

# PSB-LIU requests for the Beam Dynamics WP

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# LIU-PSB Beam Dynamics

- Make sure we can **successfully produce** and **optimize** the LIU high-brightness beams and the future high-intensity beams, **taking into account the Upgrade modifications** (higher energy, Linac4 connection, new injection/extraction hardware,...)
  - Need to **follow-up** and be involved in the hardware specification and to **be ready** with our tools to respond to requests that may come through the life of the Project

# LIU-PSB Beam Dynamics

- Optics modelling for (deterministic) resonance compensation.
- Performance with respect to space charge, including the new hardware. Impact of resonance compensation and optimization of the working point (with chromaticity).
- Impedance model, including the new hardware, and Beam Stability.
- Localization and mitigation of the losses (high-intensity beams)
- Simulation of the curve Emittance vs. Intensity for the beams available from the Booster after L4 connection
- MDs (Requirements for 2014 → tentatively by the ~end of Jan.)

Description	Start Date	Finish Date	Comments
<b>PSB Optics modelling</b>	<b>1-Jul-2012</b>	<b>31-Dec-2015</b>	
Response matrix measurements (linear optics) performed		31-Dec-2014	
Turn-by-turn MDs (non-linear optics) performed		31-Dec-2014	turn-by turn PUs available
Optics model and resonances compensation scheme implemented		30-Jun-2015	
<b>Performance at low energy (Space Charge)</b>	<b>1-Feb-2012</b>	<b>31-Dec-2015</b>	
Curve Emittance vs. Intensity with H- from Linac4 simulated		30-Jun-2014	(*****) High priority LIU
Analysis and benchmark with 2012-2013 measurements finished		30-Jun-2014	to be ready for 2014 MDs
Code consolidated and benchmarked		31-Dec-2014	
Machine Development Studies (MDs) in 2014 performed		31-Dec-2014	
Impact of the new injection hardware on beam dynamics estimated		31-Dec-2014	inj. hardware need to go in production
Impact of resonance compensation estimated		31-Dec-2015	after we have model & scheme
Working point (including chromaticity) optimized		31-Dec-2015	
<b>Beam stability</b>	<b>1-Feb-2012</b>	<b>31-Dec-2015</b>	
Impedance and instabilities Codes/models for $\beta_{rel} < 1$ validated		31-Dec-2014	
PSB impedance/wakefields implemented in HEADTAIL and benchmarked		30-Jun-2014	
Machine Development Studies (MDs) in 2014 performed		31-Dec-2014	
New injection hardwares impedance and impact on the beam evaluated		31-Dec-2014	inj. hardware need to go in production
Finmet cavities impact estimated		31-Dec-2014	finmet cavities decision needs to be finalized
New extraction elements impedance and impact on the beam evaluated		31-Dec-2015	
Effect of the damper studied and requirements to future beam stability extrapolated		31-Dec-2015	
<b>Losses localization and mitigation measures</b>	<b>1-Oct-2013</b>	<b>31-Dec-2016</b>	
Losses localization studies done and benchmarked		31-Dec-2014	
Losses in the injection region evaluated		31-Dec-2014	
Machine Development Studies (MDs) in 2014 performed		31-Dec-2014	new BLM available
Collimation/scrapers scheme in the rings proposed		31-Dec-2015	

Let's have an intermediate review ~June 2014 and to see the status of our studies