Electron cloud meetings
General introduction

Structure

- Goals:
  - Set & review all together the objectives of the electron cloud studies machine by machine, according to the new/existing requests and needs
  - Present the work progress and generate/follow up actions
  - Discuss relevant new results as well as raise issues or questions of different nature
- Participation
  - Normal meetings invitation only to be-ecloud-members
  - Special topics: invitation extended to additional sub-groups of people, according to the machine/project
  - Style: interactive, presentations are mainly meant to animate discussions

Structure

- Documentation:
  - Indico subcategory:

    Home >> Projects >> Electron Cloud and Numerical Simulations >> Electron Cloud meetings
  - https://indico.cern.ch/categoryDisplay.py?categId=5020
  - Minutes will be posted on the web page after each meeting.
- Frequency & location
  - Aim at monthly meetings, but sometimes more frequent, if necessary (depending on requests & progress)
  - When? (How about Thursday afternoon at 14:00 ?)
  - Where? (According to room availability, 6-2-008 ?)

Electron cloud in the PS

- Measurements
  - Build up in different conditions and at different cycle times
  - Horizontal instabilities
- Systematic comparison between measurements and simulations
- Mitigation measures (experimental & simulations)
  - Double-step bunch rotation
  - Reduced voltage
  - Feedback system
- Full characterisation of the electron cloud in the machine (different chambers, combined function magnets)
- Input for more measurement techniques to be developed and hopefully applied after LS1 (based on e-cloud monitors in magnets and/or synchrotron phase shift)
- Short term: Write up of the LIU-PS TDR
- Long term simulation plan: Develop a PyECLOUD-HEADTAIL combined code to study the instabilities?

Electron cloud in the SPS

- Simulations and characterisation of all types of chambers (pending quadrupoles)
- Measurements both with the e-cloud monitors and the pressure gauges + all beam based measurements -most results already collected in a detailed note, anything to be added to this point?
  - Comparison between observations with standard and BCMS 25ns beam (impact of transverse emittance and train structure on e-cloud)
- Studies for a scrubbing beam both in simulations and MDs with lower e-cloud threshold than the 25ns beam
  - Transverse stability? Can we accelerate it?
  - Application with sweep scrubbing
- General studies on the high bandwidth damper module in HEADTAIL to damp e-cloud instability
- More detailed HEADTAIL simulations with Q20 to assess the tolerable amount of electron cloud in the machine + the applicability of the HBWD

Electron cloud in the LHC

- Preparation of the future 25ns runs of LHC
- Analysis of the existing data and forecast of what will be needed in future operation
  - Beam data (tunes, transverse emittance, lifetime, stability) + machine settings
  - Heat load in arcs, SAMs, triplets
  - Synchronous phase shift
  - Vacuum around the machine in different beam conditions/processes
- Dedicated simulation campaigns to fit machine data and describe/explain the evolution of the SEY until now
- Further extension of the PyECLOUD code to include more options
  - 2-beam cases (ALICE 800mm tube, triplets), beams displaced from the center of the chamber
- HEADTAIL simulations to determine instability thresholds, determine electron cloud tune footprints, study the effect of octupoles on e-cloud instabilities
  - Extension to study the effect on the beam of electron cloud in quads?
- Tackle open questions
  - Efficiency/speed of scrubbing
  - Behaviour of electron cloud with energy in the different parts of the machine

Other electron cloud studies

- Use of nonlinearities in the transverse plane to create islands to improve scrubbing efficiency (Cedric)
- Distribution of the synchrotron radiation around the LHC, important to define the distribution of seeds above a certain energy (Humberto)
  - Impact of the dipole edges? (Gianni)
- HL-LHC studies (Octavio's note already published)
  - Different filling patterns
  - Doublet beams
  - Scrubbing scenarios
- CLIC damping rings
  - Determine thresholds in different parts of the positron ring (dipoles, wigglers, quarupoles) and propose the adequate countermeasures
  - Need different scenarios to be considered for the CLIC damping rings (re-baselining), i.e. two bunch spacings and beam intensity scans
  - Assess the impact in terms of heat load (important for the cold wigglers) as well as in terms of beam stability