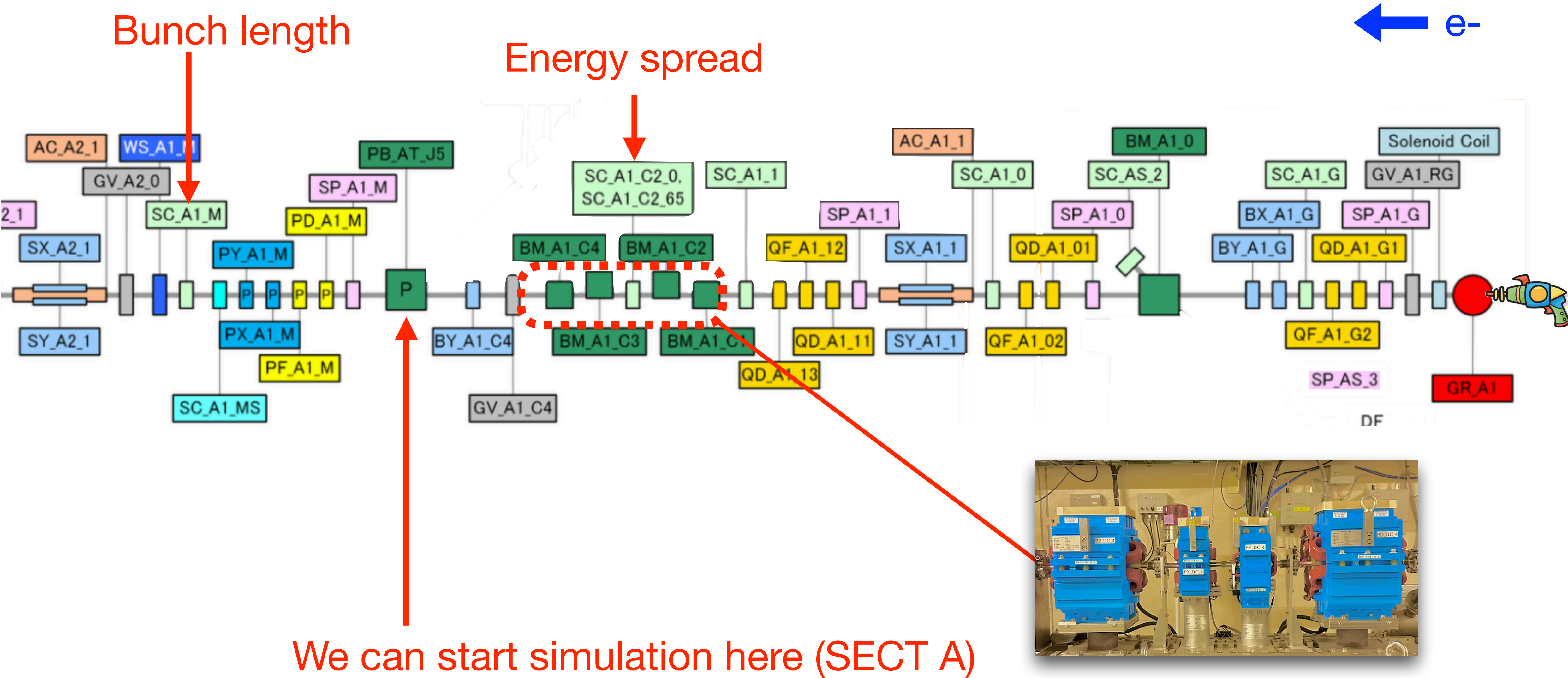
SAD:

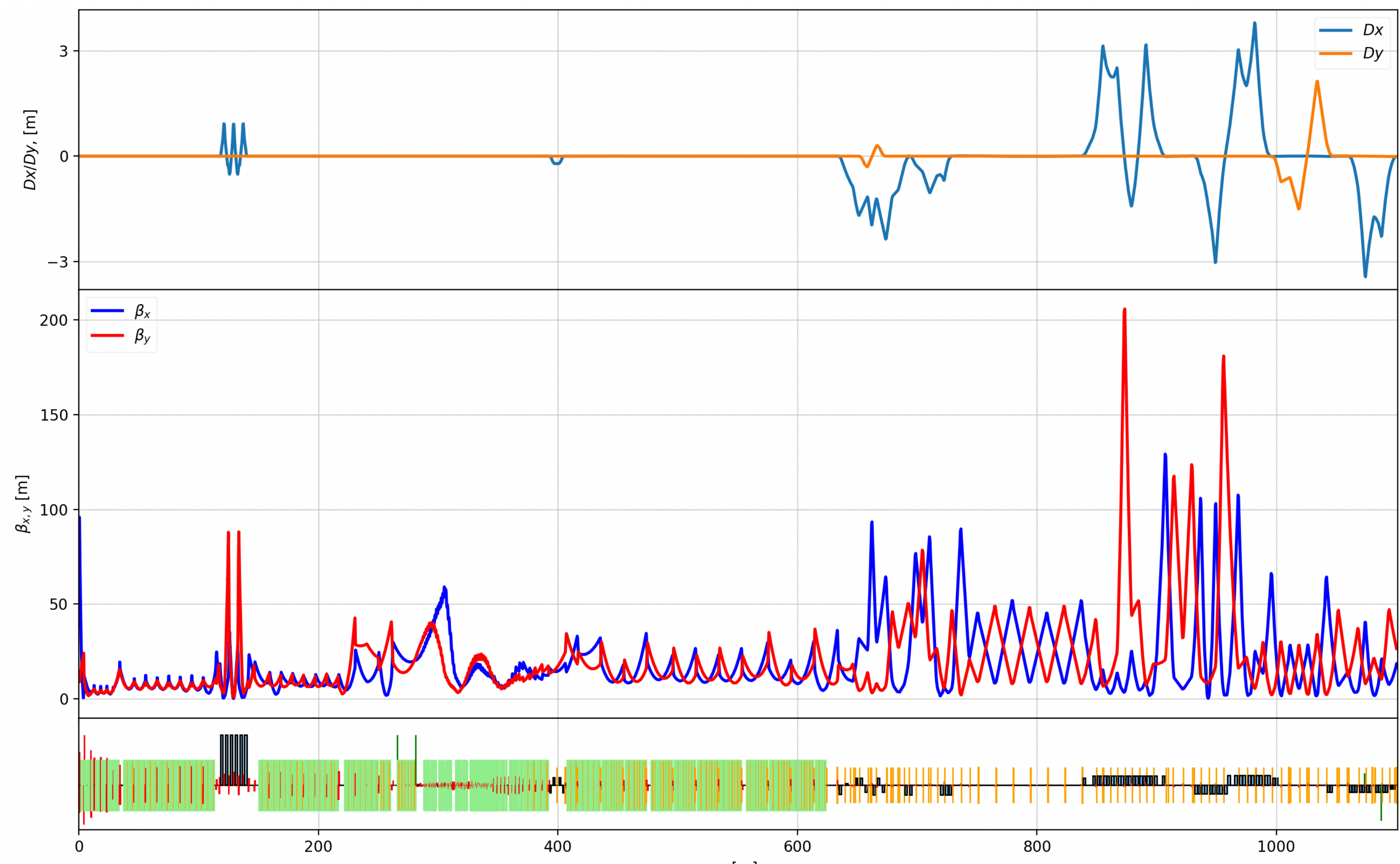
- BEND
- CAVI
- SOL
- SEXT
- QUAD
- DRIFT



- Thermal Cathode Gun
- RF Gun
- Beam Stopper
- Charge Limit Monitor
- Positron Target
- Sextupole Magnet(DC)
- Acceleration Tube
- Flux Concentrator
- Quadrupole Magnet(DC)
- Quadrupole Magnet (Pulse)
- Screen Monitor
- Bending Magnet(DC)
- Bending Magnet (Pulse)
- Backleg Magnet
- Solenoid coil
- Steering Magnet (DC)
- Steering Magnet (Pulse)
- Collimator
- Wire Scanner
- Stripline Timing Monitor
- Beam Position Monitor
- Vacuum Gate Valve
- Beam shutter
- Beam Dump

Bunch length and energy spread measurement





LONGITUDINAL WAKEFIELDS

For a bunch of longitudinal charge distribution λ_z , the *bunch wake* $\mathcal{W}(s)$ —the voltage *gain* for a test particle at position s —is given by

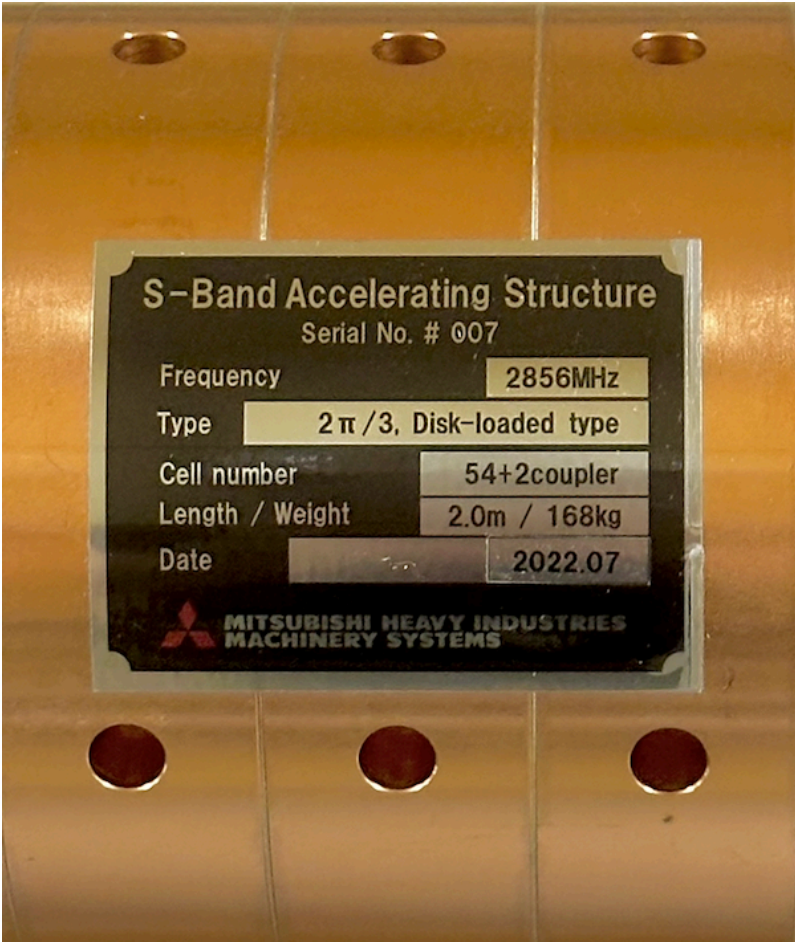
$$\mathcal{W}(s) = - \int_0^\infty W(s') \lambda_z(s - s') ds' .$$

For an array of cavities with period p

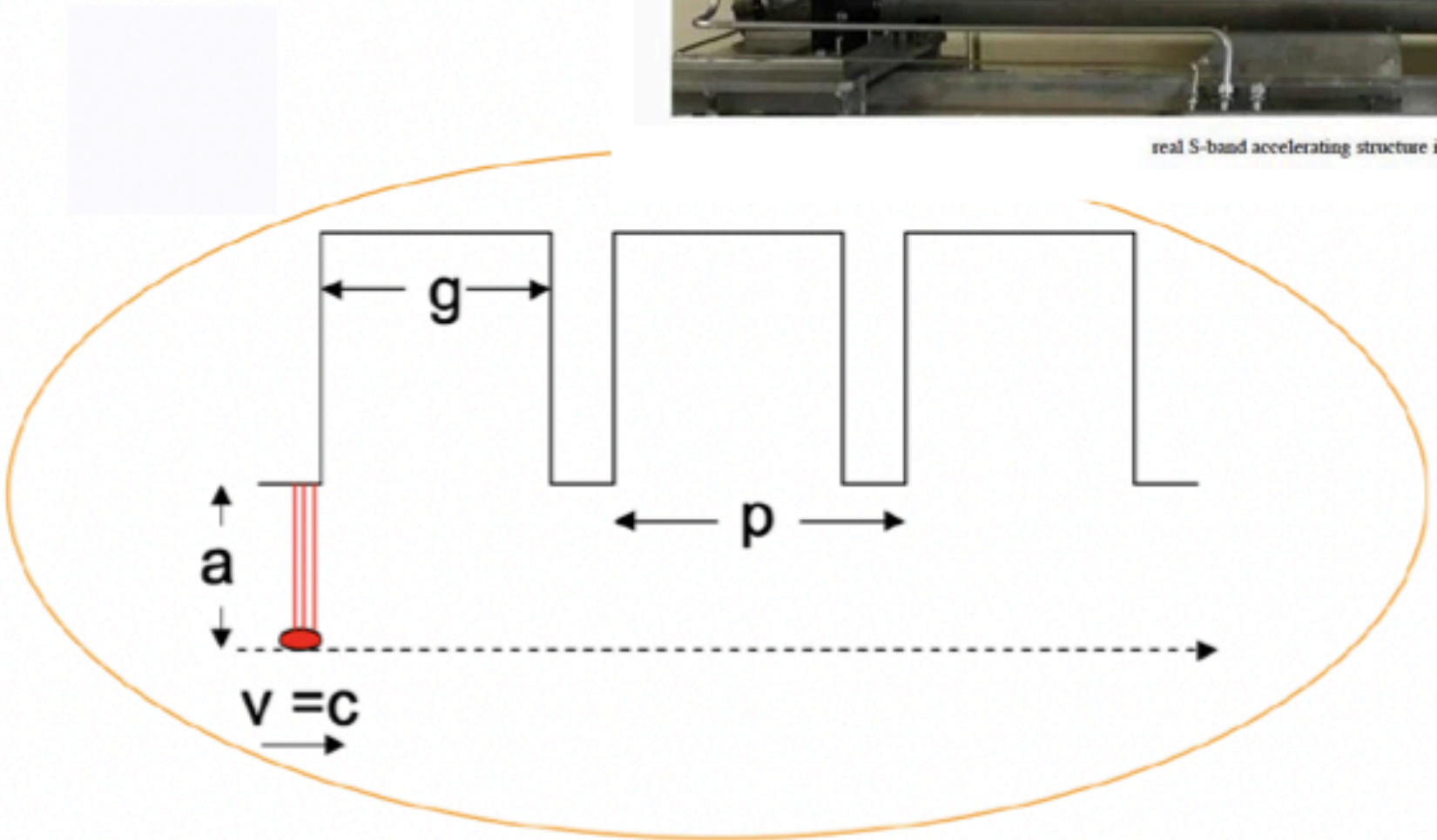
$$W(s) = \frac{Z_0 c}{\pi a^2} \exp \left(- \sqrt{s/s_1} \right) \quad ,$$

$$s_1 = 0.41 \frac{a^{1.8} g^{1.6}}{p^{2.4}} .$$

Derived from empirical modeling (not first-principles Maxwell's equations) for short-range wakes in disk-loaded structures to quantify how a trailing particle is affected by fields generated by leading particles, as a function of their separation s .



real S-band accelerating structure installed in a lab.



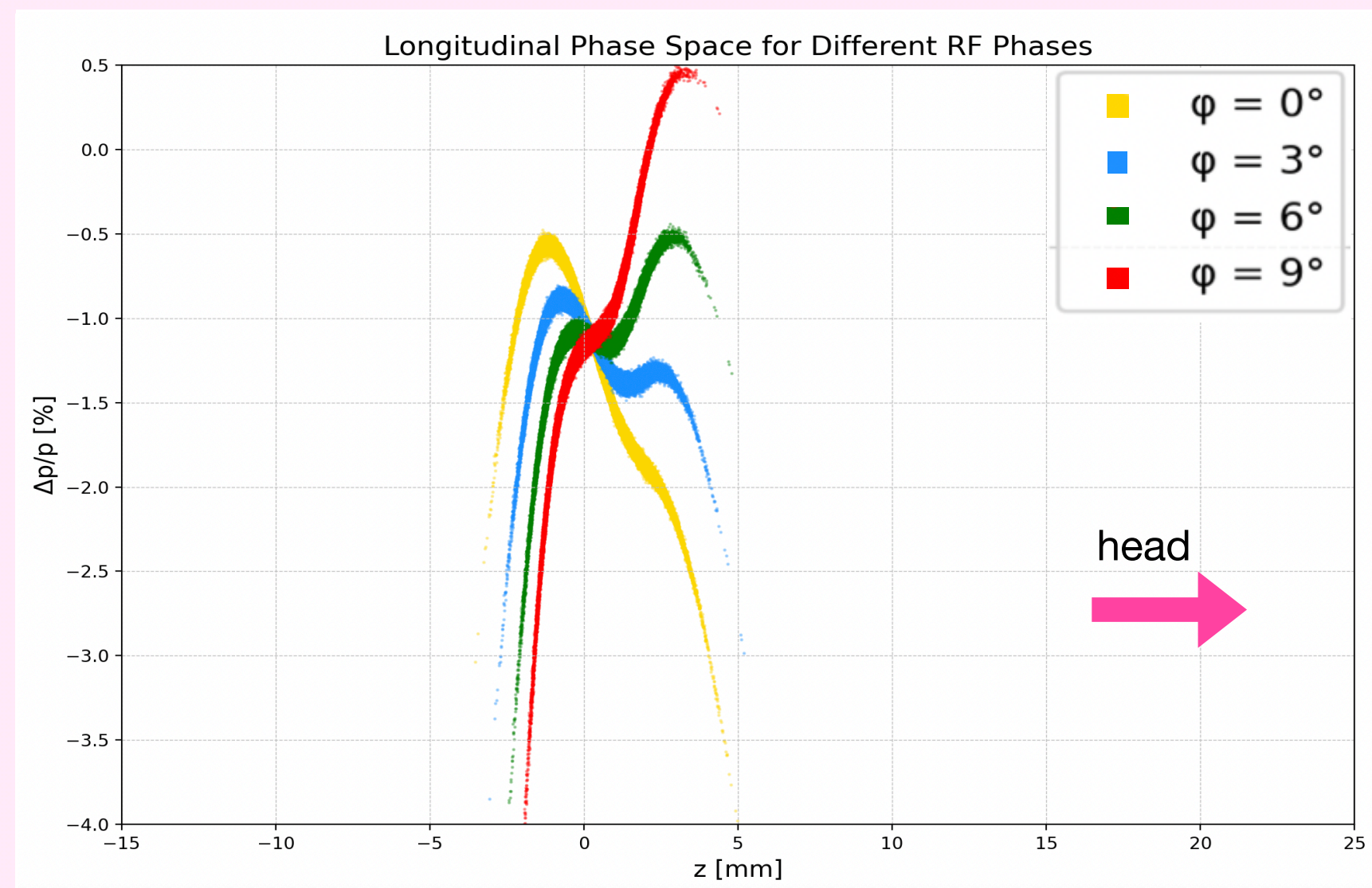
For our code based on superkekb structure:

Parameter	Symbol	Value
Cell period	$p = \lambda/3$	35.0 mm
Iris radius	a	10 – 11 mm
Gap length	g	~29.2 mm
Energy gain [MeV/MW ^{1/2}]		7.87

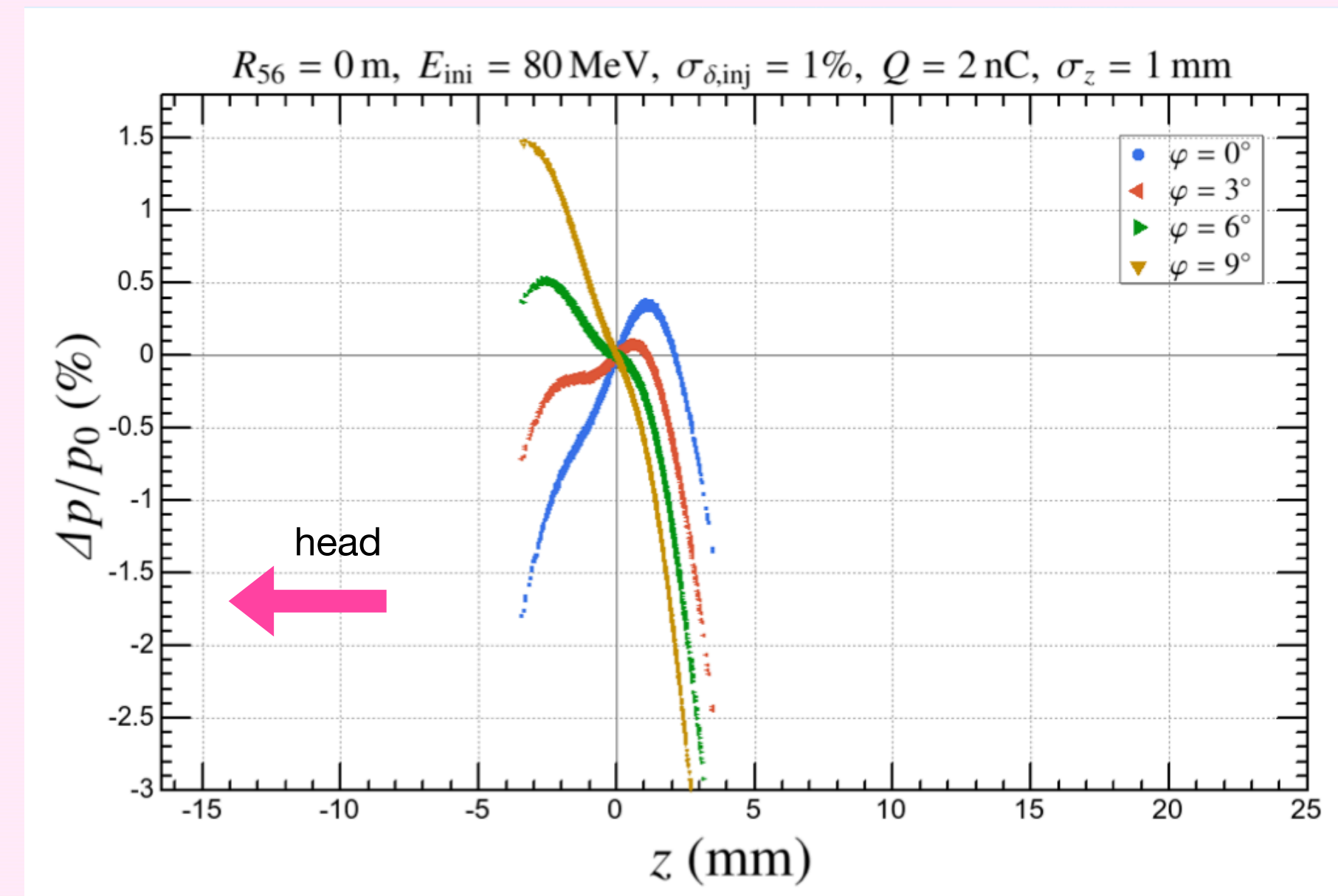
Process	Included in shown simulations	Available in ocelot
Second-order transverse maps	no	yes
Wakes	yes	yes (need wake table)
Space charge	no	yes
CSR	yes	yes, but not taking beam pipe into account. To be included
SR energy loss and diffusion	No/yes (checks for BTE only)	yes

END OF LINAC; 2nC:

OCELOT:



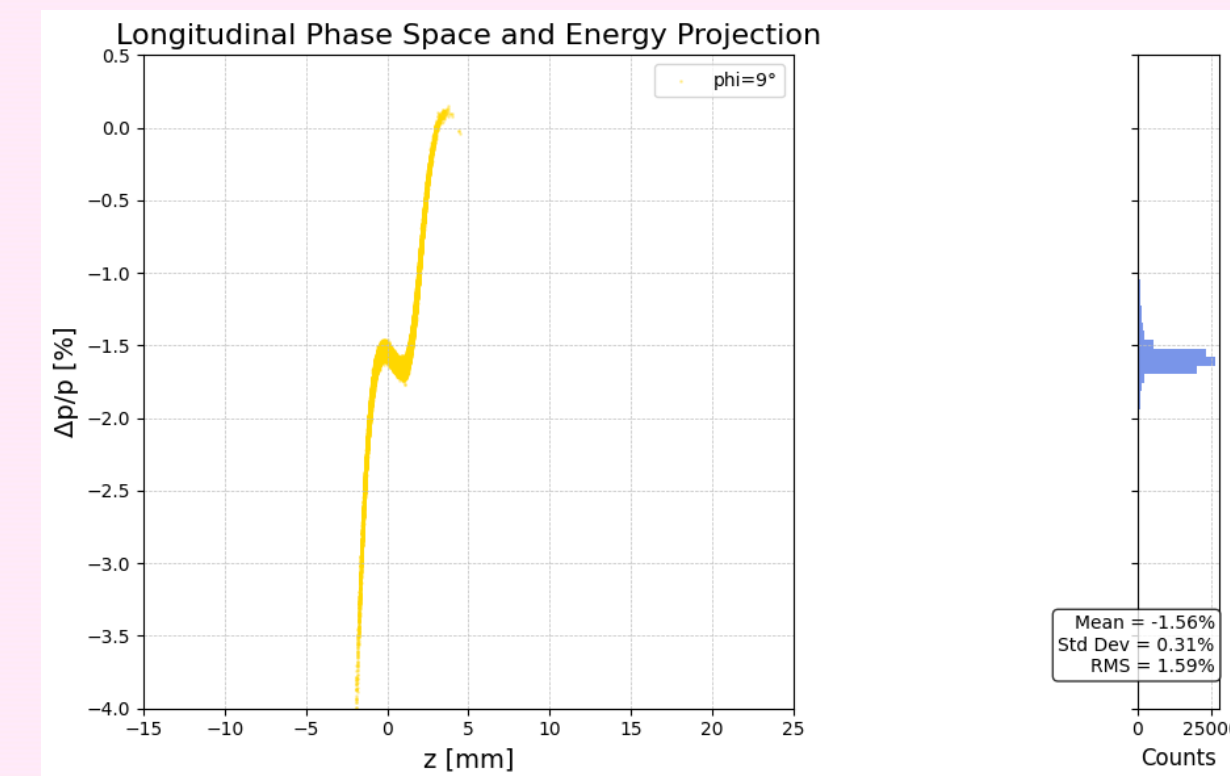
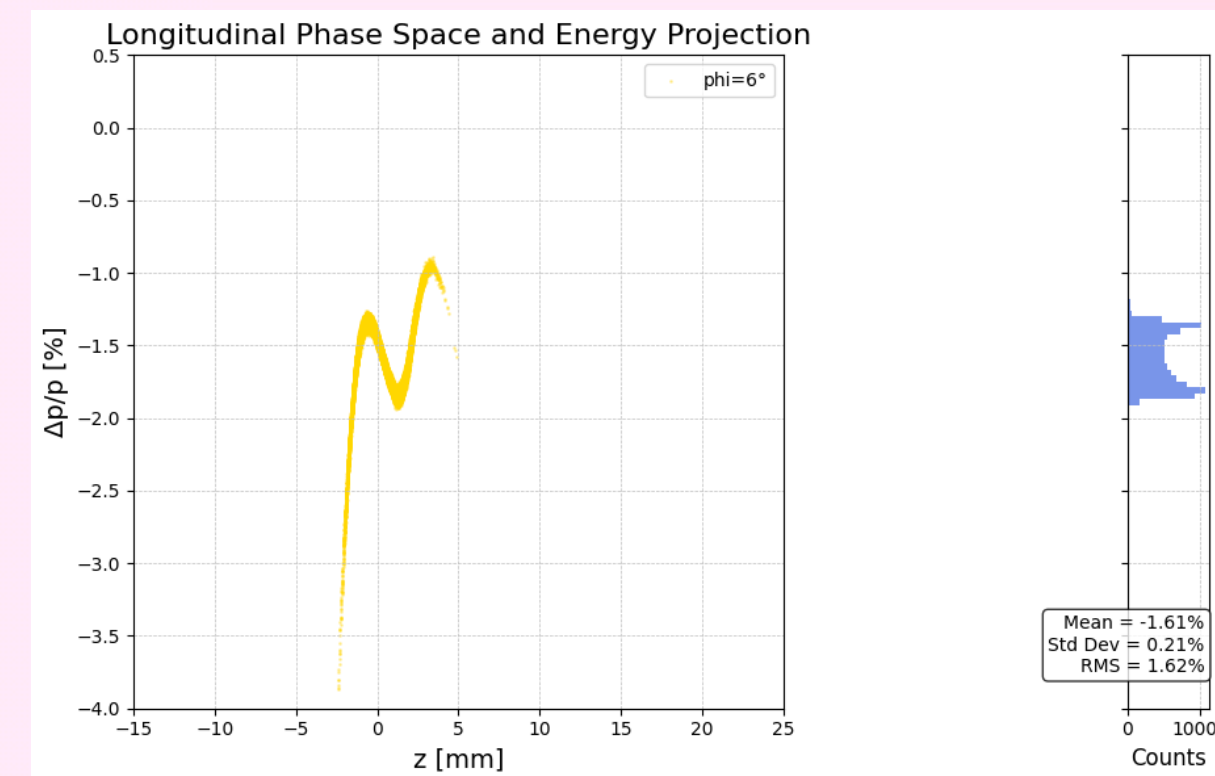
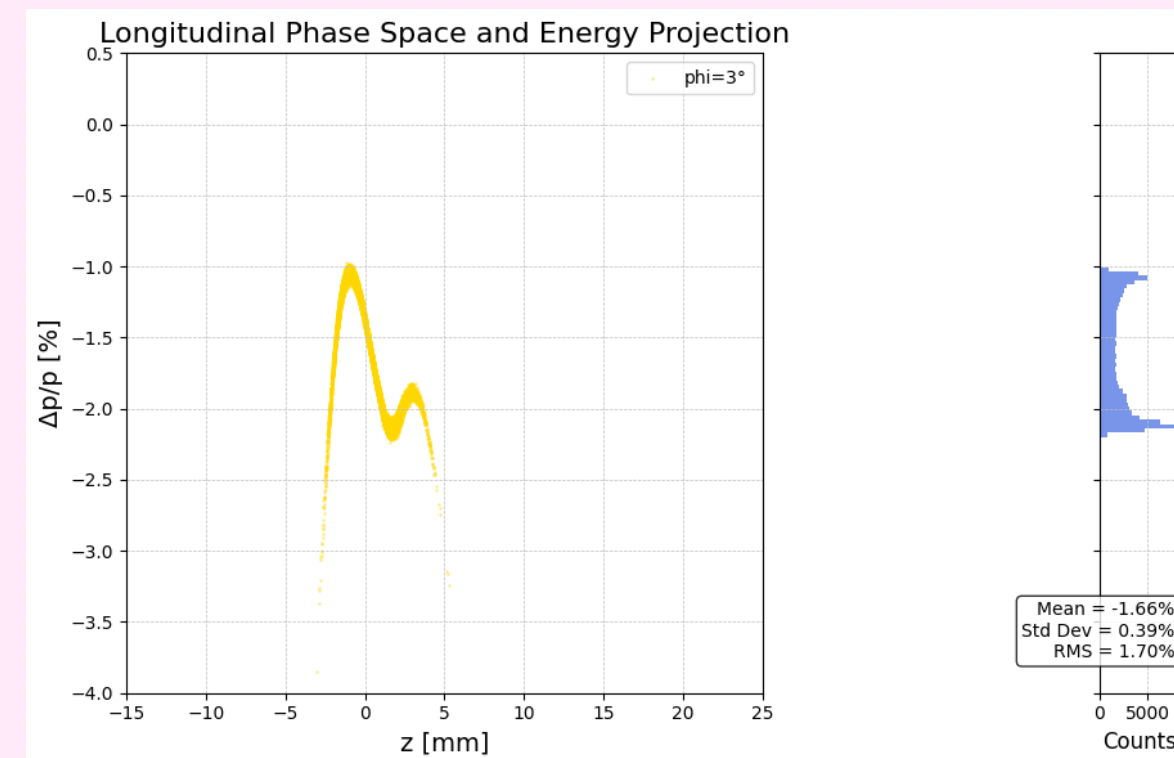
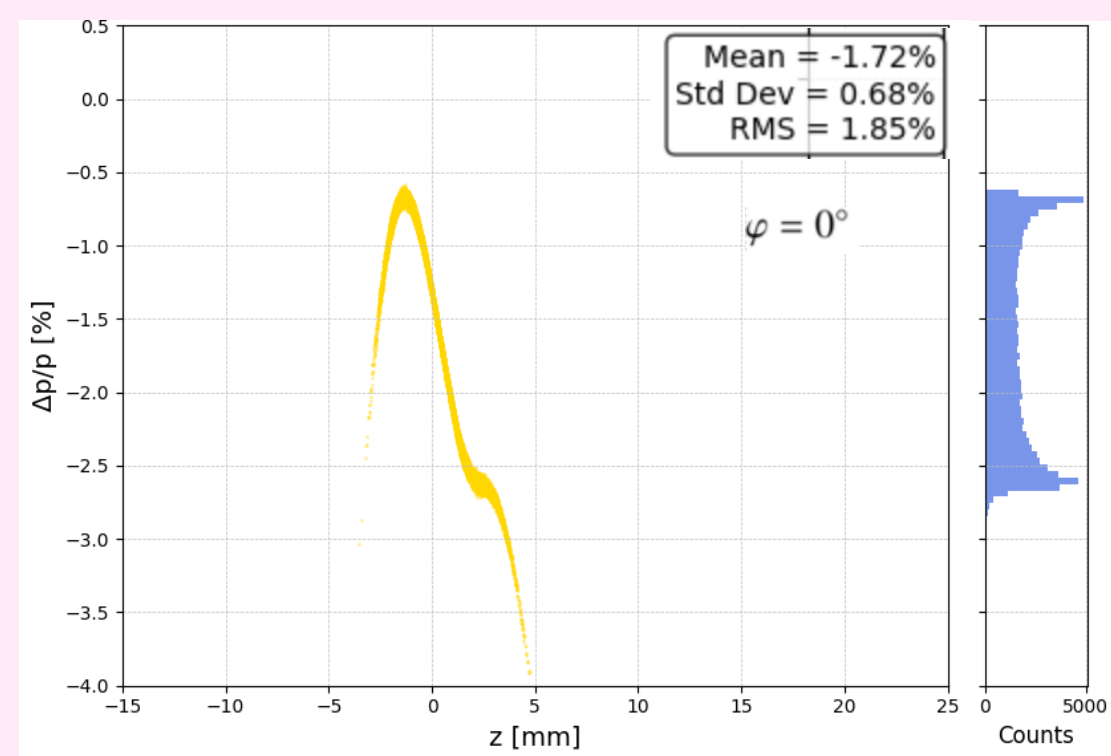
SAD:



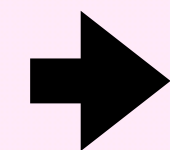
After having same results, we do for different bunch charges : 1nC and 3 nC

Using OCELOT we where able to do several test like this

3nC: value we where using in BT studies

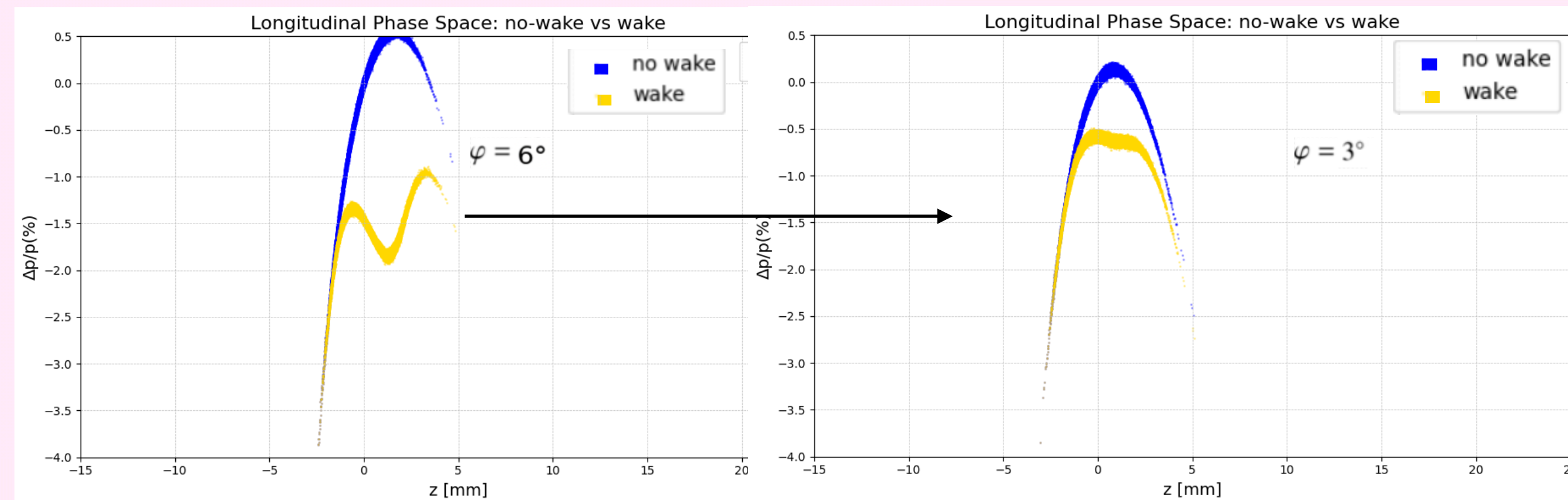


3nC, $\phi=6$

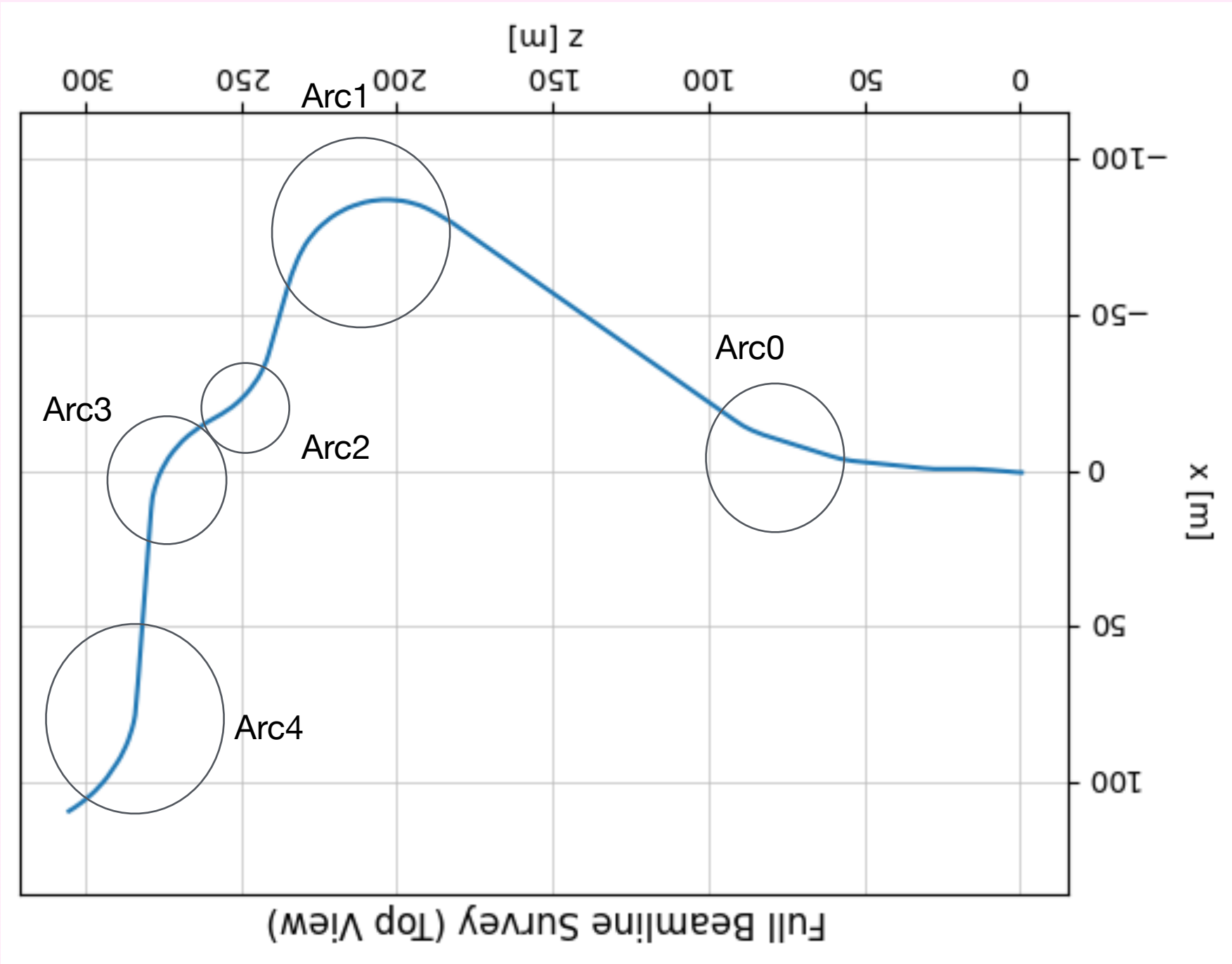
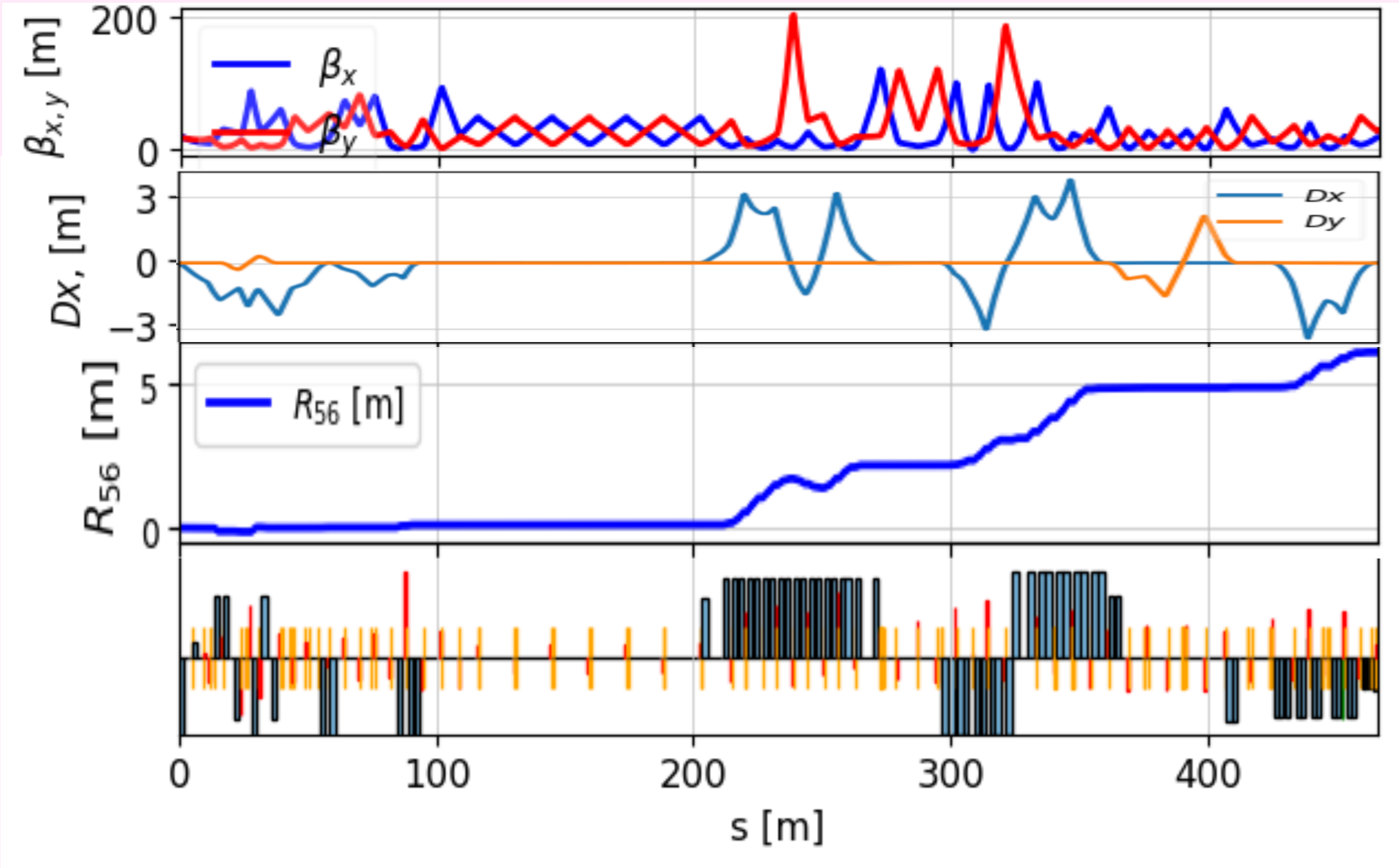


1 nC, $\phi=3$

This was done in machine study



BTE



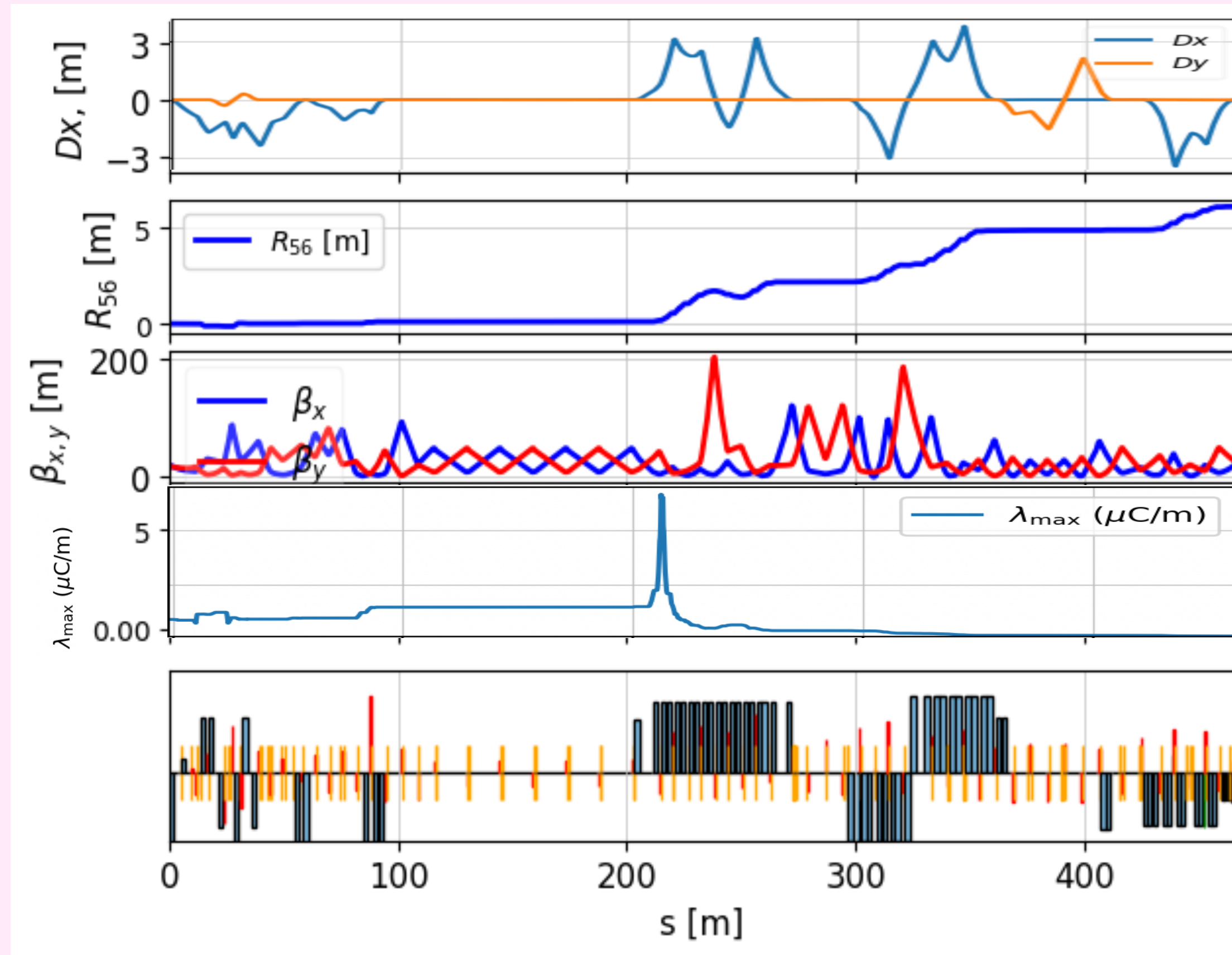
BTE

OCELOT:

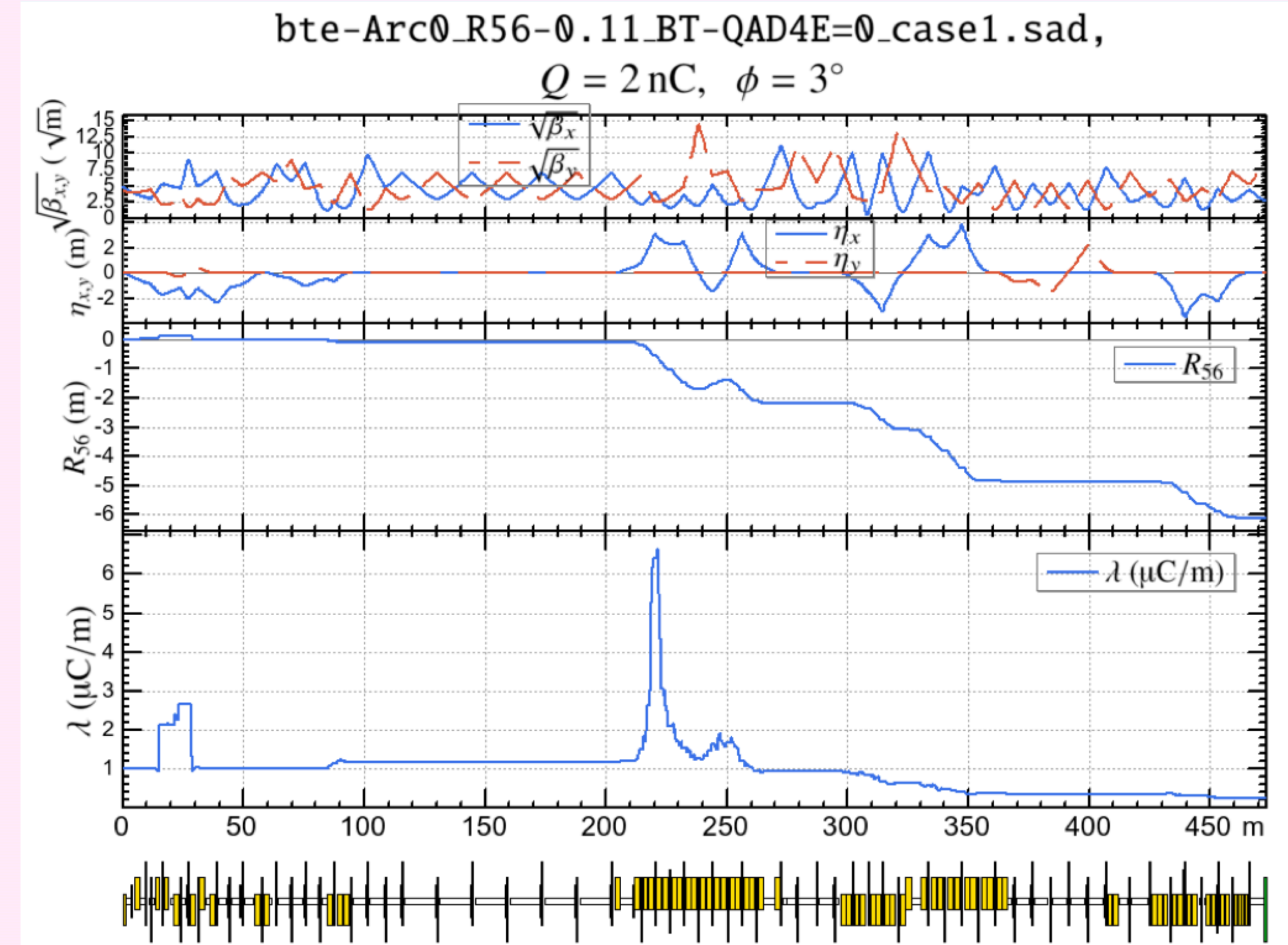
Arc0_R56-0.11_BT

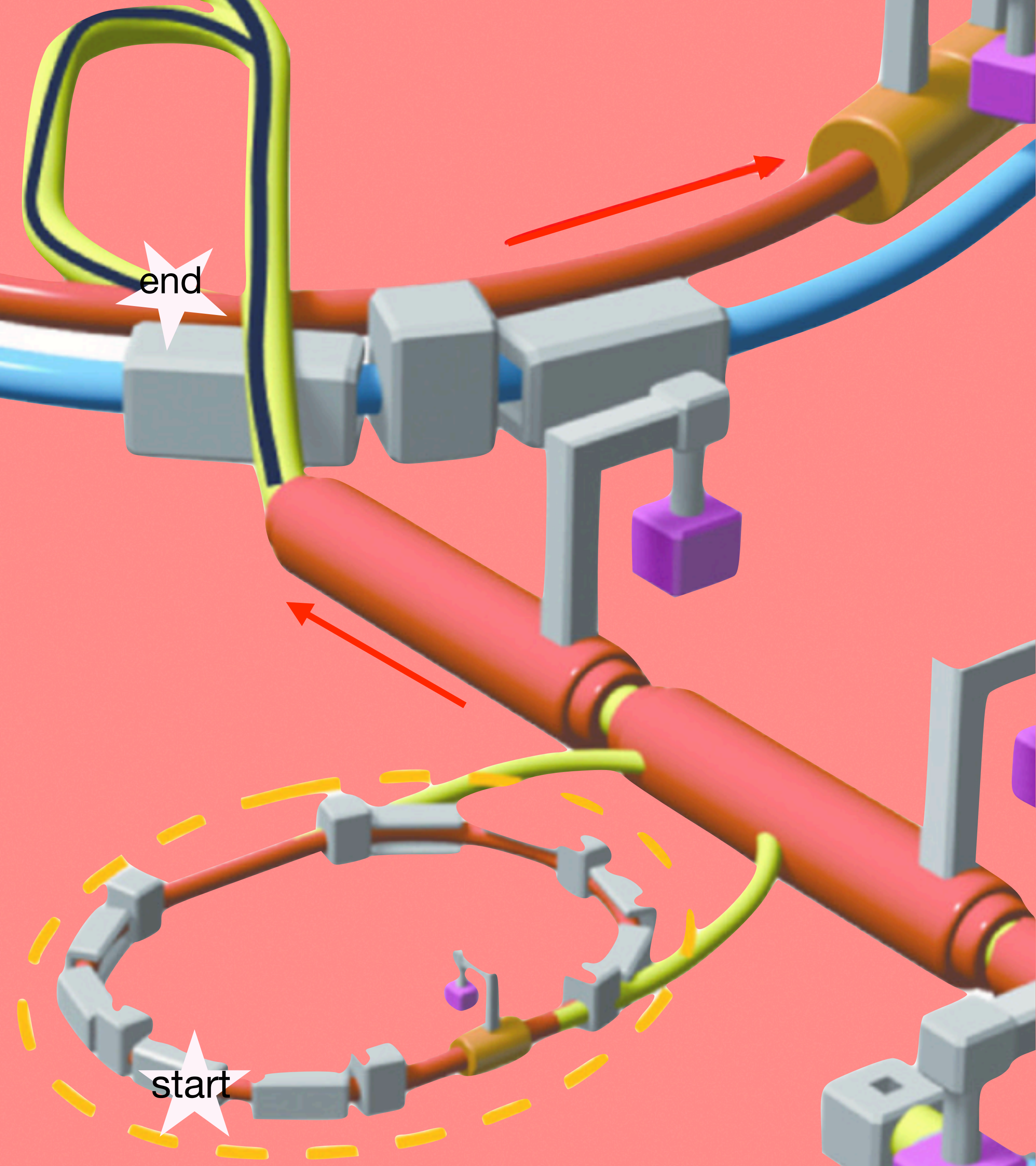
$Q = 2 \text{ nC}$,

$\phi = 3^\circ$



SAD:

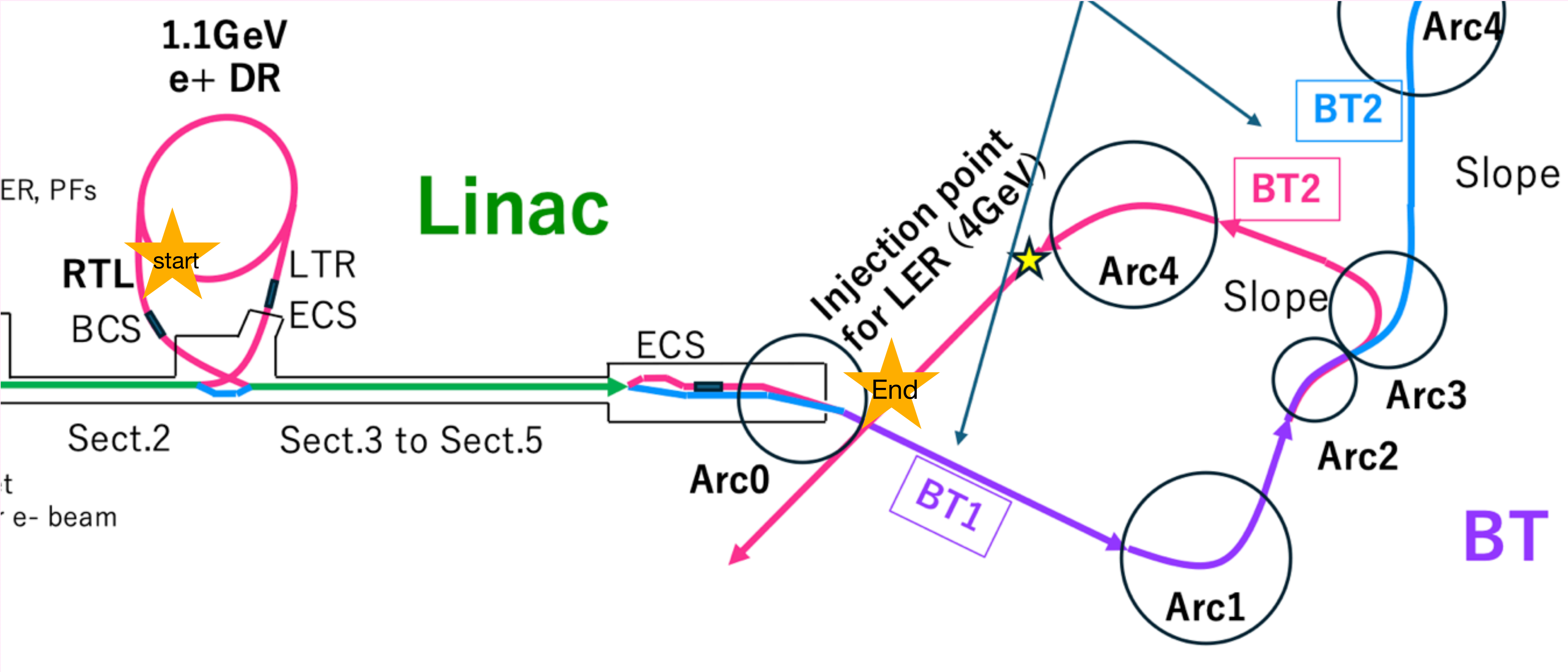




Let's check BTP

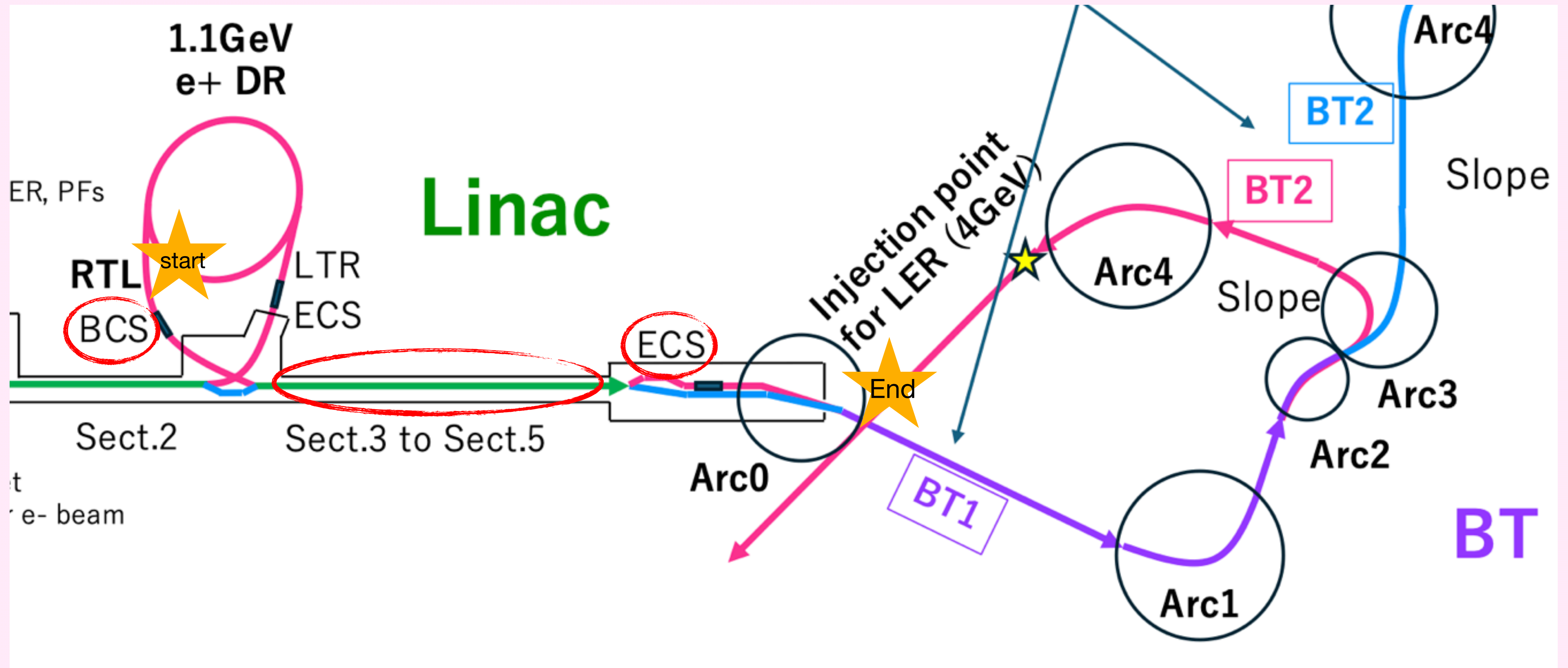
*First week of beam study was for DR
And BTP

RTL ➡ LER injection point



RTL → LER injection point

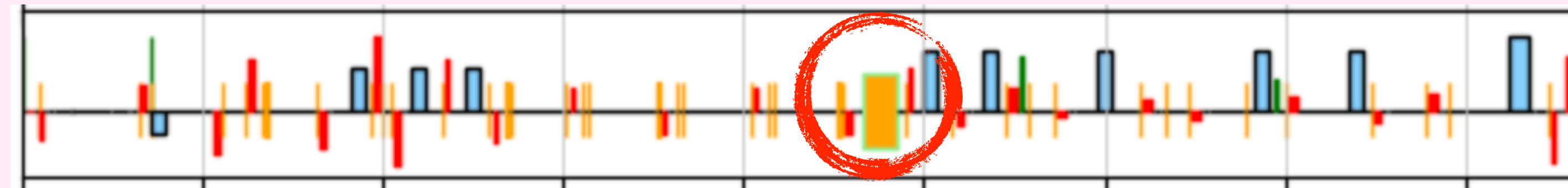
3 parameters to optimize from RTL to ring entrance:



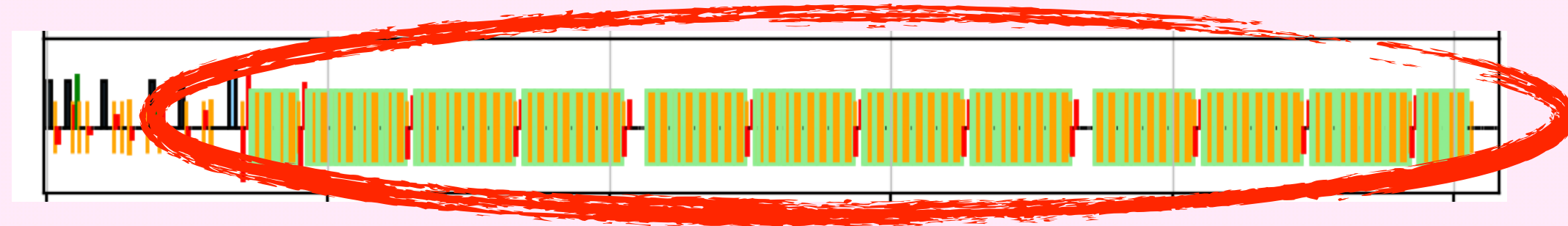
To minimize energy spread at entrance of main ring:

3 parameters to optimize from RTL to ring entrance:

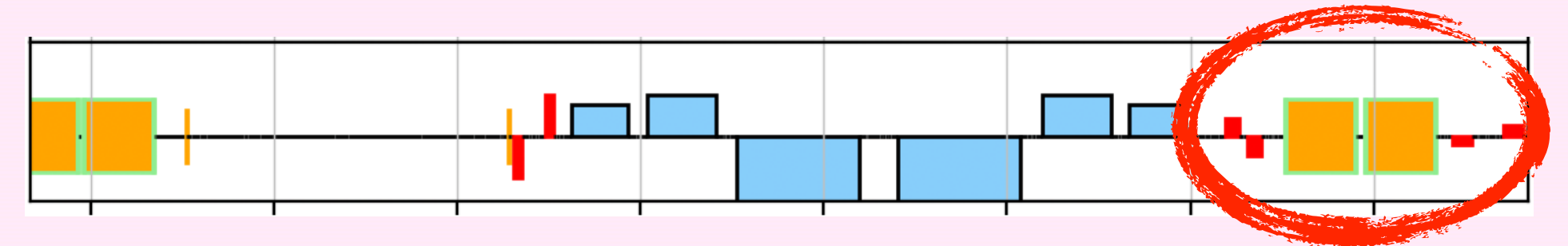
Amplitude at BCS



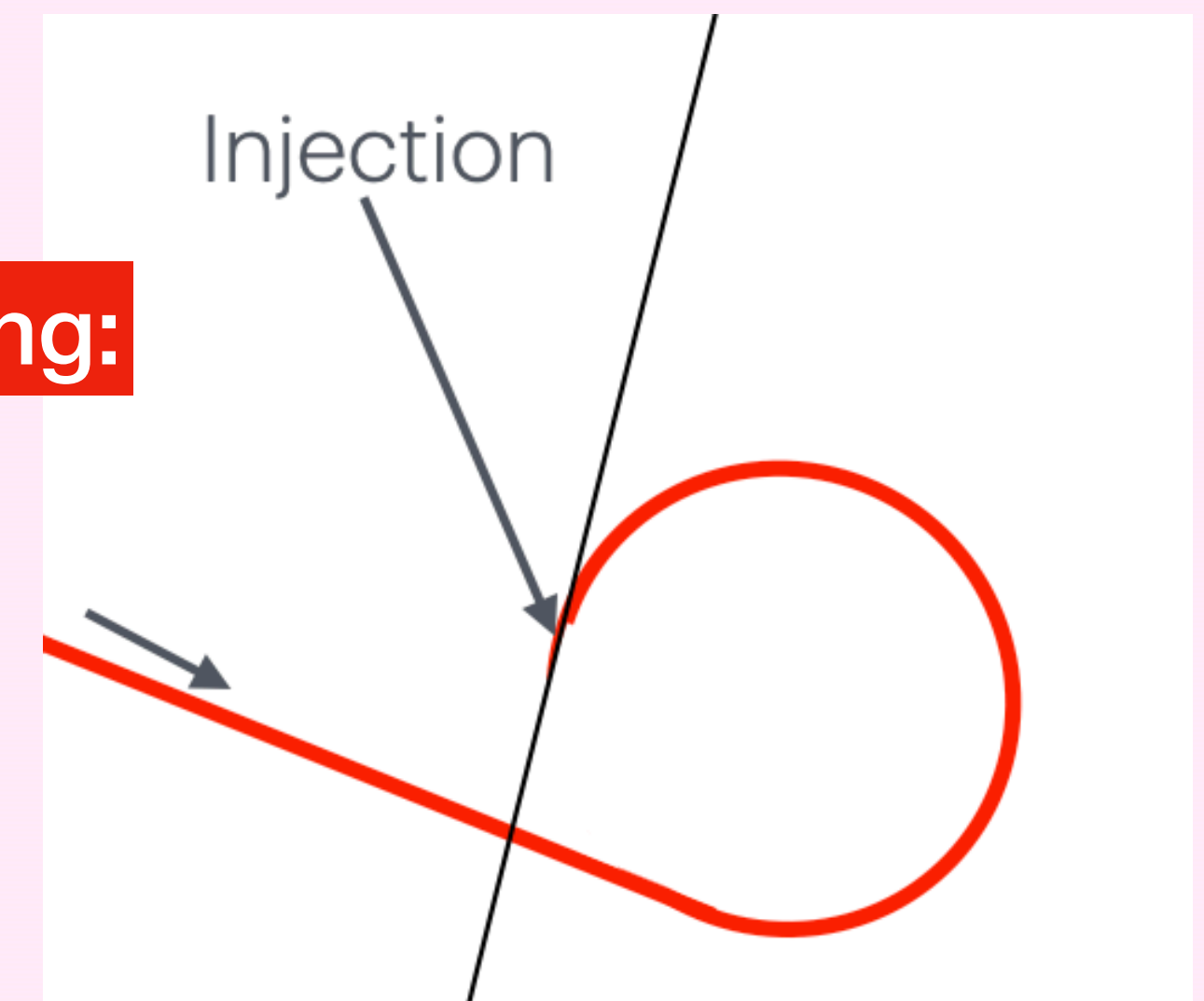
RF PHASE of linac



Amplitude at ECS?

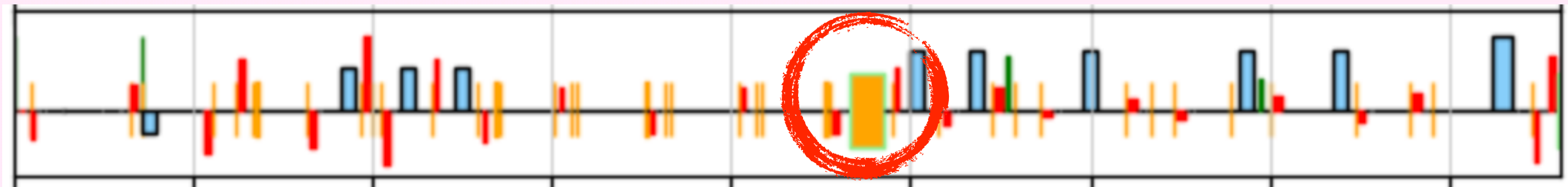


To minimize energy spread at entrance of main ring:

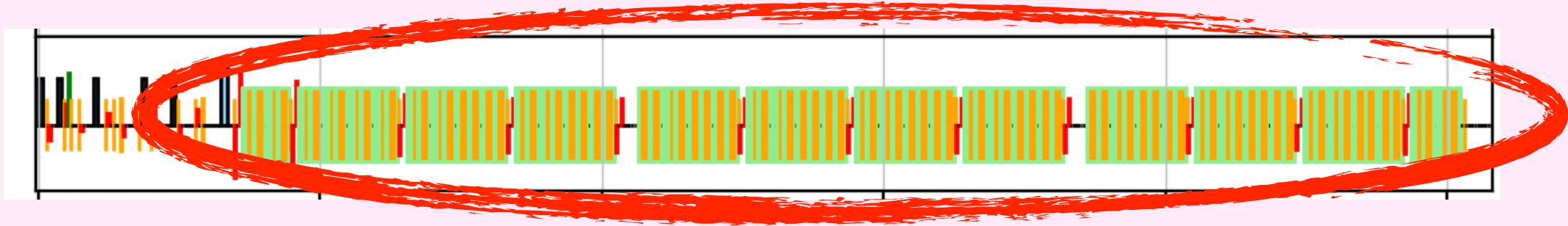


3 parameters to optimize from RTL to ring entrance:

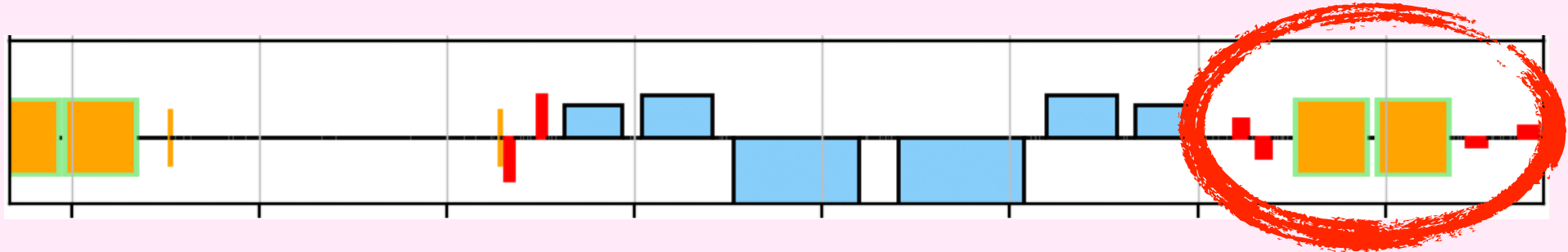
Amplitude at BCS



RF PHASE of linac

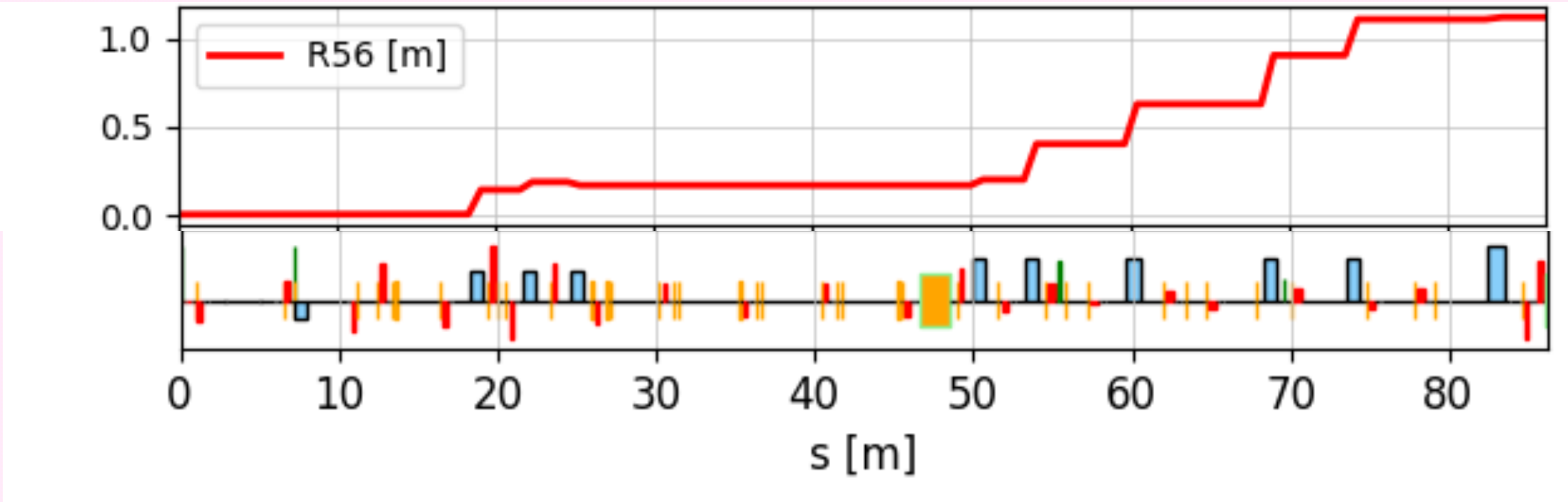


Amplitude at ECS?

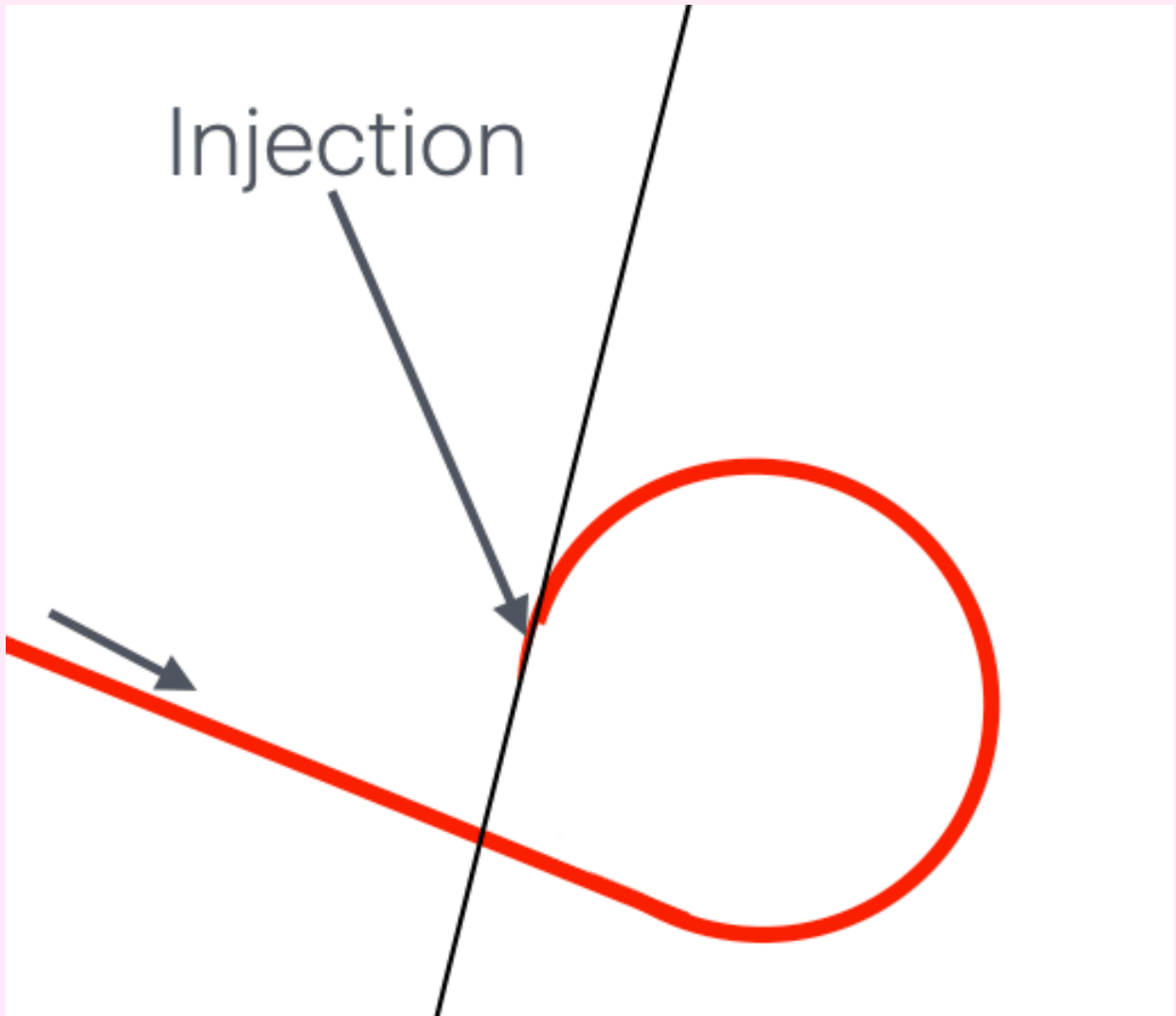


R56 ocelot = -R56

s = 77.99 m. E = 1.100 GeV. R56 =

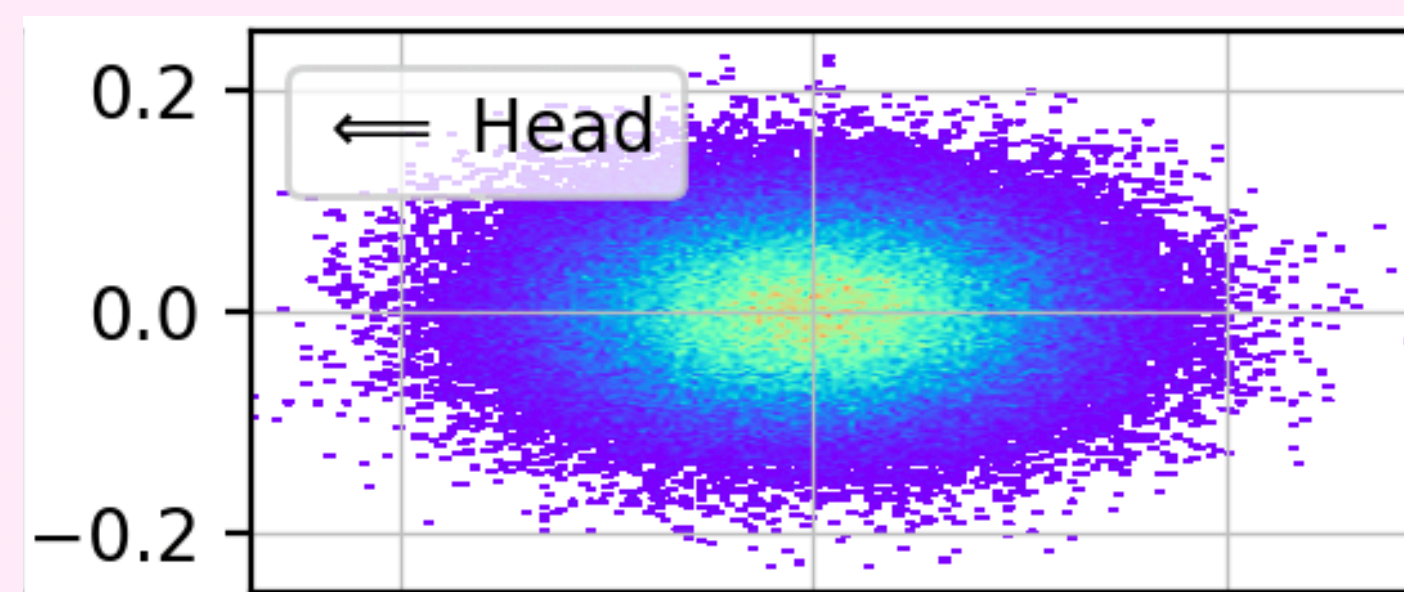


R56_{RT} ≈ -1.0

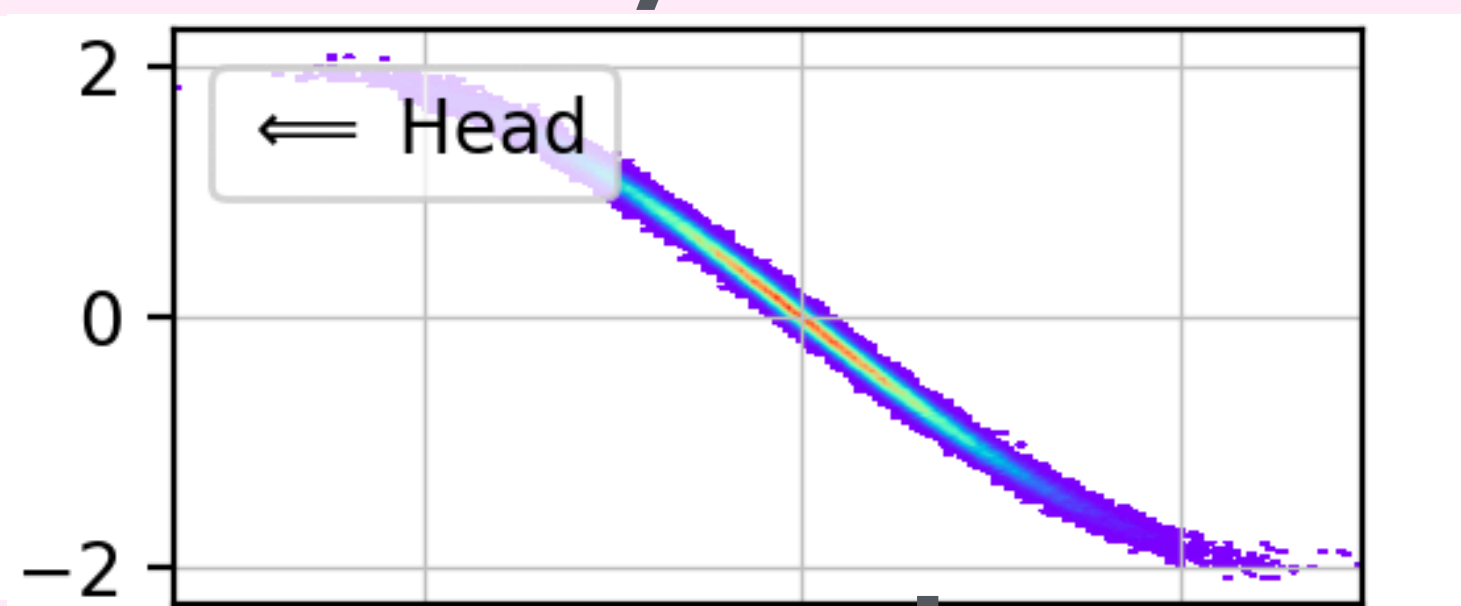


***No wake field yet (just examples)**

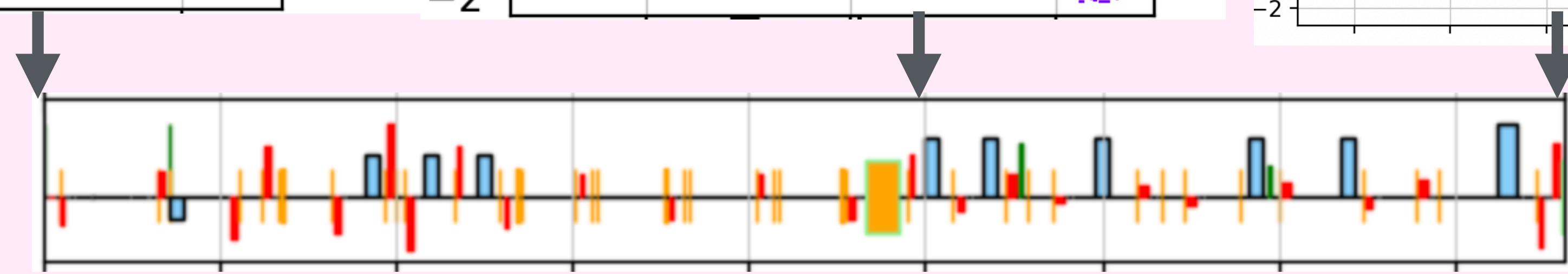
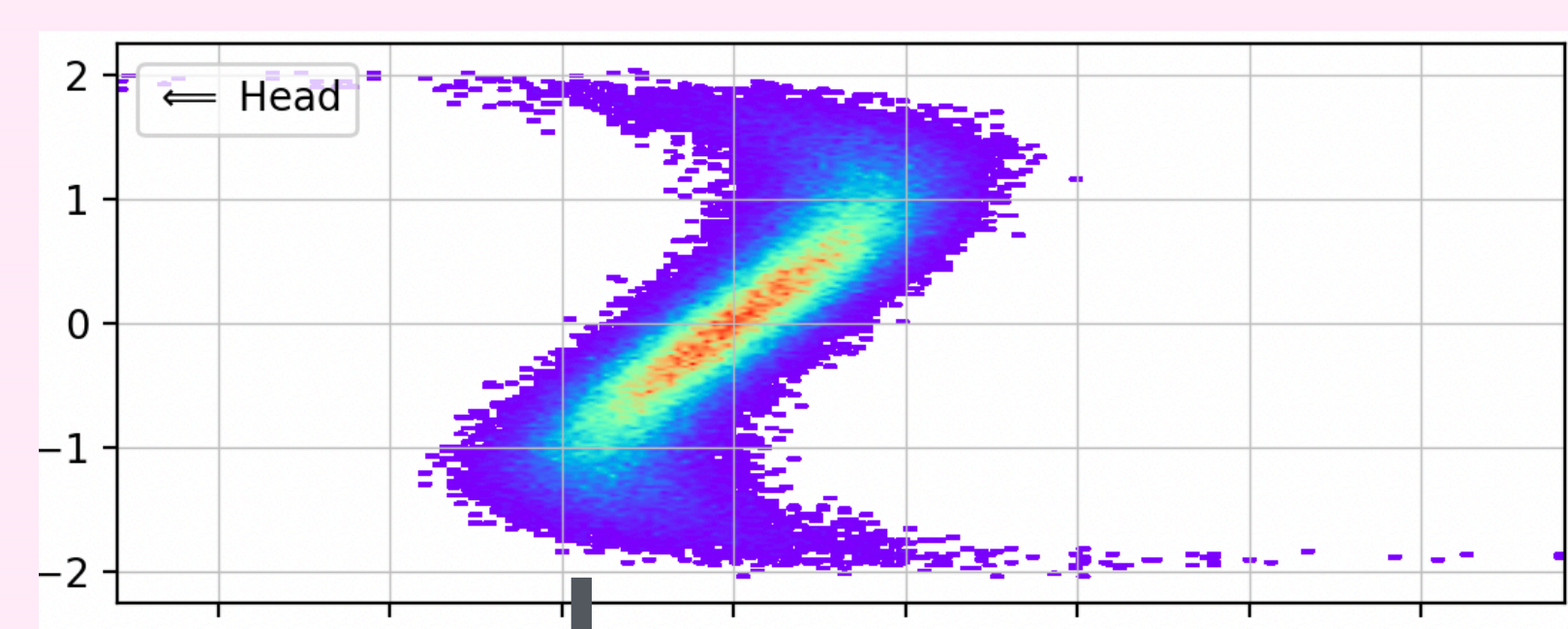
Initial. Gaussian



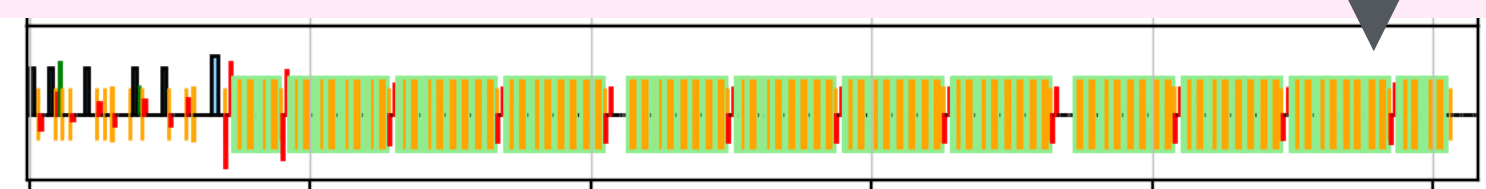
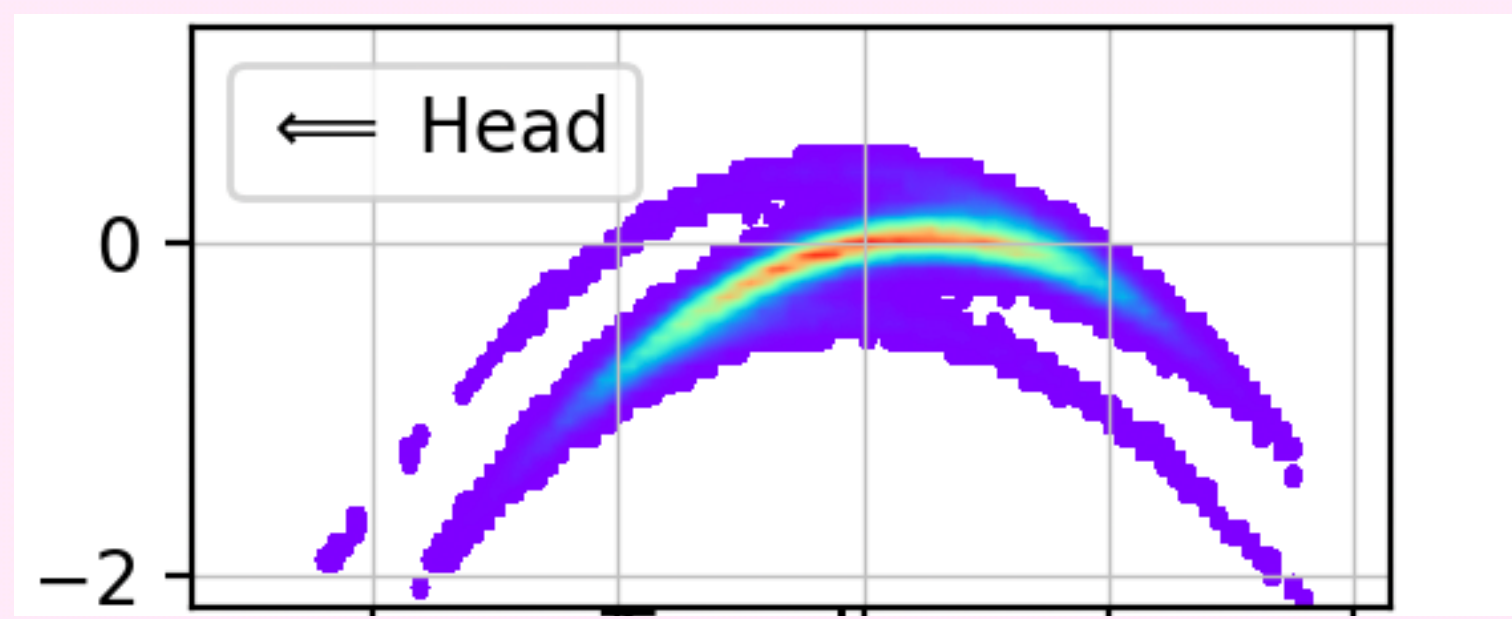
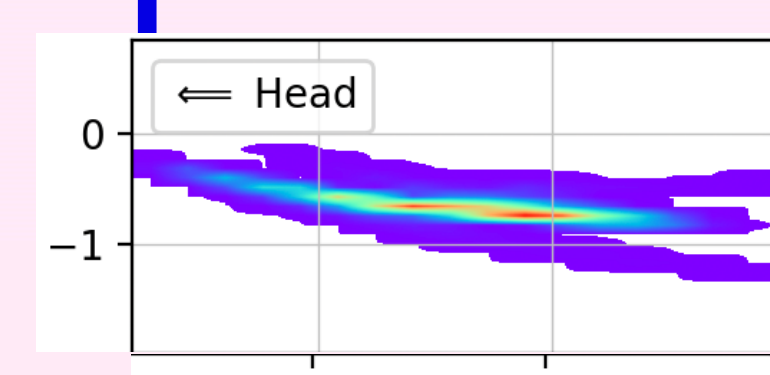
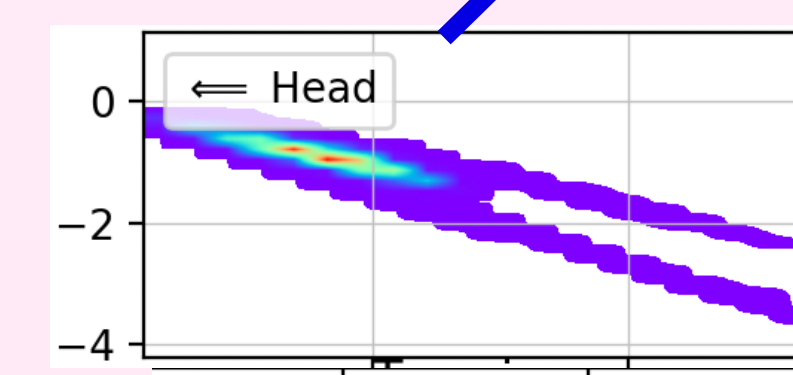
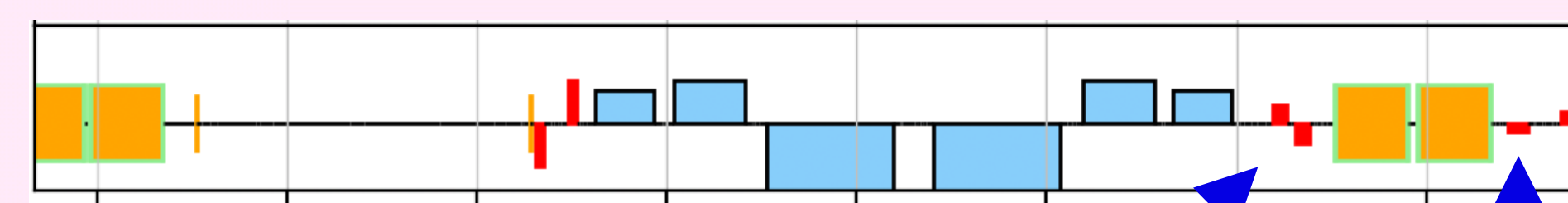
After cavity



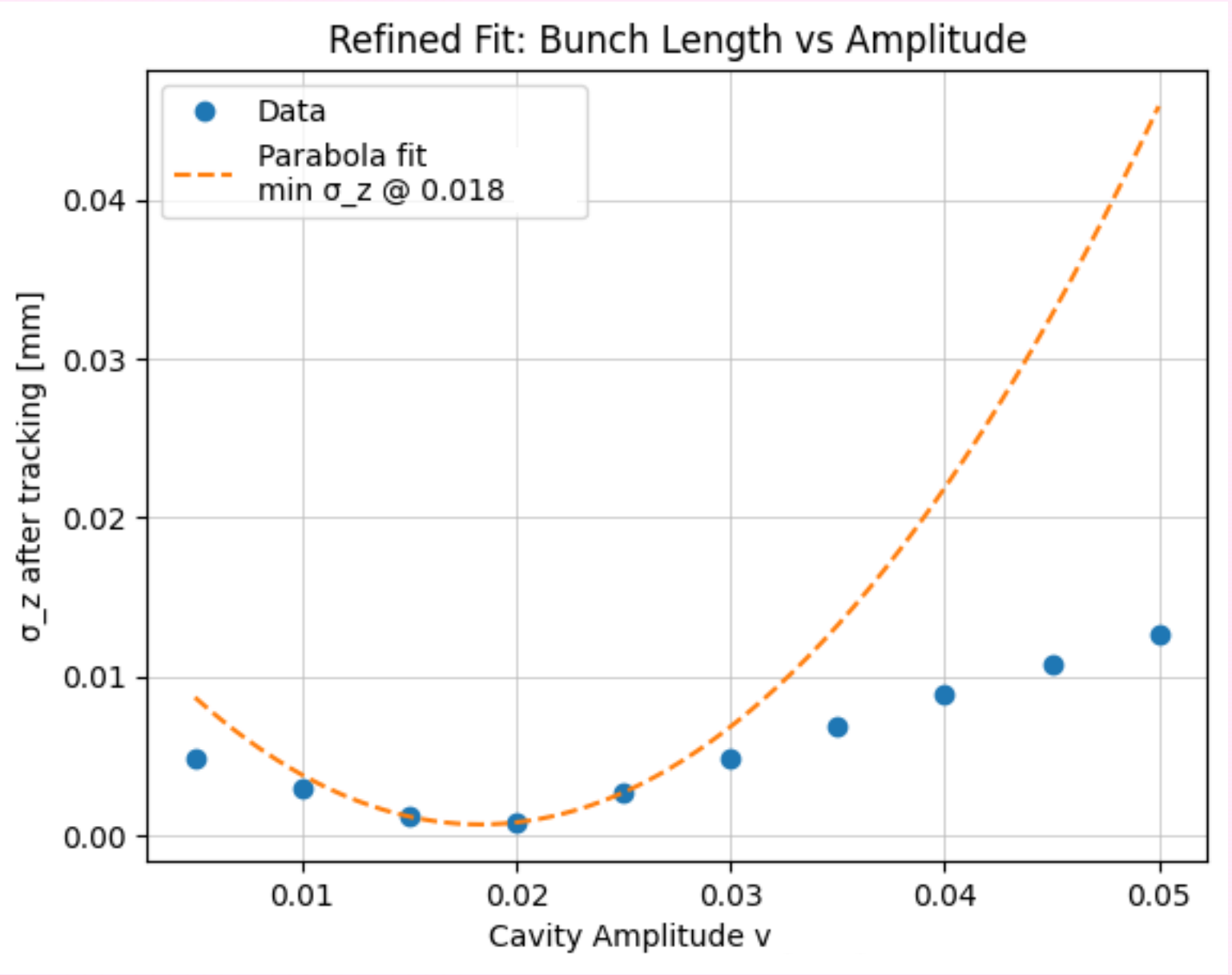
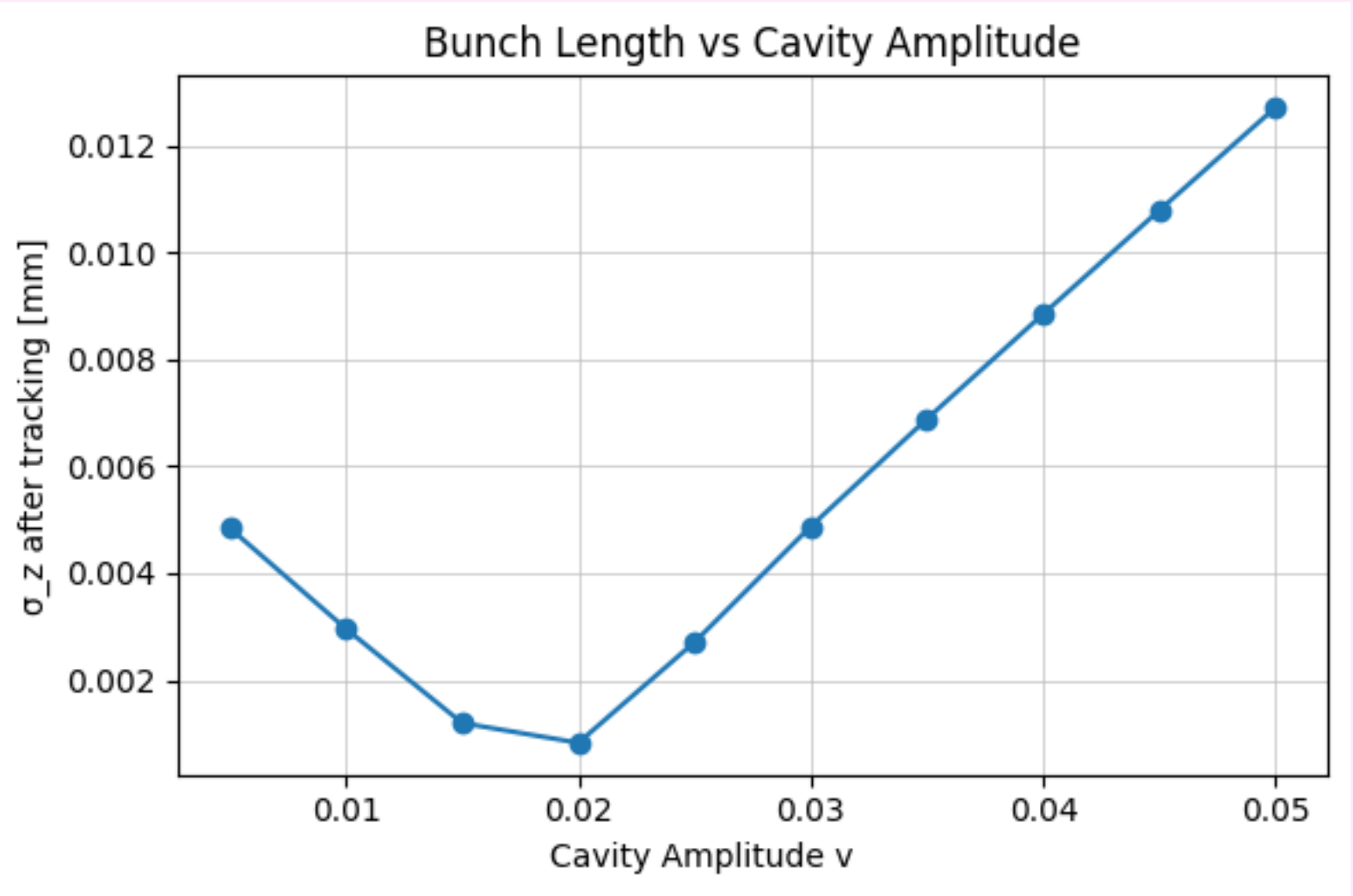
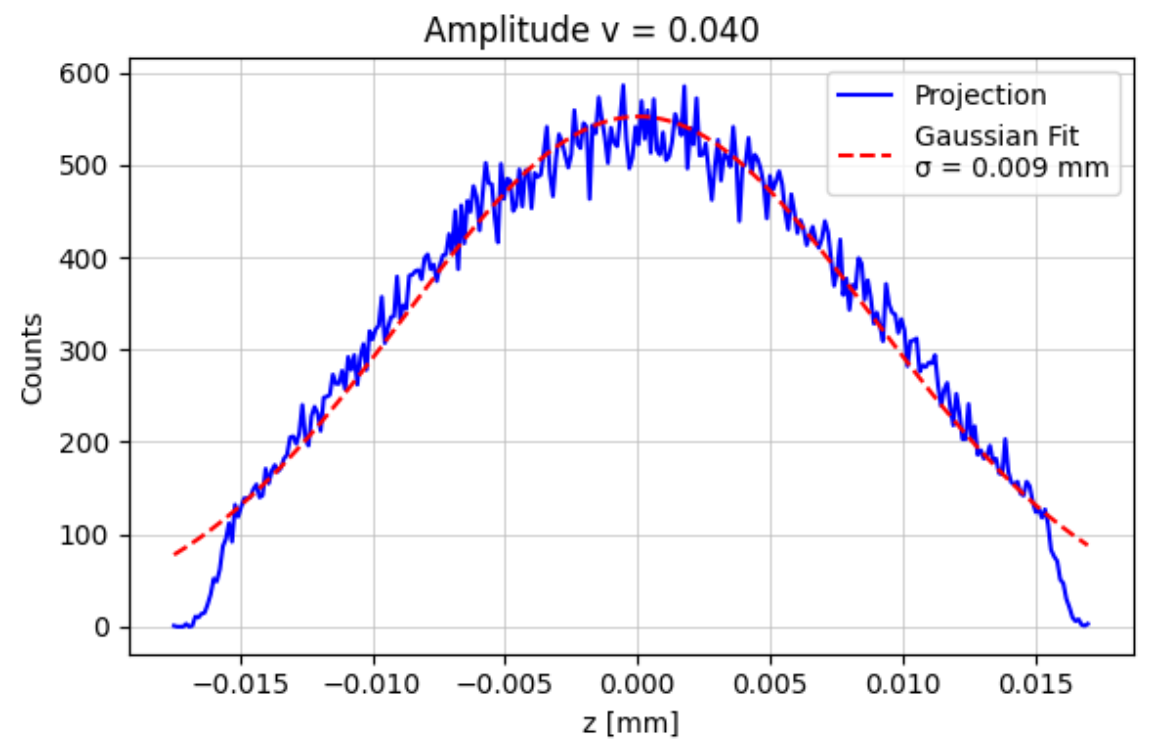
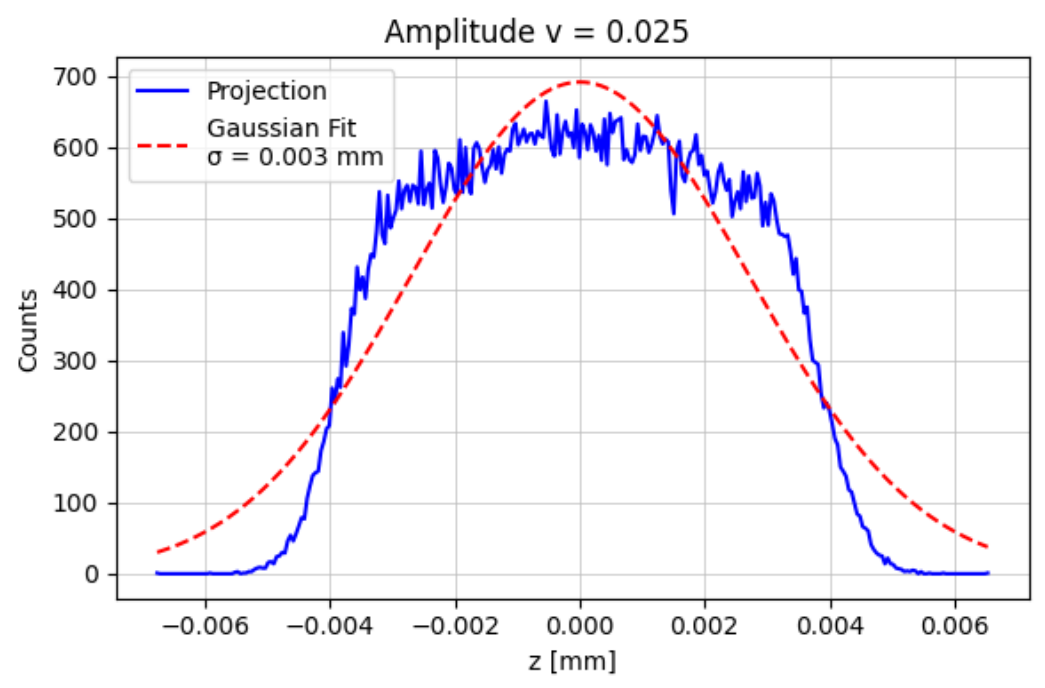
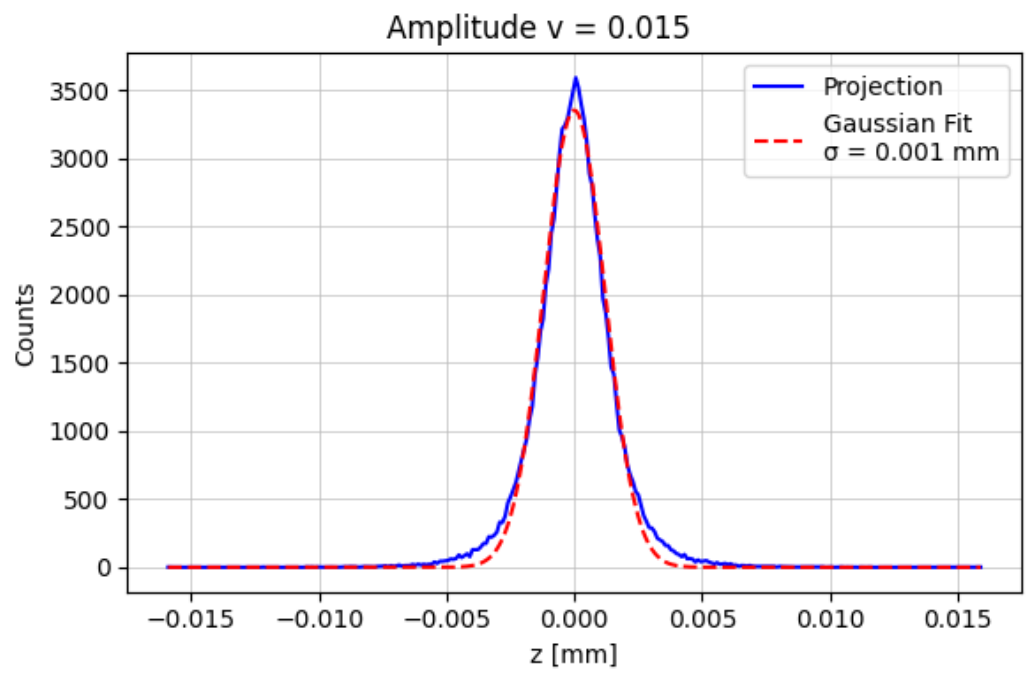
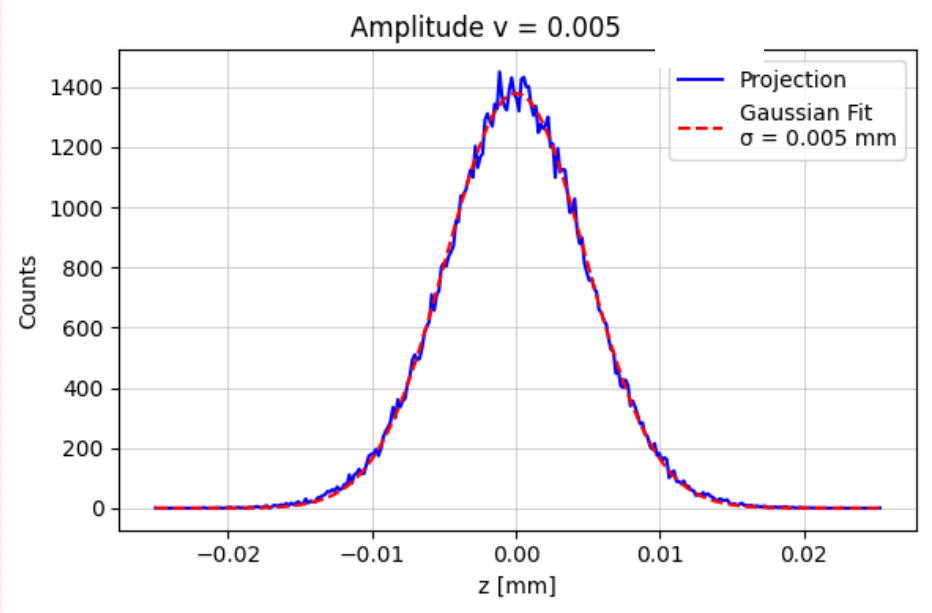
R56 = -1.05 m



BCS



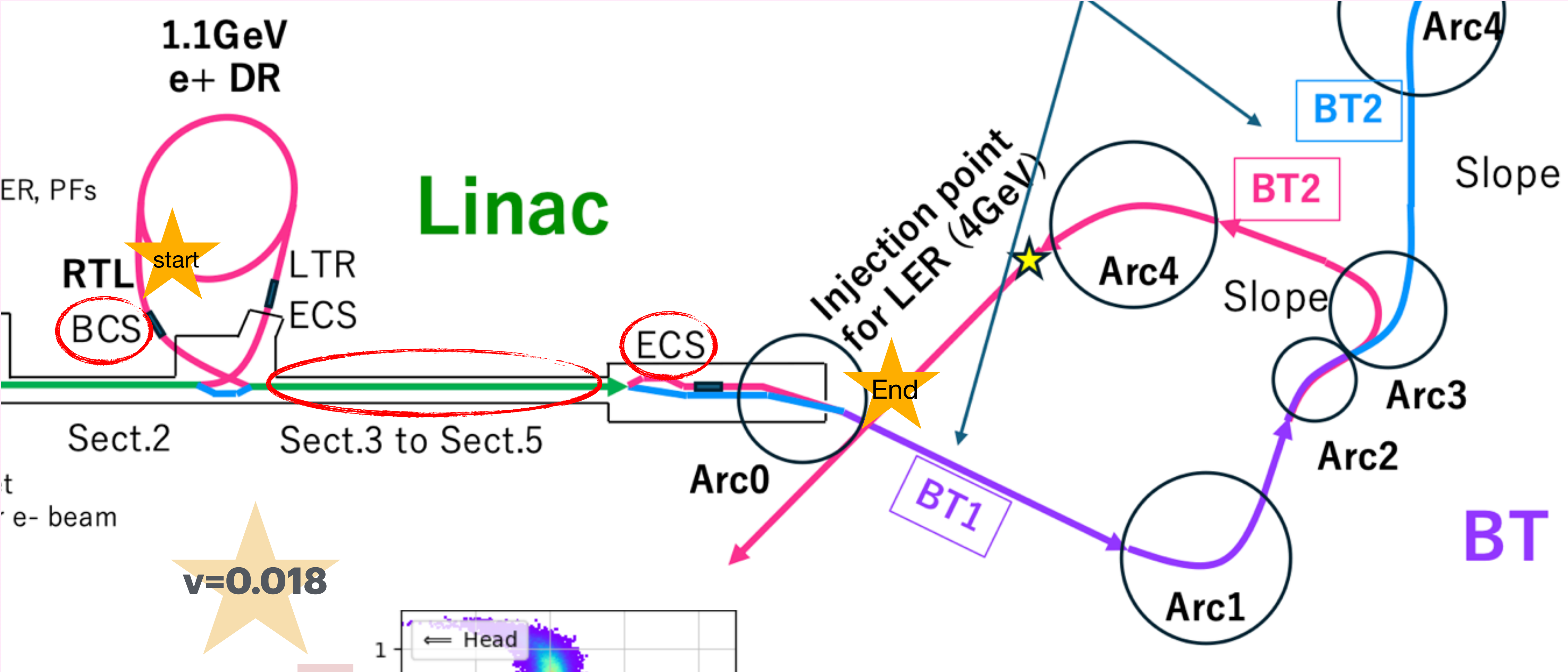
SECT5 FINAL



$v=0.018$

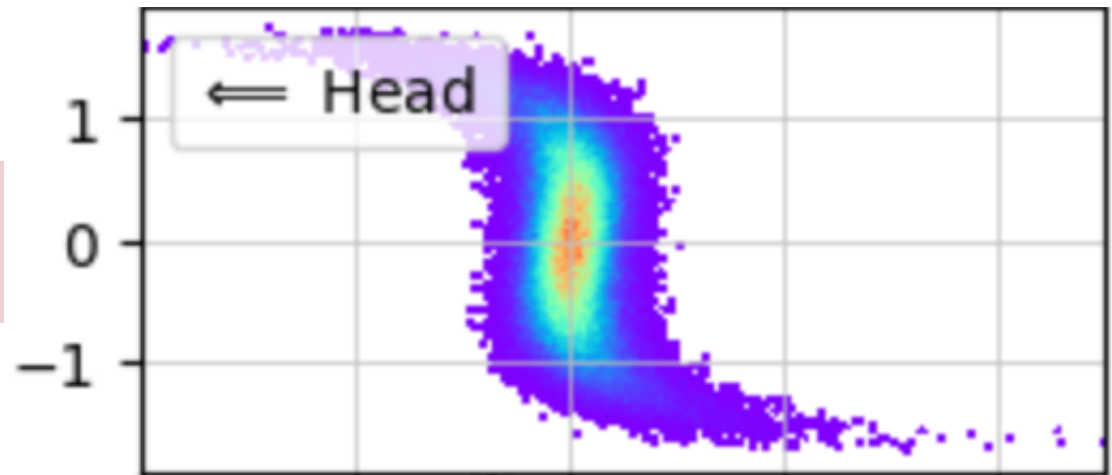
Lets find optimal amplitude for RF CAVITY DOING A SCAN

RTL → LER injection point

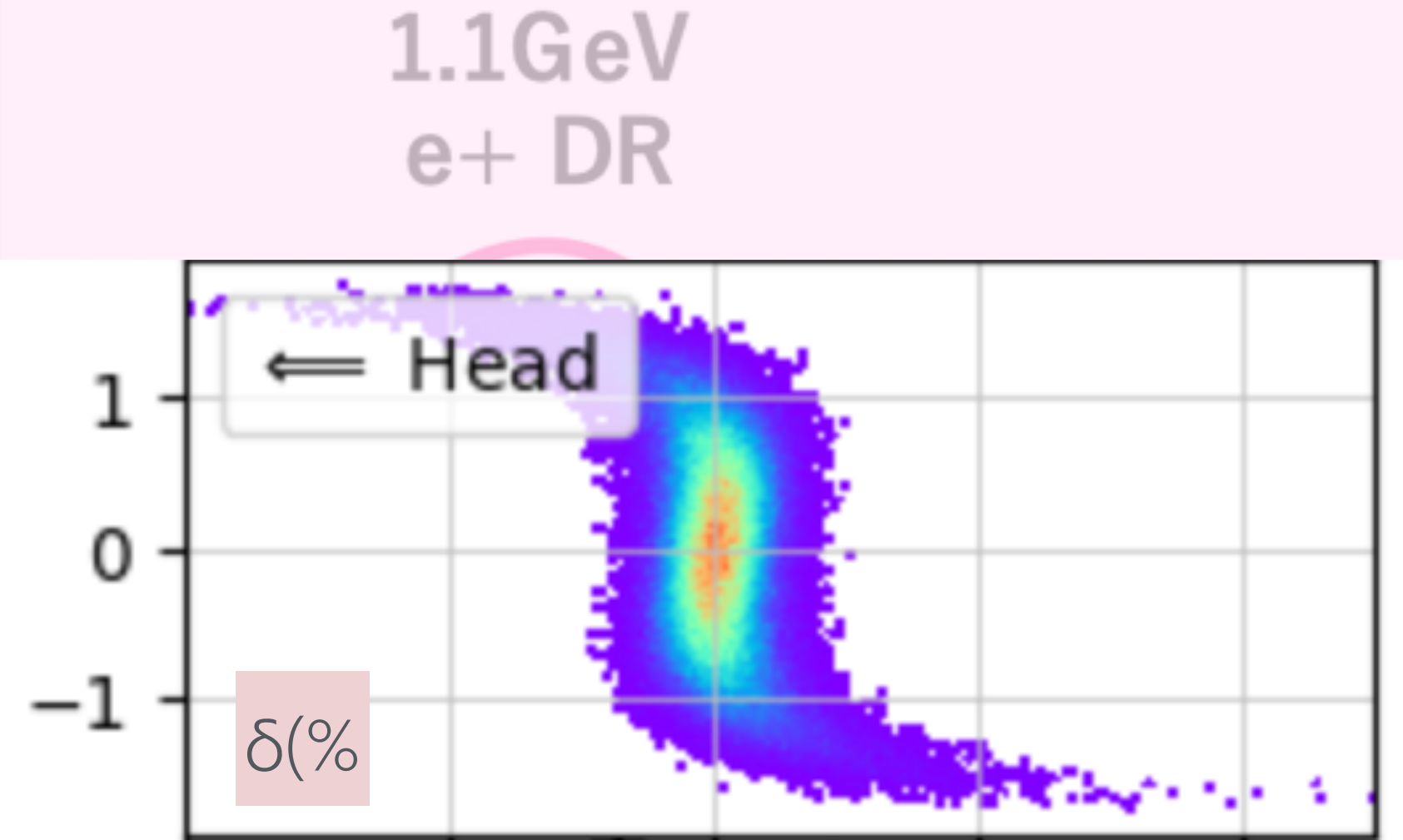


$v=0.018$

$\delta(\%)$



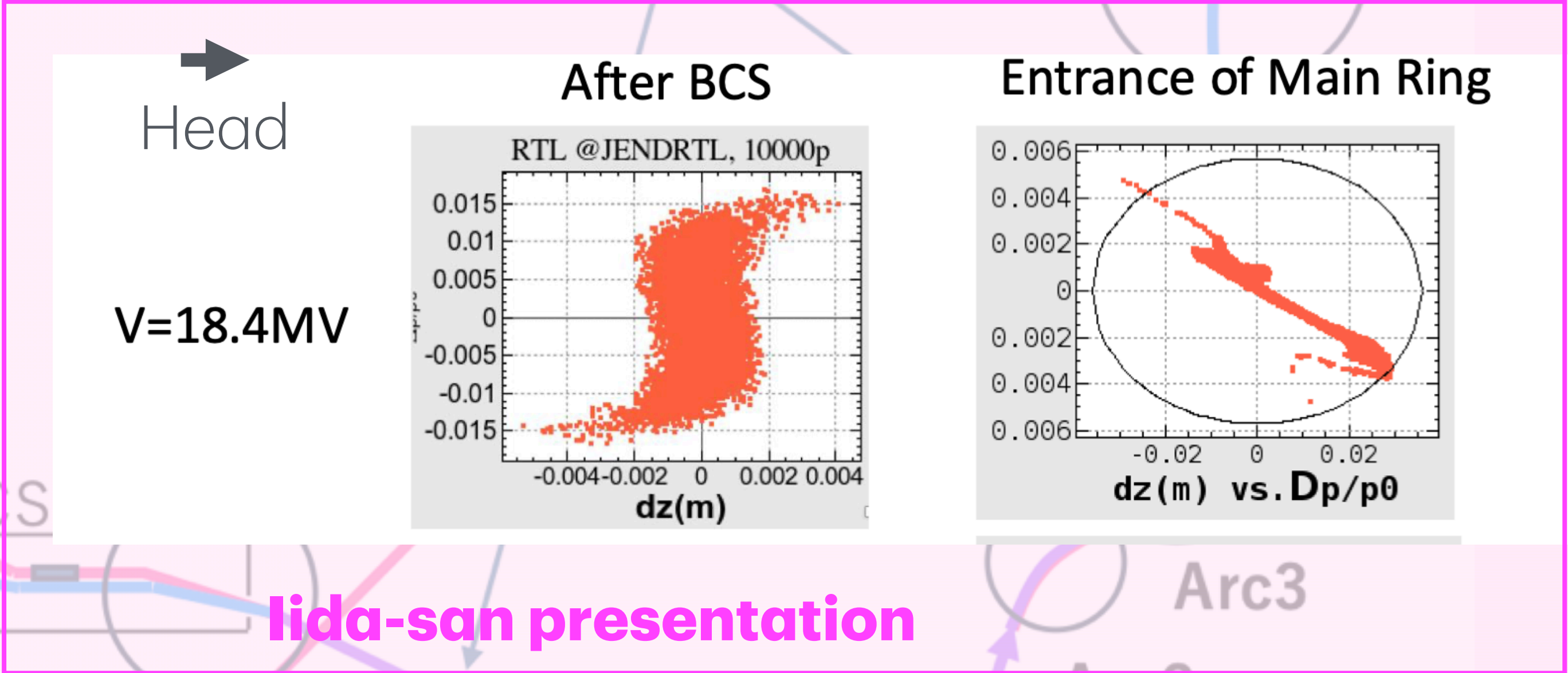
RTL → LER injection point



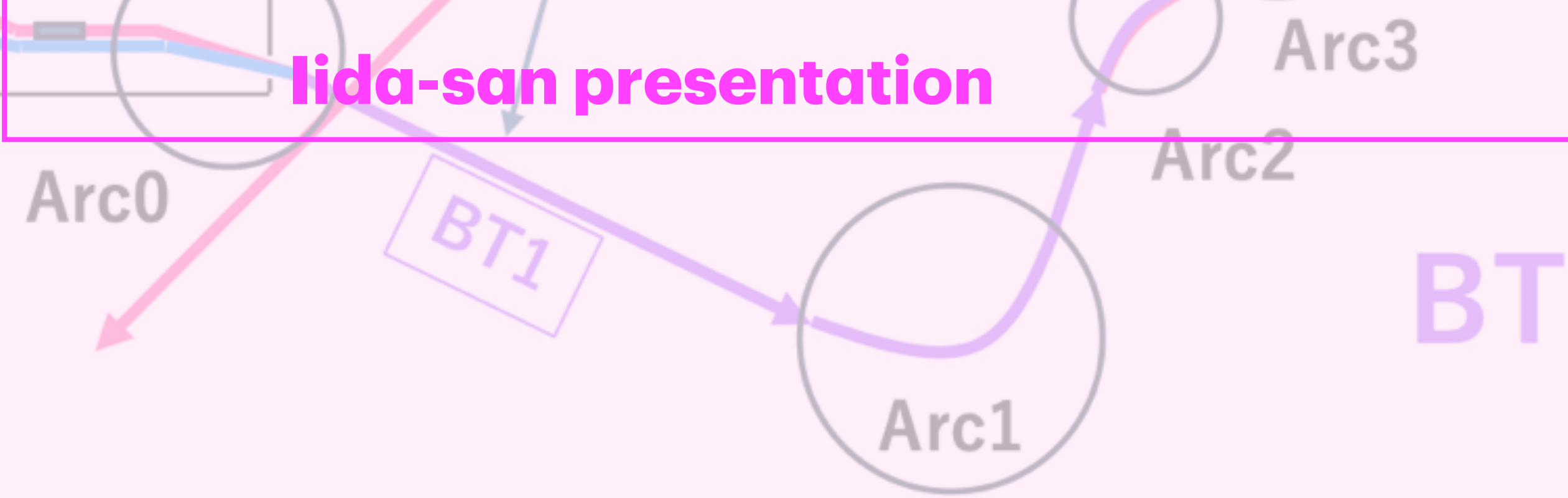
Sect.2 Sect.3 to Sect.5

at
e- beam

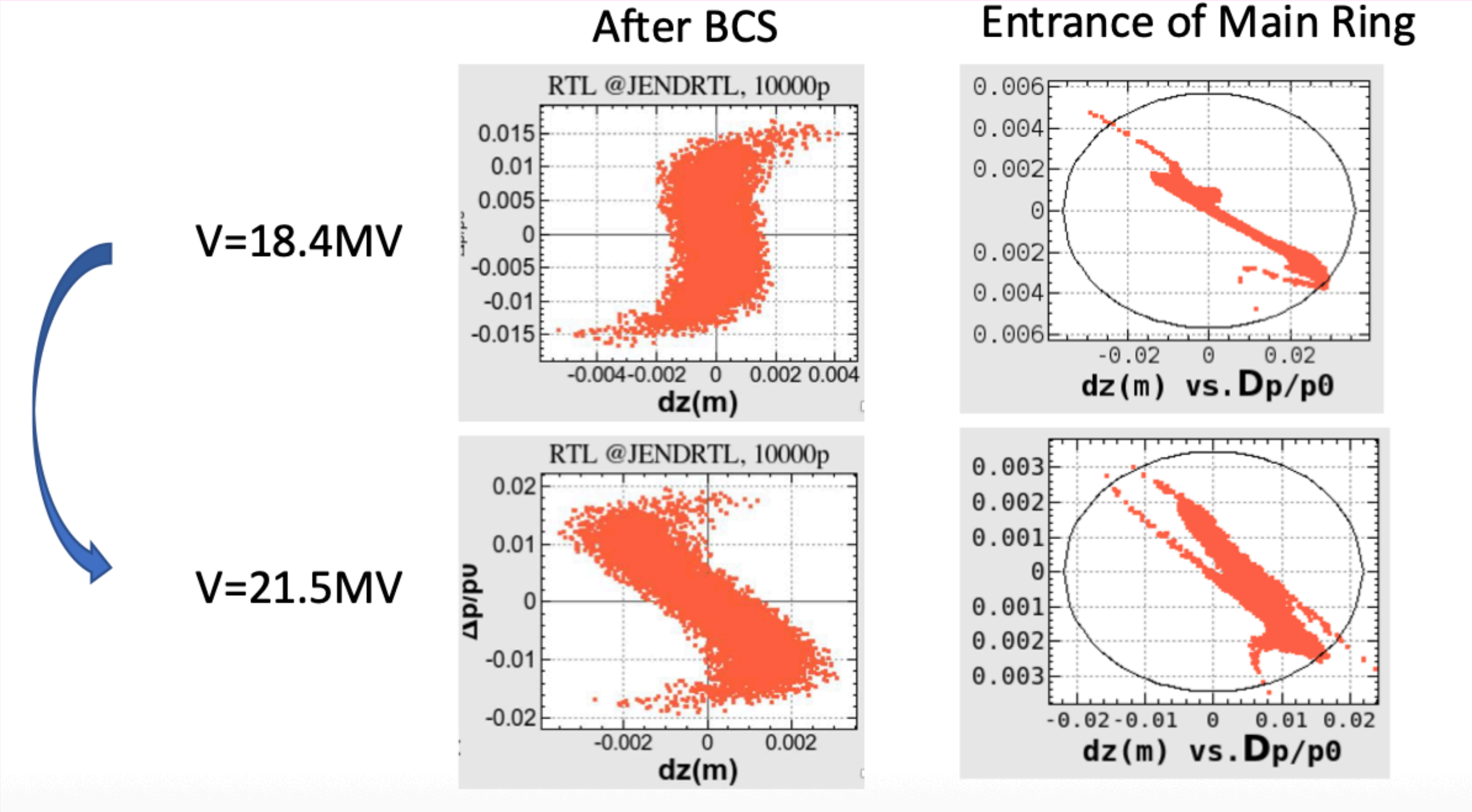
v=0.018



lida-san presentation



RTL ➡ LER injection point



Iida-san presentation

ICG summary 2025.May-June

BT Studyまとめ

							その他	ICGシフト
2025/5/22 (木)	早朝	0:00-9:00	KBE		KBP			
	昼	10:00-12:30	BTビーム調整 (熊野)		LTR, DR, RTLビーム調整 (飯田, 清宮, 由元)			伊藤
	昼	13:30-17:00	BTモニター確認 (Driss, 由元)		入射キッカー, Strip line kicker調整 (多和田, 小玉, 杉村)			
	準夜	17:00-20:00			Sector3-5 Phasing, B0E Water trouble(植田, 小玉)		KEKB/AR安全シフト : 大西	宮原
	準夜	20:00-23:00			ECS位相調整, BTp BPM調整			
2025/5/23 (金)	早朝	0:00-9:00	KBE		KBP			
	昼	10:00-12:30	WS測定, 1Hz keep		WS測定, 1Hz keep, 再Phasing(Sect.3-5)			紙谷
	昼	13:30-17:00	Response measurement (下崎, 庄司)		OTR調整(Driss), 2 bunch調整 (飯田, 三浦)			
	準夜	17:00-20:00	Response measurement (下崎, 庄司)		FC On調整, 2 bunch調整 (飯田, 三浦)			山口
	準夜	20:00-23:00	Response measurement (下崎, 庄司)		2 bunch調整(飯田, 三浦)			
2025/5/24 (土)	早朝	0:00-9:00	KBE		KBP		KEKB/AR安全シフト : 小玉	(安全)
	昼	10:00-12:30	e- 調整 (吉田)		Strip line FB調整(小玉)			由元
	昼	13:30-17:00			RTL emittance measurement, dispersion (由元)			
	準夜	17:00-20:00	e- 調整 (吉田)		RTL emittance measurement, dispersion (由元)			Di Wang
	準夜	20:00-23:00	e- 調整 (吉田)		RTL 六極を変えてBT1 Emittance測定 (由元)			
2025/5/25 (日)	早朝	0:00-9:00	KBE		KBP			(安全)
	昼	10:00-12:30	e- 調整 (吉田)					紙谷
	昼	13:30-17:00	HER-BTとSY3タンブラインでのビームライン中心軌道位置BPM値		Sector3-5で0.5mm水平軌道出してBT1でWS測定 (飯田)			
	準夜	17:00-20:00	及びベンド運転磁場値の確認, 調整 (紙谷)					
	準夜	17:00-20:00	e- 調整 (吉田)					
準夜	20:00-23:00	e- 調整 (吉田)						
2025/5/26 (月)	早朝	0:00-9:00	KBE				BPM KBLog trouble	
	昼	10:00-12:30	BT data取り (BT parameterは動かない) (生出)		BT data取り (BT parameterは動かない) (生出)			山本
	昼	13:30-17:00	AR南のケーブル導入口スクリーン挿入時のシールド効果測定 (三増)		AR南のケーブル導入口スクリーン挿入時のシールド効果測定 (三増)			
	準夜	17:00-20:00	e- 調整 (吉田)		E=3.5GeVに変更して, X-Y Coupling測定 (菊池, 飯田, 清宮)			宮原
	準夜	20:00-23:00	S8_61_H1, SC_61_H1の試験, KBP パラサイトOK (宮原)		E=3.5GeVに変更して, X-Y Coupling測定 (菊池, 飯田, 清宮)			
2025/5/27 (火)	早朝	0:00-9:00	KBE				KBE trouble	
	昼	10:00-12:30	BT data取り (BT parameterは動かない) (生出)		BT data取り w/o QCD2P (BT parameterは動かない) (生出)			岡安
	昼	13:30-17:00	SY3 診断ラインのビームコルメータ (CO_61_H1) , 圧力の監視と		MSP.15 Beam size measurement (Driss, 飯田)			
	準夜	17:00-20:00	E11A / E11B エリアでの空間実効線量評価 (岡安)		Emittance measurement w/w/o QCD2P (Driss, 飯田)			吉川
	準夜	20:00-23:00	HER-BTとSY3タンブラインでのビームライン中心軌道位置BPM値		各OTR-BPM measurement (Driss)			
2025/5/28 (水)	早朝	0:00-9:00	KBE		KBP		BPM KBLog trouble	
	昼	10:00-12:30	BT data取り w QCD2P (BT parameterは動かない) (生出)		BT data取り w QCD2P (BT parameterは動かない) (生出)		KBE-3nC A1_M Streak camera測定	Driss
	昼	13:30-17:00	Response measurement (下崎, 庄司)		Q-scan magnets studies (Driss)			
	準夜	17:00-20:00	Response measurement (下崎, 庄司)		Q-scan magnets studies (Driss)			Di Wang
	準夜	20:00-23:00	Response measurement (下崎, 庄司)		Q-scan magnets studies (Driss)			
2025/5/29 (木)	早朝	0:00-9:00	KBE		KBP		BT data (BT parameterは動かない) (生出, 梶)	
	昼	10:00-12:30	e- 調整 (吉田)		KBP stops			SC. Wang
	昼	13:30-17:00	e- 各電荷量(1, 2, 3nC)で調整 (吉田)					
	準夜	17:00-20:00	e- 各電荷量(1, 2, 3nC)で調整 (吉田)					夏井 (由元)
	準夜	20:00-23:00	Emittance電荷量依存性測定 (由元, 夏井)					
2025/5/30 (金)	早朝	0:00-9:00						
	昼	10:00-12:30	Emittance電荷量依存性測定 (由元, 夏井)					小林
	昼	13:30-17:00	e- 3nCで調整					
	準夜	17:00-20:00	BTp Off, BTeでDispersion, 軌道, Emittance測定 (飯田, Driss, 植田)				トシネキ入場 (見学) 14:00→14:25	船越
	準夜	20:00-23:00	Emittance測定Q-scan w only drift space (飯田, Driss)					
2025/5/31 (土)	早朝	0:00-9:00	KBE					
	昼	10:00-12:30	Emittance測定Q-scan w only drift space (飯田, Driss)					恵郷
	昼	13:30-17:00	e- 調整 (吉田) , Response measurement (下崎)					設楽
	準夜	17:00-20:00	Response measurement (下崎, 庄司)					
	準夜	20:00-23:00	Response measurement (下崎, 庄司)					
2025/6/1 (日)	早朝	0:00-9:00	KBE					
	昼	10:00-12:30	e- 調整 (吉田)					吉田
	昼	13:30-17:00	e- 調整 (吉田)					
	準夜	17:00-20:00	e- 調整 (吉田) , Program check (清宮)					清宮
	準夜	20:00-23:00	e- 調整 (吉田) , Program check (清宮)					
2025/6/2 (月)	早朝	0:00-9:00	KBE					
	昼	10:00-12:30	e- 調整 (吉田)					吉川
	昼	13:30-17:00	MSE.10 Emittance study (飯田, 清宮)					
	準夜	17:00-20:00	MSE.10 Emittance study (飯田, 清宮)					佐藤
	準夜	20:00-23:00	ECS1用のArc0 optics study, Including dispersion corrections					
2025/6/3 (火)	早朝	0:00-9:00	KBE					
	昼	10:00-12:30	3nC測定 (飯田, 清宮)					伊藤
	昼	13:30-17:00	e- 調整 (吉田)					
	準夜	17:00-20:00	ECS1用のArc0 optics study, including dispersion corrections,					SC. Wang
	準夜	20:00-23:00	optics matching, 1nC (飯田, 清宮)					
2025/6/4 (水)	早朝	0:00-9:00	KBE					
	昼	10:00-12:30	ECS1用のArc0 optics study, 3nC性測定 (飯田, 清宮, 紙谷)					
	昼	13:30-17:00	e- Beam gate trouble (対応 : 吉田, 豊富)					山本
	準夜	17:00-20:00	2玉測定 (宮原) , ECS1用のArc0 optics study, 3nC測定 (飯田, 清宮, 多数)					Di Wang
	準夜	20:00-23:00	ECS1用のArc0 optics study, 3nC測定, 2玉調査 (飯田, 清宮, 多数)					
2025/6/5 (木)	早朝	0:00-9:00	KBE					
	昼	10:00-17:00	ECS1用のArc0 optics study, 3nC測定, 2玉調査 (飯田, 清宮, 多数)					
			2玉問題調査 (清宮, 飯田)		2玉進行方向位置測定 at 東側Dump診断ライン (吉田)			
			・A1MでのEmittance測定 (清宮, 夏井) ・Q fudge factor測定(菊池)		・Emittance and energy spread measurements for 2nd bunch ・with Fast kicker (由元)		・QFE, AREのP(FD)A1_MをKBPと同値にしてOKか? :	

ICG summary 2025.May-June

BT Studyまとめ

			その他	ICGシフト
		KBE	KBP	
2025/5/22 (木)	早朝	0:00-9:00		
	昼	10:00-12:30	BTビーム調整 (熊野)	伊藤
	昼	13:30-17:00	BTモニター確認 (Driss, 由元)	
	準夜	17:00-20:00	入射キッカー、Strip line kicker調整 (多和田、小玉、杉村)	宮原
	準夜	20:00-23:00	Sector3-5 Phasing, B0E Water trouble(植田、小玉)	
			ECS位相調整、BTp BPM調整	
2025/5/23 (金)	早朝	0:00-9:00	KBE	
	昼	10:00-12:30	WS測定、1Hz keep	
	昼	13:30-17:00	Response measurement (下崎、庄司)	紙谷
	準夜	17:00-20:00	Response measurement (下崎、庄司)	
	準夜	20:00-23:00	Response measurement (下崎、庄司)	山口
2025/5/24 (土)	早朝	0:00-9:00	KBE	
	昼	10:00-12:30	e- 調整 (吉田)	KEKB/AR安全シフト：小玉 (安全)
	昼	13:30-17:00		由元
	準夜	17:00-20:00	e- 調整 (吉田)	
	準夜	20:00-23:00	e- 調整 (吉田)	Di Wang
2025/5/25 (日)	早朝	0:00-9:00	KBE	
	昼	10:00-12:30	e- 調整 (吉田)	(安全)
	昼	13:30-17:00	HER-BTとSY3ダンプラインでのビームライン中心軌道位置BPM値 及びベンド運転磁場値の確認、調整 (紙谷)	紙谷
	準夜	17:00-20:00	e- 調整 (吉田)	
	準夜	20:00-23:00	e- 調整 (吉田)	
2025/5/26 (月)	早朝	0:00-9:00	KBE	
	昼	10:00-12:30	BT data取り (BT parameterは動かさない) (生出)	BPM KBlog trouble
	昼	13:30-17:00	AR南のケーブル導入口スクリーン挿入時のシールド効果測定 (三増)	山本
	準夜	17:00-20:00	e- 調整 (吉田)	
	準夜	20:00-23:00	S8_61_H1, SC_61_H1の試験、KBP パラサイトOK (宮原)	宮原
			S8_61_H1, SC_61_H1の試験、KBP パラサイトOK (宮原)	
2025/5/27 (火)	早朝	0:00-9:00	KBE	
	昼	10:00-12:30	BT data取り (BT parameterは動かさない) (生出)	KBE trouble
	昼	13:30-17:00	SY3 診断ラインのビームコリメータ (CO_61_H1)、圧力の監視と E11A / E11B エリアでの空間実効線量評価 (岡安)	岡安
	準夜	17:00-20:00	HER-BTとSY3ダンプラインでのビームライン中心軌道位置BPM値 及びベンド運転磁場値の確認、調整 (紙谷)	古川
	準夜	20:00-23:00		
2025/5/28 (水)	早朝	0:00-9:00	KBE	
	昼	10:00-12:30	BT data取り w QCD2P (BT parameterは動かさない) (生出)	BPM KBlog trouble
	昼	13:30-17:00	Response measurement (下崎、庄司)	KBE-3nC A1_M Streak camera測定
	準夜	17:00-20:00	Response measurement (下崎、庄司)	
	準夜	20:00-23:00	Response measurement (下崎、庄司)	Di Wang
			Response measurement (下崎、庄司)	
			KBP 2 bunch energy, orbit study (清宮、飯田)	

ICG summary 2025.May-June

BT Studyまとめ

2025/5/27 (火)	早朝	0:00-9:00	BT data取り (BT parameterは動かさない) (生出)	BT data取り wo QCD2P (BT parameterは動かさない) (生出)	KBE trouble	
	昼	10:00-12:30	SY3 診断ラインのビームコリメータ (CO_61_H1)、圧力の監視と	MSP.15 Beam size measurement (Driss, 飯田)		岡安
	昼	13:30-17:00	E11A / E11B エリアでの空間実効線量評価 (岡安)	Emittance measurement w/wo QCD2P (Driss, 飯田)		古川
	準夜	17:00-20:00	HER-BTとSY3ダンプラインでのビームライン中心軌道位置BPM値	各OTR-BPM measurement (Driss)		
	準夜	20:00-23:00	及びベンド運転磁場値の確認、調整 (紙谷)			
2025/5/28 (水)	早朝	0:00-9:00	BT data取り wo QCD2P (BT parameterは動かさない) (生出)	BT data取り wo QCD2P (BT parameterは動かさない) (生出)	BPM KBLog trouble	
	昼	10:00-12:30	Response measurement (下崎、庄司)	Q-scan magnets studies (Driss)	KBE-3nC A1_M Streak camera測定	Driss
	昼	13:30-17:00	Response measurement (下崎、庄司)	Q-scan magnets studies (Driss)		
	準夜	17:00-20:00	Response measurement (下崎、庄司)	Q-scan magnets studies (Driss)		Di Wang
	準夜	20:00-23:00	Response measurement (下崎、庄司)	KBP 2 bunch energy, orbit study (清宮、飯田)		
2025/5/29 (木)	早朝	0:00-9:00	e- 調整 (吉田)		BT data (BT parameterは動かさない) (生出、梶)	
	昼	10:00-12:30	e- 各電荷量(1, 2, 3nC)で調整 (吉田)	KBP stops		SC. Wang
	昼	13:30-17:00	e- 各電荷量(1, 2, 3nC)で調整 (吉田)			
	準夜	17:00-20:00	Emittance電荷量依存性測定 (由元、夏井)			夏井
	準夜	20:00-23:00	Emittance電荷量依存性測定 (由元、夏井)			(由元)
2025/5/30 (金)	早朝	0:00-9:00	Emittance電荷量依存性測定 (由元)			
	昼	10:00-12:30	e- 3nCで調整			小林
	昼	13:30-17:00	BTp Off、BTeでDispersion、軌道、Emittance測定 (飯田、Driss、植田)		トンネル入域(見学) 14:00~14:25	
	準夜	17:00-20:00	Emittance測定Q-scan w only drift space (飯田、Driss)			船越
	準夜	20:00-23:00	Emittance測定Q-scan w only drift space (飯田、Driss)			
2025/5/31 (土)	早朝	0:00-9:00	e- 調整 (吉田) , Response measurement (下崎)			
	昼	10:00-12:30	Response measurement (下崎、庄司)			恵郷
	昼	13:30-17:00	Response measurement (下崎、庄司)			
	準夜	17:00-20:00	Response measurement (下崎、庄司)			設楽
	準夜	20:00-23:00	Response measurement (下崎、庄司)			
2025/6/1 (日)	早朝	0:00-9:00	e- 調整 (吉田)			
	昼	10:00-12:30	e- 調整 (吉田)			吉田
	昼	13:30-17:00	e- 調整 (吉田)			
	準夜	17:00-20:00	e- 調整 (吉田) , Program check (清宮)			清宮
	準夜	20:00-23:00	e- 調整 (吉田) , Program check (清宮)			
2025/6/2 (月)	早朝	0:00-9:00	e- 調整 (吉田)			
	昼	10:00-12:30	MSE.10 Emittance study (飯田、清宮)			古川
	昼	13:30-17:00	MSE.10 Emittance study (飯田、清宮)			
	準夜	17:00-20:00	ECS1用のArc0 optics study, including dispersion corrections			佐藤
	準夜	20:00-23:00	3nC測定 (飯田、清宮)			
2025/6/3 (火)	早朝	0:00-9:00	e- 調整 (吉田)			
	昼	10:00-12:30	ECS1用のArc0 optics study, including dispersion corrections,			伊藤
	昼	13:30-17:00	optics matching, 1nC (飯田、清宮)			
	準夜	17:00-20:00	ECS1用のArc0 optics study、3nC性測定 (飯田、清宮、紙谷)			SC. Wang
	準夜	20:00-23:00				
2025/6/4 (水)	早朝	0:00-9:00	e- Beam gate trouble (対応 : 吉田、豊富)			
	昼	10:00-12:30	2玉測定 (宮原)、ECS1用のArc0 optics study、3nC測定 (飯田、清宮、多数)			山本
	昼	13:30-17:00	ECS1用のArc0 optics study、3nC測定、2玉調査 (飯田、清宮、多数)			
	準夜	17:00-20:00	ECS1用のArc0 optics study、3nC測定、2玉調査 (飯田、清宮、多数)			Di Wang
	準夜	20:00-23:00	ECS1用のArc0 optics study、3nC測定、2玉調査 (飯田、清宮、多数)			
2025/6/5 (木)	早朝	0:00-9:00	2玉問題調査 (清宮、飯田)			
	昼	10:00-17:00	2玉進行方向位置測定 at 東側Dump診断ライン (吉田)			

・A1MでのEmittance測定 (清宮、夏井)

・Emittance and energy spread measurements for 2nd bunch

・QFE、AREのP{FD}A1_MをKBPと同値にしてOKか？

ICG summary 2025.May-June

"double-bunch problem" the last day

it was also observed to split into two at SC_58_4.

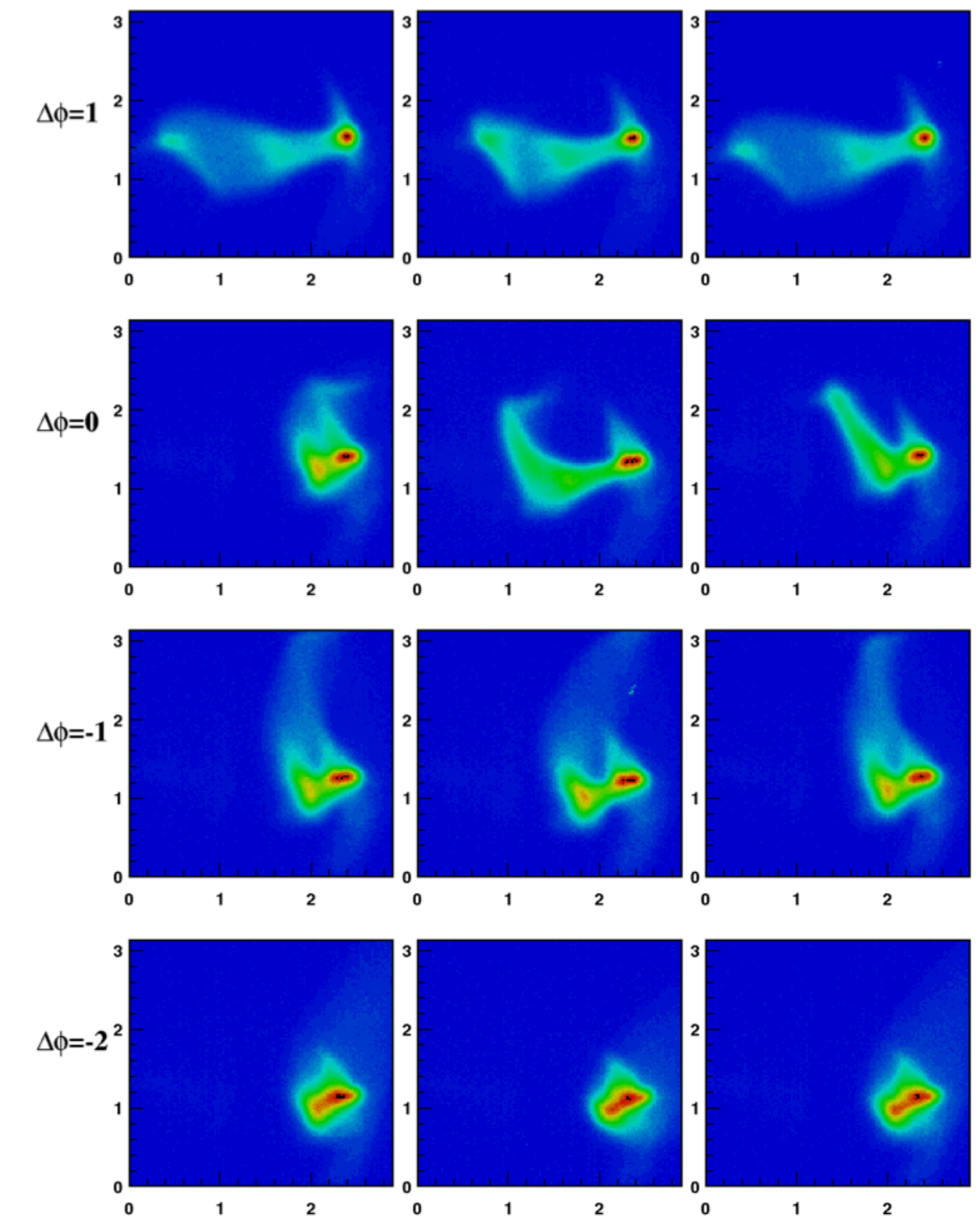
KBE 2玉問題の調査

HER BTでKBEビームが2つに分かれているとき、SC_58_4でも2つに分離していた。

KL_A2, KL_3, KL_A4, SB_B の位相を [-2, +1] 度変化させると、分離の様子が変わった。

位相を運転値 -2°にセットするとほぼ1つにまとまる。

1st Laserのカソード照射位置を変えてもコアの部分は動かない。
何故？



Beam Profiles at SC_58_4 and A-sector, B-sector klystron phase.

SUMMARY

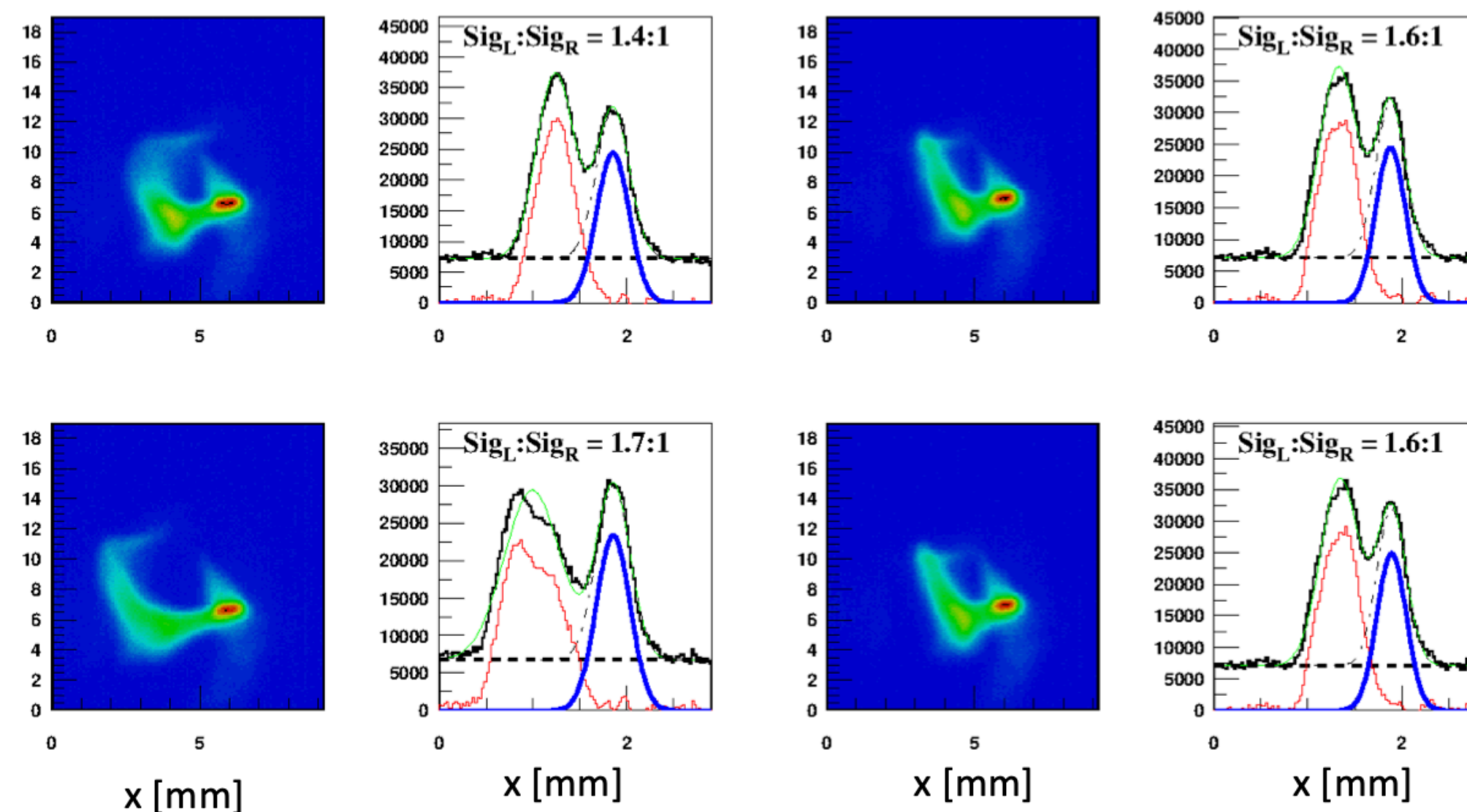
ICG summary 2025.May-June

"double-bunch problem" the last day

KBE 2玉の比率

分布に Gauss(Left) + Gauss(Right) + Const. をフィットして左の玉と右の玉の信号の比率を評価

KL_A2, KL_3, KL_A4, SB_B の位相が運転値の場合 :



Sig_R = Gauss(Right)
Sig_L = Histogram - Sig_R - Const.

SC_58_4Lでは広がっている分布
(赤色) がショットごとに動く

2玉に分かれた場合にRF位相で位置が変化する玉の部分は動かない部分の 1.6倍程度
(BTでは動く玉と動かない玉が逆転?)

SUMMARY

A cross-check of emittance estimation in Quad-OTR scans

- Discrepancies have been noticed between the emittance displayed on the Quad-OTR scan panel and other methods (D. Oumbarek, eg., in the beam size discussion on May 29).
- Then an independent analysis is tried for the same measurement data.

K. Oide, N. Iida @ ICG June 3, 2025

Many thanks to Driss Oumbarek, and all members of the ICG/SuperKEKB team.

Summary

- Factor of x3-x4 discrepancies in the emittance found in the case of BTP horizontal using MS.4 and QXF6P.
- Horizontal, MS.10 and QMF4P, the difference is only 4%.
- For BTE, both horizontal and vertical, two calculations give identical results.

BTP(X)

screen	quad	$\gamma\beta\epsilon_x$ (μm , panel)	$\gamma\beta\epsilon_x$ (μm , this calc.)
MS.4	QXF6P	505	135
MS.4	QXF6P	173	47
MS.15	QMF4P	193	185

BTE(X)

screen	quad	$\gamma\beta\epsilon_x$ (μm , panel)	$\gamma\beta\epsilon_x$ (μm , this calc.)	remarks
MSE10	QTF1E	264.8	264.8	original
MSE10	QTF1E	320.5	320.5	long bump
MSE10	QTF1E	421.4	421.4	R56 = -0.67 m

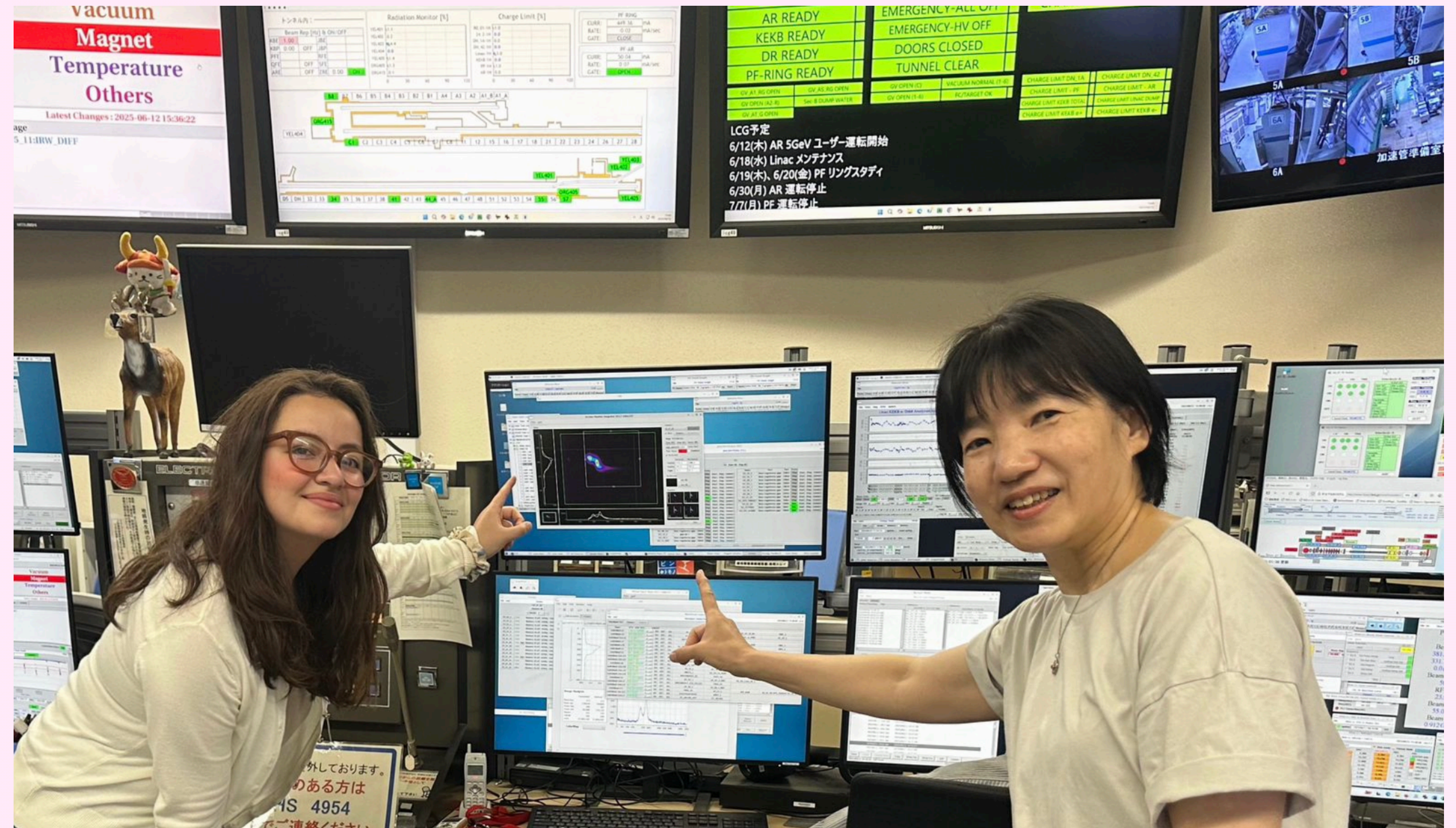
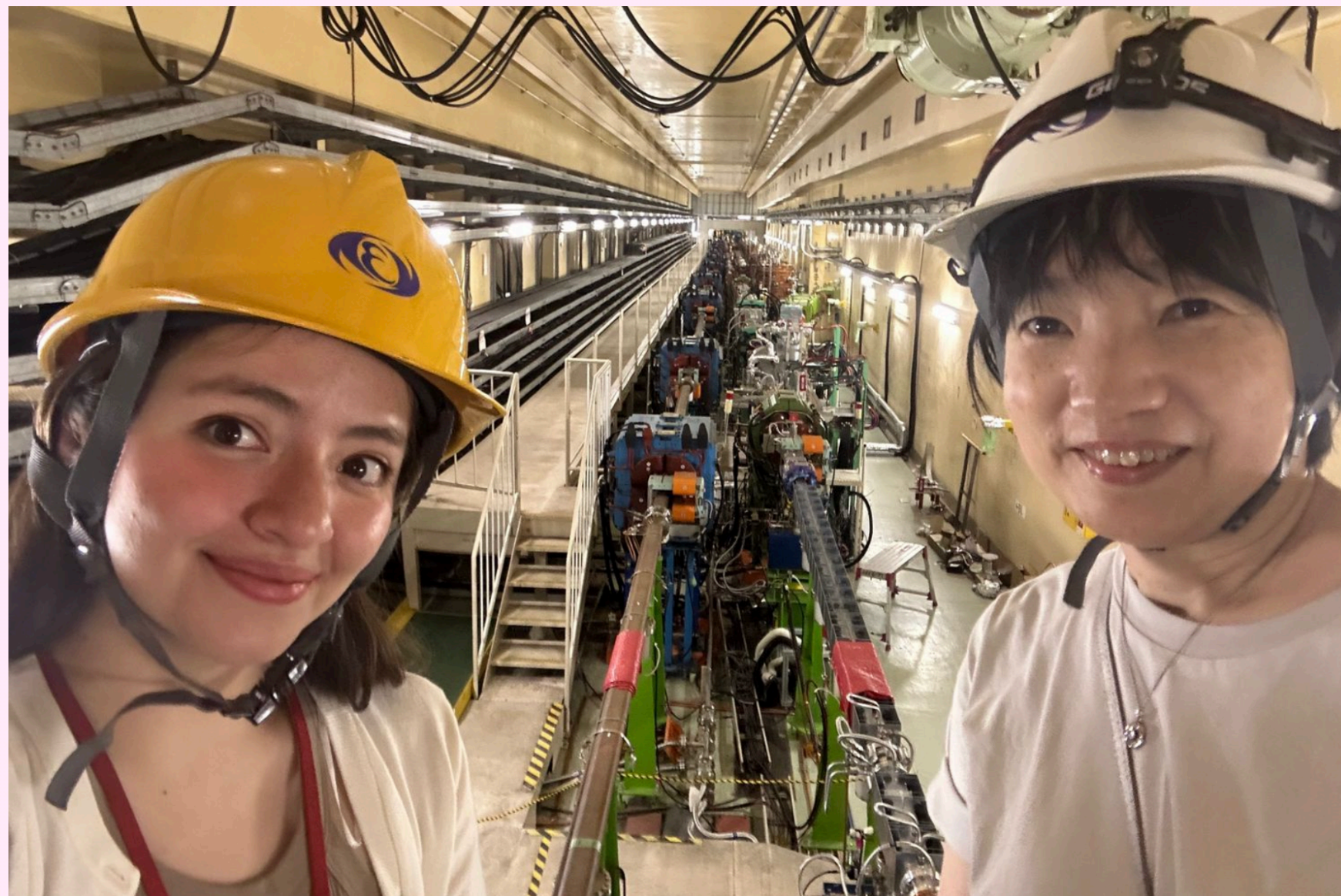
BTE(Y)

screen	quad	$\gamma\beta\epsilon_y$ (μm , panel)	$\gamma\beta\epsilon_y$ (μm , this calc.)	remarks
MSE10	QTD2E	106.4	106.4	original
MSE10	QTD2E	106.1	106.1	reset to ref
MSE10	QTD2E	170.7	170.7	R56 = -0.67 m

Last week: Measurements at linac CR

- They will send me the raw data
- STAFF meeting KBE beam study: "double-bunch problem"
- Screen size of first measure was wrong
- SAD simulation seimiya-san
- VPN ACCES

New Scale @ SC_A1_C2_65 (in the chicane near RF gun) is following:
H [mm/pixel]: 0.0615
V [mm/pixel]: 0.0626



Outlook

- We have a simulation setup for the electron injection chain (except gun),
- When we are confident in simulation setup, it can be used in parameter scans, optimization, experimental data fits and much more.
- Further simulation improvements can be
 - Space charge (only switch on in simulations, easy)
 - Gun simulations (expertise available at DESY, could be done quickly if geometry available)
 - Shielded CSR (need to program new model)
- After machine studies in May-June and finalizing the cross-checks, further steps will be defined