
CERN

Introduction to
2022 Joint Accelerator Performance Workshop

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https://indico.cern.ch/event/1194548/

Many thanks to:

Organising Committee, **Session Chairs** and **Speakers** for the hard work in preparation

Lucie Mainoli for the logistics

Participants, for your valuable time and upcoming active contributions

CERN Joint Accelerator Performance Workshop

Objectives and scope:

- **Bring together** clients and accelerator teams **across complex** to focus on 2022 lessons, 2023 desiderata and update longer-term perspective
- Spotlight on **requirements** and **integrated performance**
- Outcome: summary of **performance limitations, priorities** and specific **action proposals for complex improvements** to follow up
- Should provide **input to Chamonix** 2023 on expected performance, limitations and priorities for themes of work
- Intended to be a forum for **open and detailed technical discussion**, with focus on **new topics and results**

Rational for merging Montreux + Evian

- ATS teams work across all accelerators
- LHC performance in LHC depends critically on injectors
- Facilitate exchange of tools, methods, ideas and solutions
- Improve cohesivenss across machines and ATS units
- Aim for holistic approach in optimising global physics output
- Deal together with challenges of delivering more physics as efficiently as possible – in terms of resources and of energy

Risks of a big common Workshop?

- *“Not enough time for detailed discussion”?* → Careful session timetables, breaks, speaker discipline, chairperson flexibility
- *“Large sections of the audience not involved”?* → Hosted at CERN, wide invitation list, time for discussion - please participate!
- *“Management presence inhibits free discussion?”* → Objective is to identify and develop where to improve, so we all really, really WANT people to be constructively critical and discuss freely

Try it out this way – and learn from the experience for 2023

Other notes on organisation

- No proceedings – so the INDICO slides and Chairperson summaries with ‘Action list’ will be the legacy
- Important ‘non-technical’ parts of Workshop, since much (most?) of the valuable discussion takes place outside the Sessions proper

Workshop Sessions: outline

Mon	Session 1: **Introduction, aims and 2022 recap** (Rhodri) Session 2: **Accelerator and client view by beam** (Bettina, Nikos)
Tues	Session 3: **LIU Proton Beams for the LHC** (Hannes, Stephane) Session 4: **Accelerator performance: LHC** (Matteo, Roderik)
Wed	Session 5: **Equipment availability and efficiency improvements** (Chiara, Giulia) Session 6: **Beam related issues throughout the complex** (Alexandre, Barbara)
Thur	Session 7: **Efficiency, reliability & tools across the complex** (Alex, Verena) Session 8: **Outlook and roadmap for Run3 and Run4** (Johannes, Reyes) Session 9: **Main points and follow-up** (Brennan, Rhodri)

Outside the Session program

- Many people pointed out the need for opportunities for discussion in relaxed setting (automatic in ‘outside CERN’ WS)
- To try and provide this, everyone is warmly invited to:
  - Coffee breaks: provided in each Session – please stay around
  - Lunch each day: free-form, but B30 cafeteria and R2 are close
  - Welcome cocktail: Monday, 18:00 in main building (Pas-Perdus)
  - Workshop Dinner: Tuesday 18:00, same place (Pas-Perdus)
  - Physics Seminar: *“Space-based science meets accelerator-based science at CERN”* Urs Wiedemann, Wednesday 18:00, KJA, B30

Workshop spirit

- Asked Chairs and Speakers to concentrate mainly on problems to solve: so a lot of topics and discussion will be based around needs for improvement
- These aims should not detract from impressive 2022 achievements: was in many respects a great success for injectors and LHC (maybe some teams not so visible because they did a perfect job in 2022!)
- Don’t perceive this focus as negative: huge appreciation at all levels for fantastic performance achieved across complex, and big improvements already made in 2022 on many fronts

Workshop spirit

- So although it's 5th December, we're **NOT** aiming at Krampusnacht….

Final words

- All trying to push the performance of the machines and maximise physics output of the complex
- There many stimulating and creative opportunities for this – opportunities to make breaktrhoughs and make a difference
- It should also be fun, so let’s enjoy this week together

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Understanding the requirements

- Most important lessons from 2022
- Key experiment/client desiderata for 2023
- Experiment preferences, i.e. peak performance vs. reproducible performance, etc.
- Are there new experiment/client requirements for 2023 or beyond? What do these imply for the machines?

Where are the limits?

- Review of performance ramp-up progress (LIU beams, LHC)
- What are bottlenecks to performance, in terms of maximising beam for physics and data-taking? How can these be improved?
- What needs to be improved for more efficient, reproducible operation?
- Where should availability get even better?
- Are the measurement metrics, instrumentation and tools adequate? If not, what needs to improve?
- What are the priorities for overall performance improvement (in terms of useful physics beam delivered)?

Where should we put our attention?

- Where should the main focus be in 2023 (and possibly beyond) for the key performance improvement threads?
- What are the specific recommendations on fixes/upgrades/additions for improving equipment (HW, SW) ?
- What are the specific recommendations for improving operating the complex (tools, procedures, schedule, coordination)?
- What needs a specific decision process (e.g. on longer-term perspective)?

What's the vision for the future?

- Can we aim to deliver as much physics in 2023 with reduced time available?
- What are the longer-term prospects for doing more physics with less time and less overall power consumption?
- Is increased beam intensity per cycle compatible with beam losses, equipment and experimental limits?
- What are the priorities for CONS or for new developments/breakthroughs?
- Are there any new ideas for performance improvement or synergies to explore?
- What is holding us back in terms of communication, meetings and our decision process?
- Has it made sense to treat injectors and LHC together in this workshop? What are options for the future?