Removal of the CT hardware from the PS ring

M. Giovannozzi , A. Huschauer

MSWG, 18 May 2018

Motivation

- **MTE confirmed as long-term replacement of CT by the IEFC on 8 December 2017 (minutes of the 222nd IEFC meeting)**
- **Decision based on**
  - operational experience and performance since 2015
  - high-intensity tests performed in 2017
- **Endorsement to remove the CT hardware during LS2**
- **Changes summarized in EDMS 1959218**
- **Several changes to the machine with the following purpose**
  - Removal of most of the CT hardware
  - Relocation of some CT equipment
  - Improvement of the MTE hardware

Potential changes to be carried out

- **“Potential” as feasibility of changes being investigated by the respective equipment responsible**
  - Changes will be fully detailed in ECRs for the different equipment

- **Removal of CT equipment with beneficial impact**
  - on the available space in the PS ring
  - on the ring impedance (small in transverse, to be quantified in longitudinal)
    - impedance bench measurements to be envisaged if acceptable in terms of radiation

1) Removal of CT hardware from the ring

- **PE.BFA09**
  - Kicker to close the fast bump generated by PE.BFA21
  - Pedestal functionality still used to improve MTE bump closure
  - **Removal of staircase magnet** from the tank
    - Envisage appropriate measures to control impedance
    - If infeasible, disconnect only power converter

- **PE.BFA21**
  - Kicker to generate the five-turn closed bump
  - **Removal of the complete kicker tank** (both staircase and pedestal functionalities)
  - Replacement vacuum chamber with equivalent or larger aperture than the kicker
  - Given the presence of the extraction bump, it is wise to keep aperture margin

1) Removal of CT hardware from the ring

- **PE.SEH31**
  - Electrostatic septum used to shave off the beam
  - **Removal of the septum**
  - Replacement vacuum chamber will be of same enlarged type as in the adjacent magnet units

- **PE.BSW31.27 and PE.BSW31.35**
  - Dipole magnets to generate slow bump 31
  - **Removal of both magnets**
  - No vacuum chamber modification required

2) Relocation of CT hardware

- **PE.QKE25 and PE.QKE73**
  - Modification of the optics for the CT extraction
  - **Removal of the both elements** and **reinstallation in SS33 and SS49** (low-beta insertion for high-intensity beams at 2 GeV)
    - PE.QKE16.05 and PE.QKE16.25 **must not be removed**

3) Improvement of MTE hardware

- **F16.DFA242**
  - Reduction of horizontal emittance prior to SPS injection by reducing trajectory difference between different turns
  - Currently no turn-by-turn capability of F16.DFA242 available
  - **Reuse staircase power converter of PE.BFA09 to provide turn-by-turn kick capabilities**
  - Tests will be performed to determine optimum polarity of each DFA

Conclusions

- **Following the IEFC meeting on 8 December 2017, removal of CT hardware has been endorsed**

- **ECRs are currently being prepared by the different groups involved:**
  - TE-ABT for septum and kickers
  - TE-MSC for dipole magnets and quadrupoles