



PS LIU Tunespread

Comparison of Analytical Expectation with Simulated
Tunespreads

`haroon.rafiq@cern.ch`

13.12.19

Table of Contents

LIU Tunespread

Conclusion
Acknowledgements

Motivation

August 25, 2017 – Beam parameters at injection of each accelerator

		PS (Standard: 4b+2b – BCMS: 2× 4b)						
		N (10^{11} p/b)	$\epsilon_{x,y}$ (μm)	E (GeV)	ϵ_z (eVs/b)	B_l (ns)	$\delta p/p_0$ (10^{-3})	$\Delta Q_{x,y}$
Achieved	Standard	16.84	2.25	1.4	1.2	180	0.9	(0.25, 0.30)
	BCMS	8.05	1.20	1.4	0.9	150	0.8	(0.24, 0.31)
LIU target	Standard	32.50	1.80	2.0	3.00	205	1.5	(0.18, 0.30)
	BCMS	16.25	1.43	2.0	1.48	135	1.1	(0.20, 0.31)

Beam Size

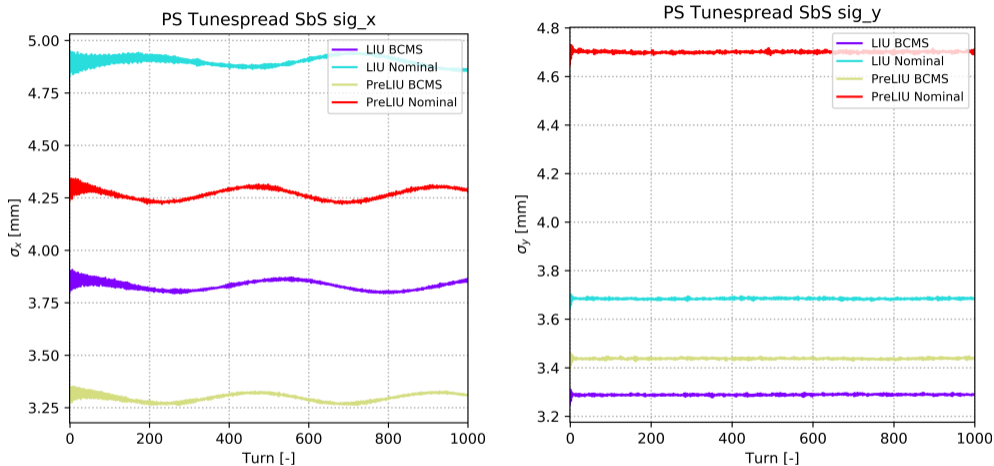


Figure: Horizontal (left), and vertical (right) beam size as a function of turn.

Dispersion

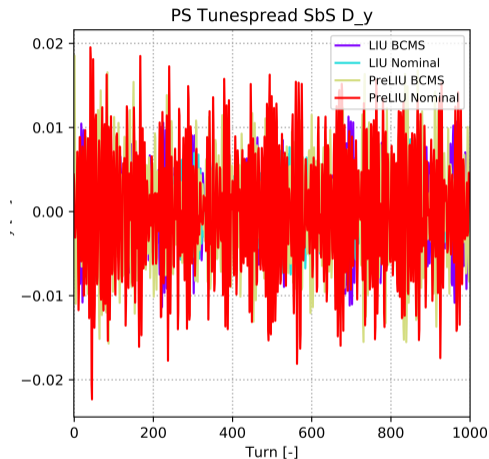
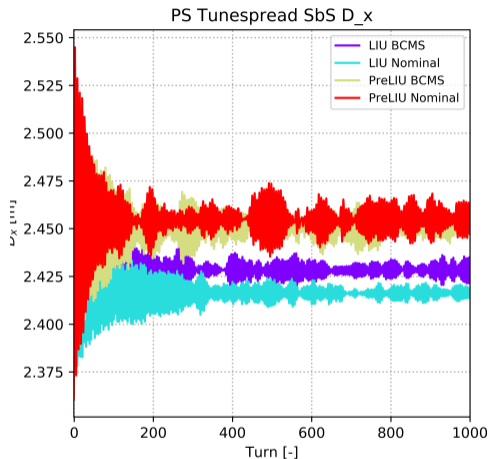


Figure: Horizontal (left), and vertical (right) dispersion as a function of turn.

Beta Function

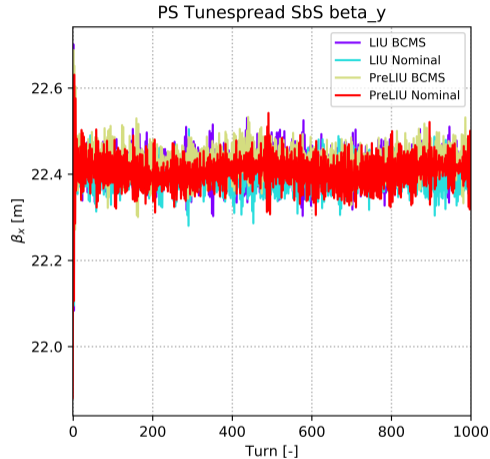
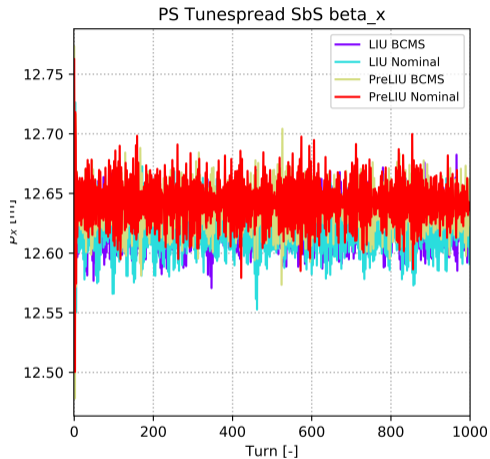


Figure: Horizontal (left), and vertical (right) beta function as a function of turn.

Longitudinal Stability

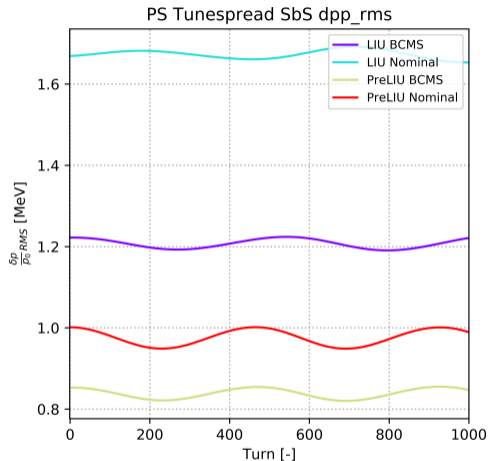
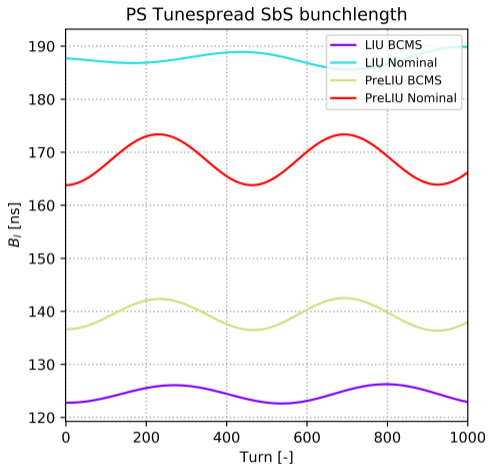


Figure: Bunch length (left), and momentum spread (right) as a function of turn.

LIU Tunespread

Conclusion
Acknowledgements

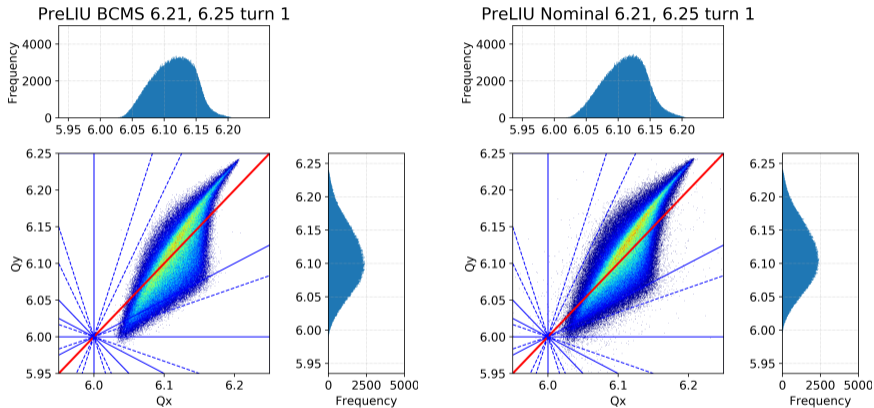


Figure: PreLIU parameter BCMS (left) and Nominal (right) tunespreads from PyORBIT.

BCMS vs Nominal Tune: First 50 Turns

LIU Tunespread

Conclusion

Acknowledgements

Conclusion

What have we learnt?

- ▶ PyORBIT simulations of 4 cases appear stable over 1000 turns.
- ▶ Simulated tunespreads in reasonable agreement with analytical estimates, good definition of ΔQ yet to be established from simulations.

LIU Tunespread

Conclusion

Acknowledgements

Acknowledgements

“If I have seen further it is by standing on the shoulders of Giants” - Newton

- ▶ Alexandre Lasheen: Longitudinal bunch profiles RF Voltages



www.cern.ch