

HL-LHC Crystal Collimation Day

CERN, 19 October 2018 (Friday of the HL-LHC Annual Meeting Week)

Mandate / Scope / Program

The HL-LHC project is considering crystal collimation as an option to improve the ion collimation cleaning efficiency. While the definitive assessment of needs and feasibility of such a system can be carried out only in 2019, the HL-LHC Project envisages to have a preliminary review of the state-of-the-art and possible solutions for HL-LHC, considering also the possibility of an early deployment during Run3. For this purpose, a crystal collimation day is organised as a satellite meeting to the 8th Annual Meeting. Although no formal review panel is foreseen, the HL-LHC Project managements, EN department and UA9 Collaboration will use the outcome of this open workshop to draw preliminary conclusions and possible pathways for the deployment of crystal collimations at the LHC. The technical program is organised by WP5 – Collimation of HL-LHC.

Detailed agenda and syllabus.

1. **Welcome and Introduction - ROSSI, Lucio (10 min)**
 - Welcome and general introduction
 - Mandate of the workshop
 - General context and collaborations as path towards baseline
2. **Motivation for HL-LHC - BRUCE, Roderik (20+10 min)**
 - HL-LHC baseline upgrade for betatron cleaning
 - Review layouts and expected performance for Run III and IV
 - Target performance for the heavy-ion programme at the HL-LHC
 - Performance concerns for lead ion operations
3. **Crystal collimation system: concept and layouts - MIRARCHI, Daniele (20+10 min)**
 - Concepts of crystal-based beam collimation
 - Theoretical cleaning improvements for protons
 - LHC layouts: from MD to operations (can we use the MD layouts for ion cleaning?)
 - Specification of crystal for LHC collimation
 - Layout evolution during Run II and present status
4. **UA9: achievements and role for HL-LHC implementation - SCANDALE, Walter (20+10 min)**
 - UA9 and the studies for beam collimation with crystals
 - Overview of crystal performance in the SPS, protons + ions
 - Selection of other achievements by UA9 relevant (tests of LHC gonio in the SPS, operational aspects, channeling of ions, ...)
 - Recap. of instrumentation at the SPS: what can be interesting for the LHC
5. **Crystal technology at INFN - GUIDI, Vincenzo (20+10 min)**
 - Crystal production methodology
 - Tests at the producer premises
 - Measurements of crystal performance (validation without beam)
 - Crystals available for LHC collimation

6. **Crystal technology at PNPI - IVANOV, Iouri (20+10 min)**
 - Crystal production methodology
 - Tests at the producer premises
 - Measurements of crystal performance (validation without beam)
 - Crystals available for LHC collimation
7. **Overview of crystal performance at SPS-H8 - GARATTINI, Marco (20+10 min)**
 - Introduction of UA9 setup in H8
 - Procedure for crystal testing prior to installation in the LHC
 - Measurements of crystals now in the LHC
 - Review of the performance of new crystals for collimation: where we are
8. **LHC operational experience with proton beams - D'ANDREA, Marco (20+10 min)**
 - Review of measurements performed with proton beams
 - Operational procedures: linear scans, angular scans, loss maps
 - Results of crystal characterization
 - (If available) Results from low-background test for high-beta* run in 2018
9. **LHC operational experience with heavy ion beams - ROSSI, Roberto (20+10 min)**
 - Review of measurements performed with ion beams
 - Performance with lead ion beams, 2016
 - Performance with Xe ion beams, 2017
 - Proposed settings strategy and plans for beam tests: what do we need by 2018?
10. **LHC crystal alignment - GAVRIKOV, Yury (20+10 min)**
 - Critical aspects for alignments
 - Experience with the crystal installed in the LHC
 - What needs to be done for future installations
11. **LHC implementation: what is needed and what can be reused - CALVIANI, Marco (20+10 min)**
 - Review of present design
 - Mechanical design: present design and possible improvements
 - What can stay in the machine after LS2
 - Timeline for new production. Decision points for LS2 implementations.
12. **Goniometer and controls - MASI, Alessandro (20+10 min)**
 - Design of the goniometer and main features
 - How can we achieve μ rad controls in operations
 - Operational experience with LHC measurements
 - What is needed to get the present system operational
 - Possible improvements and new design
13. **Discussion and path towards a decision for baseline - BRUNING, Oliver (10+10 min)**
 - Timeline of HL-LHC, including plans for ion operations until Run IV
 - Critical decision points and milestones (next C&S review)
 - Role of collaborations