ATLAS Roman Pots

Status of MP System Commissioning before First Beam

Maciej Trzebiński

Institute of Nuclear Physics
Polish Academy of Sciences
Krakow, Poland

223rd Machine Protection Panel Meeting

CERN, 21st April 2022

Beam Interlock System validation

- Both ALFA and AFP fully commissioned (last tests done on April, 8^{th}):
  - injection permit test (check that any single Roman Pot not within the ON-range of the HOME switch withholds the RP INJECTION_PERMIT for its respective beam (B1 or B2)),
  - LVDT-to-Limits comparison (test the proper reaction of pot (retraction in case of validation of warning and/or dump limit) and change of USER_PERMIT (going false in case of violation of dump limit, staying true otherwise)),
  - pot behaviour at various input flags (test behaviour of pots (extraction, loss/no loss of USER_PERMIT) as a function of various beam modes and state of override key),
  - LVDT Bypass Key (test the proper behaviour (restoration of permits) in a various scenarios using bypass key),
  - hardware and software extraction (for each pot test emergency extraction via DCS software buttons and hardware button located in ATLAS control room).
- checklist signed-off,
- usual EDMS document prepared
  - send around via e-mail and attached to the agenda,
  - do we need to sign it off since we have checklists?

Detector Commissioning during 900 GeV Collisions

- Conditions similar to pilot beam we had in Fall 2021:
  - $\beta^* = 11$ m, no crossing angle, TCLs opened (?),
- Request from AFP similar as during pilot beams: to be inserted "just outside the shadow of TCLs",
  - important data for commissioning of trigger and readout system,
  - very beneficial to have several chances to perform commissioning before first stable beams,
- Due to low intensity and quite large distance from beam (19 mm for NEAR and 16 mm for FAR last time) no Beam Base Alignment was required,
- Tentative dates: 2/06, 4/06, 11/06, 3/07.
- ALFA will be commissioned in parallel (lower priority) $\rightarrow$ staying in garage would be sufficient.

Beam Based Alignment...

... for collision optics (low-β^*):

- qualify AFP and probably ALFA,
  - AFP will be inserted in all low-β^* runs (incl. all ramp-up steps),
  - ALFA will stay in garage during low-β^* runs,
- tentative dates (accordingly to current schedule): June, 19^{th}.

... for LHCf run:

- would be beneficial if can be done in advance (beam commissioning period? MD?), otherwise it would reduce LHCf data-taking time,
- not clear if only for ALFA, AFP or both $\rightarrow$ studies and discussion with LHCf ongoing.
- important to know beam conditions (optics, collimator settings) $\rightarrow$ discussion ongoing.

... for high-β^* tests:

- qualify ALFA,

... for pp $\rightarrow$ PbPb reference run:

- in case AFP will take data during pp reference run,
- would be beneficial if can be done in advance (beam commissioning period? MD?), otherwise it would reduce pp $\rightarrow$ PbPb data-taking time,
- important to know beam conditions (optics, collimator settings).

Schedule: Special Runs

Low-μ Run during 1^{st} ramp-up:

- at 600b step (details under discussion within ATLAS),
- exact μ value to be defined ($\mathcal{O}(0.5)$)

Very low-μ run for ATLAS:

- $\mu \sim 0.005$ and no trains,

TOTEM $\beta^* = 90$ m run:

- only for ALFA,

LHCf run:

- optics studies needed,

Low-μ Run during 2^{nd} ramp-up:

- at 600b step? need to agree with ATLAS,
- exact μ value to be defined,

Other:

- low-μ 'electroweak' runs ($\mu \sim 1$),
- pp $\rightarrow$ PbPb reference run:
  - optics needed,
  - probably possible only if BBA done in advance.