LIU project: preparing for the installation phase(s)

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LS2 DAYS
29-30 SEPTEMBER 2015

http://indico.cern.ch/event/436424/

Outline

- Project deliverable and timeline
- Project organisational strategy for installation phases
- Baseline changes impacting (E)YETS, LS2
- Concerns

LIU deliverable target

	$\mathcal{N}$ (x 10^{11} p/b)	ε (μm)	# of bunches
SPS achieved	1.2	2.6	288
SPS for HL-LHC	**2.3**	**2.1**	**288**

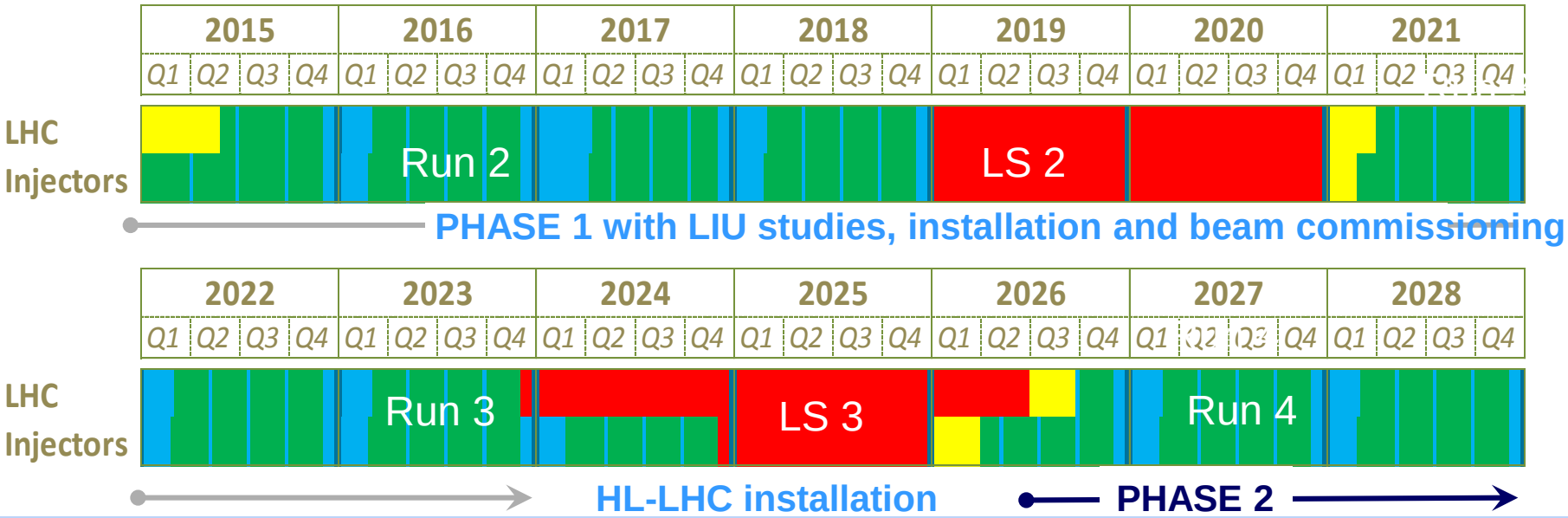
Injectors must produce 25 ns proton beams with about double intensity and even more than double brightness.

A cascade of improvements is needed across the whole injector chain to reach this target

=> Massive installation programme during LS2

Timeline

- LIU (machine, simulation, design) studies and procurement during **Run 2** until **LS2.**
- LIU installations and final hardware work mainly during **LS2**
- Beam commissioning of LIU beams
  - **Pb ion beams** need to be ready by **2021 ion run**
  - **Proton beams** during **Run 3** to be ready after **LS3**



All on-going activities on planning, layout, preparation of installation phases : under the coordination of Julie Coupard – next talk

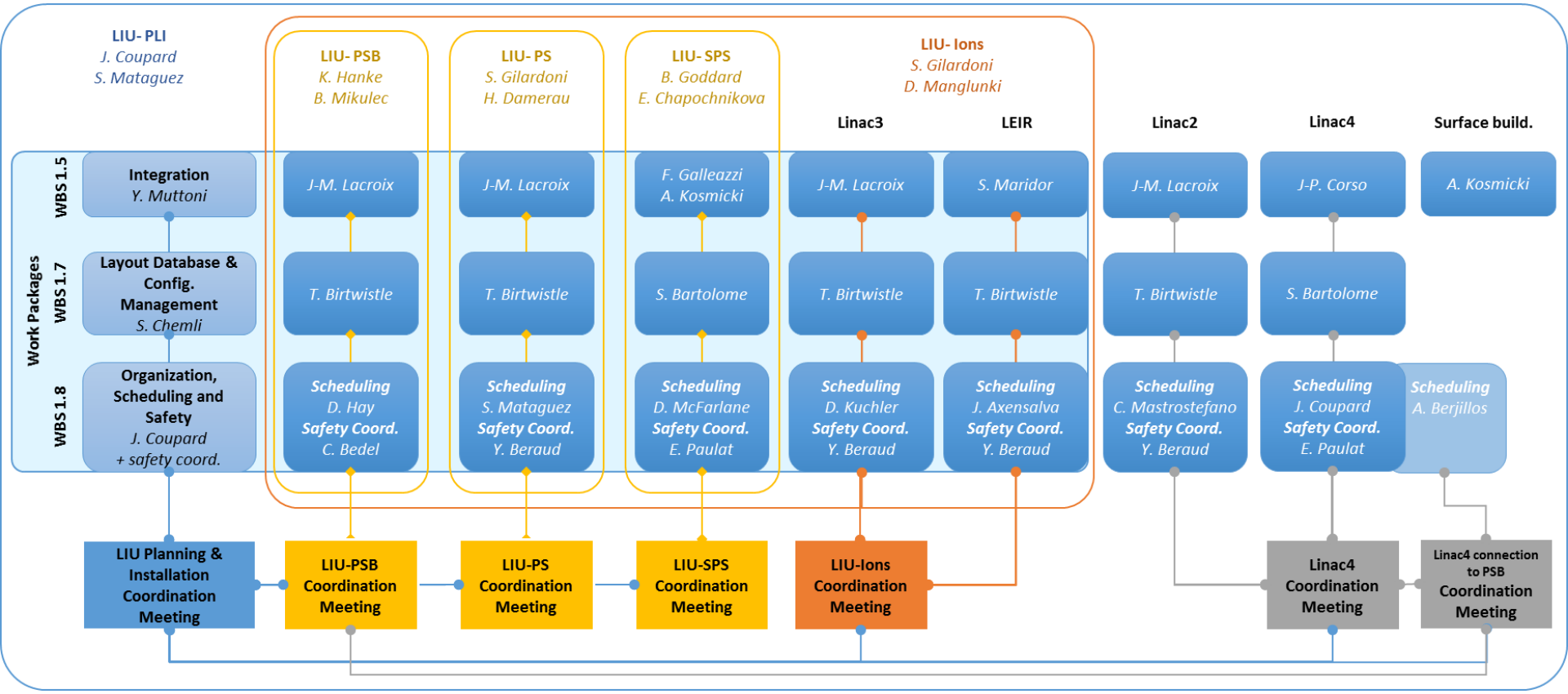
Preparing installation phases: LIU general strategy

- LIU-PSB (Klaus Hanke), LIU-PS (Simone Gilardoni), LIU-SPS (Brennan Goddard) and LIU-IONS (Simone Gilardoni) coordination groups: definition of the needs: simulation/specification/close collaboration with equipment groups through design/procurement/assembling phases and preparation of installation + commissioning
- All groups responsible for their equipment readiness, within specification and defined timeline -> LS2 talks
- Julie Coupard to coordinate the overall Planning / Layout / Installation activities with all her EN-MEF colleagues (ECR, SSR…)
- Need to take into consideration at an early stage the requirements from other projects, incl. maintenance and CONS.

  -> To be included into the LIU planning, by Julie Coupard for the Injectors

  -> LS2 days to gather all the ‘known’ needs and consolidate data with PLAN inputs
- Installation priorities / conflicts to be agreed at the level of the Accelerator and Technology Director, with recommendations from related committees (LS2, IEFC, LMC)

Preparing for LS2: LIU - Planning & Installation Coordination - EN-MEF group



Courtesy Julie Coupard

Project Status

- Project in execution phase, as defined by baseline presented at the Cost & Scheduling review in March 2015
- As planned, 2015 checkpoints in the project baseline took place through reviews
- Reviews outcomes related to (E)YEST, LS2 installation activities:
  - LIU-SPS External / Internal beam dump
  - LIU-SPS Scrubbing / aC coating in synergy with the LIU-SPS Impedance reduction programme

LIU-SPS Beam dump

- Recommendations presented on 3 July 2015 at the IEFC by Etienne Carlier (coordinator)
- Strategy:
  - New TIDVG installed in LSS5 in LS2
  - Some work to be anticipated to (E)YETS
  - Removal of actual TIDVG and TIDH in LS2
  - Design and integration to be completed by end 2015
- More in equipment groups talks.

LIU-SPS scrubbing – aC coating review

https://indico.cern.ch/event/433608/

Reviewers: W. Fischer (BNL, chair), Y. Suetsugu (KEK), K. Cornelis, J.M. Jimenez, M. Meddahi, F. Zimmermann (CERN)

Work presented by **LIU-SPS ecloud / aC teams**, years of intense theoretical and experimental studies, remarkable results.

Conclusions presented on 25 September 2015, at IEFC by Brennan.

Review conclusion

- With scrubbing experience to date, analysis of data and simulations, LIU and HL-LHC performance goals are not guaranteed with scrubbing only
- High confidence that aC coating of MBB dipoles will deliver performance goals
- Opportunistic deployment of aC should be pursued to
  (i) maintain/further develop coating technology, and
  (ii) increase performance margin in the SPS

Review recommendation

- Make aC coating of MMB dipoles the baseline until there is high confidence that scrubbing can establish LIU and HL-LHC performance goals

LIU-SPS scrubbing – aC coating review

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Proposed implementation and timeline: being analysed by equipment groups, under coordination of Paul Cruikshank

- **EYETS 16/17:**
  - pilot (up to 1 arc?) for coating QFs and QF SSS, in synergy with impedance reduction;
  - a few (4?) MBB half-cells coated in-situ, to prototype the 'final' cleaning and coating technology;
  - replacement of some (10%?) standard 156 mm drifts with coated chambers.
- **LS2**:
  - complete coating of remaining QFs and QF SSS, in synergy with impedance reduction;
  - Pilot (1 arc?) MBB coating, to debug full-scale logistics and quality control;
  - replacement of remaining 156 mm standard drifts with coated chambers.
- **Run3**:
  - Evaluation of whether these improvements, plus some improvements to the transverse damper, are already enough to reach the performance target
- **LS3:**
  - If required, coating of remaining MBBs around the machine.

Coordination meeting series will be launched – Paul Cruikshank

Concerns

- Planning / Layout / Installation activities to be integrated together with the projects, CONS, maintenance activities for the whole injectors chains – in progress
- Identification of the resources bottlenecks and strategy defined
- Critical that upgraded and new equipment are installed by end of LS2 to study the LIU beams during Run3, understand the limitations and acquire operational experience
- PRE-LS2 de-cabling campaign in PSB but also in PS and SPS
- Overall (E)YETS, LS2 cabling campaign
- Consolidation items needed for LIU operation must take place before end of LS2 (some during (E)YETS)

Outlook

- Much work ahead
- De-cabling campaigns remain a high risk activity
- Anticipate as much installation as possible – synergies
- Need of a master schedule for the injectors chain
- Thanks to all the departments and groups for their fruitful collaboration with the LIU project and deep commitments

THANK YOU FOR YOUR ATTENTION!