



30/11/2017

Introduction and Goals of the Review

B.Goddard

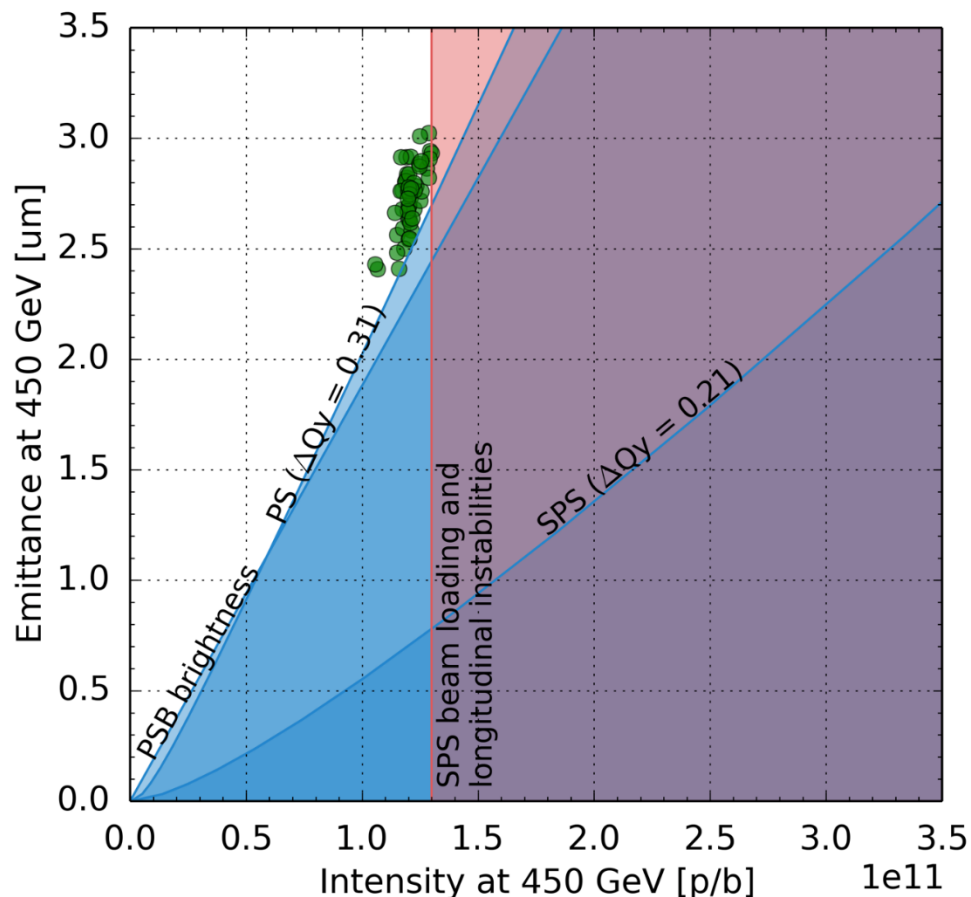


Introduction

- Losses at injection into SPS currently expected to be higher than the LIU budget of 10% (which includes everything, even scraping) - details in following talks
- If not solved, will impact performance reach of LIU project as higher intensity needed from PSB and PS, meaning higher emittance and risk of other limitations, plus higher than forecast radiation levels in SPS

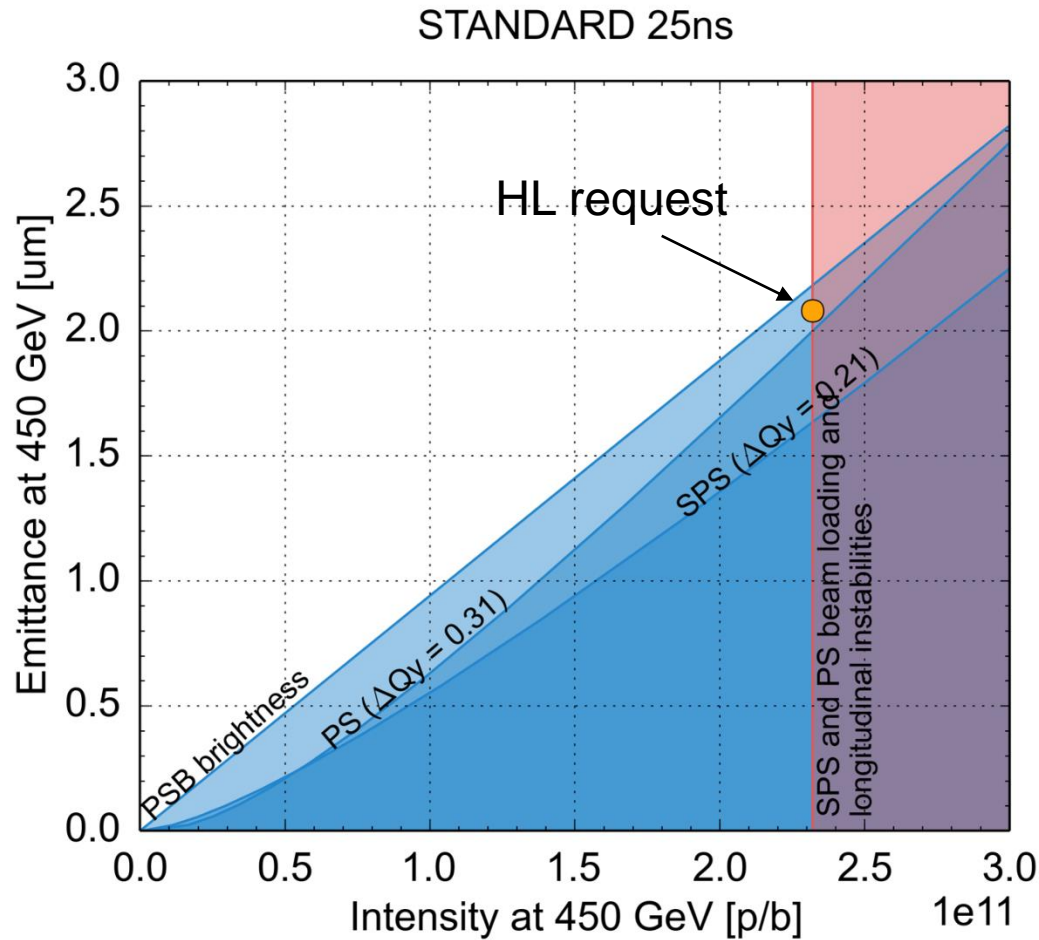


25 ns beam in 2016 (1 batch)



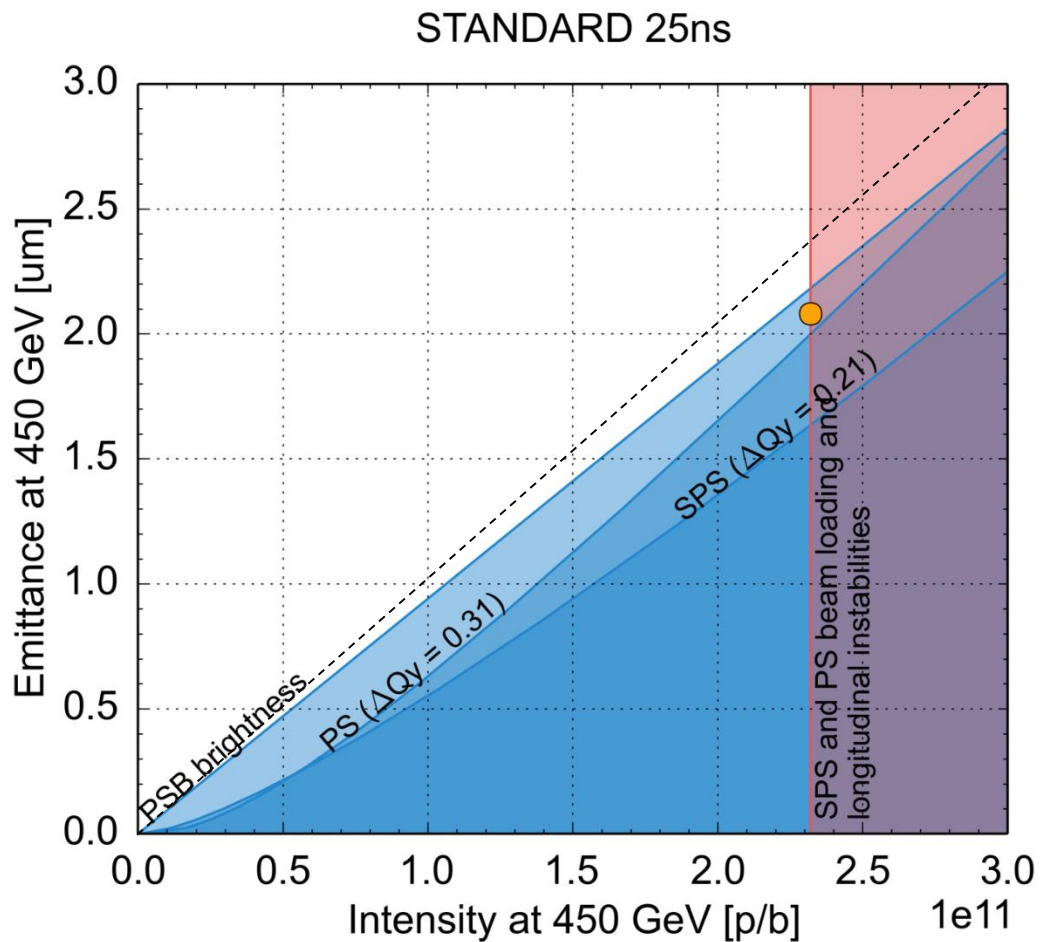


Nominal LIU performance reach





Additional 10% losses in SPS?





SPS Injection Losses WG

- Active since August 2016, with 20 meetings to date
- Winding up with this review and last meeting wrap-up next week
- <https://indico.cern.ch/category/8462/>



WG objectives defined for 2017

- Simulate gains from improved bunch rotation
- Quantify expected performance improvement from both 200 MHz power and LL upgrades together
- Update PS impedance model and identify possible improvements (to help stability with smaller long. emittance)
- (Re)define target long. emittance at PS extraction
- Conclude on feasibility of adiabatic bunch shortening in PS
- Feasibility and performance reach/issues of Q22, including high intensity beam tests
- Investigate practical implications of new systems: 120-160 MHz in PS or 80 MHz in SPS
- Conclude and propose overall strategy by ~November



Motivation for holding a Review now

- More complete and intense examination of work to date, to larger audience and review panel
- Defined as a milestone to conclude on sources of beam losses and on most suitable mitigations
 - 12 months until start of LS2: really ‘last minute’ to consider even moderate additional equipment changes
 - 1 year of beam time left before LS2 – important to take stock of 2017 results and prioritise 2018 studies
- To prepare for Chamonix and C&S review where both technical progress and cost/planning implications will need to be clearly explained
 - To note: figure of potential extra 10 MCHF mentioned in this context at last C&S review



Objectives for this Review

- Synthesis of the many studies (simulations, MDs) with aim of identifying the source(s) of the problem
- Update our forecast of effect on LIU performance
- Review of available mitigation measures (clearly linked to our understanding of the source(s) of the losses)
- Agree on proposals for any 'new' equipment changes not in present LIU scope, and provide solid justification for studying implementation
- Allow clear LIU baseline update if needed



Specific questions to Reviewers


- Has everything been covered in terms of loss mechanisms or are there other explanations which should be addressed?
- Are there other possible mitigation measures?
- Are the sources of the losses sufficiently well understood to have enough confidence in the proposed mitigations?
- What additional HW changes are needed beyond the existing LIU baseline?
- What are key studies for 2018?



- **Reviewers:**
 - G.Arduini (morning only)
 - K.Cornelis
 - H.Damerau
 - E.Jensen
 - S.Gilardoni (tbc)
 - B.Goddard (chair)
 - K.Hanke
 - K.Li (sci. sec.)
 - G.Rumolo
 - E.Shaposhnikova




Timetable (morning)

	Introduction and aims of the review (expected beam loss and impact on LIU performance reach) 774-R-013, CERN	<i>Brennan Goddard</i> 08:30 - 08:40
	Overview of measured capture and flat bottom losses 774-R-013, CERN	<i>Hannes Bartosik</i> 08:40 - 09:00
09:00	Effect of WP, chromaticity, orbit correction on FB losses 774-R-013, CERN	<i>Kevin Shing Bruce Li</i> 09:00 - 09:20
	Capture losses: measurements and simulations 774-R-013, CERN	<i>Markus Schwarz</i> 09:20 - 09:40
	SPS momentum aperture and effect on flat bottom losses 774-R-013, CERN	<i>Verena Kain</i> 09:40 - 10:00
10:00	Coffee break 774-R-013, CERN	10:00 - 10:20
	Impact of RF and LLRF settings (power, RF loops, RF noise) 774-R-013, CERN	<i>Giulia Papotti</i> 10:20 - 10:40
	PS beam injected into SPS: measurements and simulations 774-R-013, CERN	<i>Alexandre Lasheen</i>  10:40 - 11:00
11:00	Impact of LIU-PS upgrades 774-R-013, CERN	<i>Heiko Damerau</i> 11:00 - 11:20
	PS impedance (status, missing impedance and possible reduction) 774-R-013, CERN	<i>Branko Kosta Popovic</i> 11:20 - 11:40
	Additional PS upgrades - (Landau cavity, extra RF system) 774-R-013, CERN	<i>Heiko Damerau</i> 11:40 - 12:00
12:00	Lunch	



Timetable (afternoon)

12:00	Lunch	12:00 - 13:00
13:00	Q22 774-R-013, CERN	Hannes Bartosik 13:00 - 13:20
	SPS collimation 774-R-013, CERN	Marcin Patecki  13:20 - 13:40
	Additional SPS RF system (80 MHz) 774-R-013, CERN	Joel Repond 13:40 - 14:00
14:00	Discussion of mitigation schemes as function of performance gain and cost 774-R-013, CERN	Brennan Goddard 14:00 - 14:20

- Many talks with a very full agenda...let's leave some time for discussions
- Some speakers are also reviewers – be tough on yourselves!