

HB2023 WGC: Accelerator Systems

Short summary

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October 13, 2023

WGC key facts:

Total talks: 18

Invited talks: 9, Contributed talks: 9 in 6 subcategories

Geographical distribution: *Asia (6), America (6), EMEA (6)*

→ ***100% geographical balance!***

We tried to get detail and full pictures of high-intensity accelerators worldwide to date and future developments with new techniques, modifications covering

- 1) Injection and extraction, 2) RF system (joint session with E),
- 3) Impedance and Instabilities (joint session with A and E),
- 4) New ideas and novel techniques, 5) High power targets and 6) Upgrades.

→ ***Full coverage of an accelerator***

1) Injection and extraction (3 talks)

- Vincent Schoefer (BNL) : Mitigation of Space Charge Effects in RHIC and Its Injectors
- Nicolas Evans (SNS, Oak Ridge) : Self-consistent injection painting for space charge mitigation
- Chiara Bracco (CERN) : Shaping high brightness and fixed target beams with the CERN PSB charge-exchange injection

Highlights:

- The SC effects are mitigated in the RHIC accelerator chain through stopband correction dual RF harmonics and working point selection. Foil scattering beam loss reduction by minimizing injection beam size in AGS booster.
- Solenoid introduce coupling demonstrated at the SNS-AR. Idea of using a linear coupling was proposed 30 years ago, but now in a different context.
- Merits of H⁻ injection instead of p at CERN PSB, comparison of 3 different foils.

2) RF system (4 talks)

- Tamura Fumihiko (J-PARC) RF systems of J-PARC proton synchrotrons for high-intensity longitudinal beam optimization and handling
- Xiao Li (CSNS, Presented by Wu Bin) : Development of dual harmonic RF system for CSNS-II
- Chihiro Ohmori (J-PARC) Magnetic alloy loaded cavity in J-PARC and CERN
- Juan Luis Munoz (CERN) Mutiharmotic buncher (MHB) for the Isolde superconducting recoil separator project

Highlights:

- New idea of handling beam loading (single ended instead of push-pull operation), merits of FF to FB, triple-harmonic is necessarily coming in operational soon.
- More option of Magnetic Alloy. Further development of the material, e.g. thinner tape.
- International collaboration prospects

3) Impedance Instabilities (4 talks)

- David Posthuma De Boer (ISIS) : Development of an Impedance Model for the ISIS Synchrotron and Predictions for the Head-Tail Instability
- Yoshihiro Shobuda (J-PARC) A kicker impedance reduction scheme with diode stack and resistor at the RCS in J-PARC
- Michela Neroni (CERN) Beam coupling impedance of the main extraction kickers in the CERN PS
- Bjorn Lindstrom (CERN) Mitigating collimation impedance and improving halo cleaning with new optics and settings strategy of the HL-LHC betatron collimation system

Highlights:

- Better understanding of the impedance: Theory, simulations and applications
- Mitigation of the kicker impedance.

4) Novel idea, new techniques to reduce or maintain emittance (4 talks)

- Stephen Brooks (BNL) : Ultrahigh bright source using Trap
- Timofey Gorlov (SNS) : Laser stripping of H⁻ beam
- Valeri Lebedev (Fermilab) High Energy Cooling
- Natalia Triantafyllu (CERN) Simulations and Measurements of Betatron and Off-Momentum Cleaning Performance in the Energy Ramp at the LHC

Highlights:

- Ultimate ion source to create high brightness. It may help to speed up the development if there is a small or medium size application.
- Continuous progress on the laser stripping and another step forward from a proof of principle use in an operational accelerator
- High-energy, high-density proton cooling status and developments for ep-colliders are discussed.

5) Targets (1 talk)

- Shiro Matoba (KEK J-PARC) Muon production target at J-PARC

Highlights:

- High-intensity target handling issues and development prospects are discussed.
- Application of a rotation target to the high-power applications out of PSI and J-PARC collaboration.

6) Upgrades, future projects (2 talks)

- Kazami Yamamoto (JAEA/J-PARC) Beyond 1 MW Scenario in J-PARC Rapid Cycling Synchrotron
- Katsuya Yonehara (FNAL) Challenging in muon acceleration for muon colliders.

Highlights:

- Sufficient beam loss mitigation at a design beam power made it possible to move forward for multi-MW with few possible upgrades.
- Path for far future high-intensity machines for high-energy physics discussed.

Thanks to all of our WGC speakers for excellent talks!