Meeting of the restricted Machine Protection Panel

MD 12663 validation

September 27th, 2024.

Participants:
Cédric Hernalsteens (TE-MPE), Daniel Wollmann (TE-MPE), Philippe Belanger (BE-ABP), Christoph Wiesner (TE-MPE), Roderik Bruce (BE-ABP), Matteo Solfaroli Camillocci (BE-OP), Georges Trad (BE-OP), Guido Sterbini (BE-ABP), Natalia Triantafyllou (BE-ABP), Giovanni Iadarola (BE-ABP), Stefano Redaelli (BE-ABP), Frederik Van Der Veken (BE-ABP), Michi Hostettler (BE-OP), Yann Dutheil (SY-ABT), Adriana Rossi (SY-BI), Jorg Wenninger (BE-OP), Carlo Emilio Montanari (BE-ABP).

The slides of all presentations can be found on the [website of the Machine Protection Panel](#) and on [Indico](#).

Introduction (C. Wiesner, G. Sterbini)

The validation fill (fill 10147) took place during the night of 26-27 September. Guido briefly recalled the MD sequence. The wires are switched on during the beta* levelling and tight collimation settings are used in the second part of the MD (see Table 1). During the MD the wire PC interlock will be disabled (other PC interlocks will remain on).

All the loss maps have been performed as planned (see Figure 1). As a reminder, a filling scheme with a single INDIV colliding in IP1/5 and 17 pilots was used so that all loss maps could be performed in a single fill.

Validation test	Loss Maps Matrix						
	β^* (cm)						
	41.5	38.5	35.5	32.5	30.0	30.0	30.0
	Xing (μrad)						
	160	160	160	160	130	130	130
	Collimator settings						
	Nominal	Nominal	Nominal	Nominal	Nominal	Tight	Tight
	BBLR						
	ON	ON	ON	ON	ON	ON	OFF
B1H	✗	✗	✗	✗	✗	✗	✗
B1V	✗	✗	✗	✗	✗	✗	✗
B2H	✗	✗	✗	✗	✗	✗	✗
B2V	✗	✗	✗	✗	✗	✗	✗
+dp/p	✗					✗	
-dp/p	✗					✗	
ASD						✗	

Figure 1 Loss map matrix for MD12663.

$\beta* =30cm$ at 150 μm	OPERATION	MD
TCP	5.0	5.0
TCS	6.5	6.0
TCDQ	7.3	6.8
TCT - H	8.5	7.5
TCT - V	8.0	7.5

Guido commented that a new filling scheme is considered for the MD. It includes an additional train of 36b at 1.8e11 ppb compared to the initial MD request.

Results of validation fill for MD12663 (N. Triantafyllou, Y. Dutheil)

Stefano commented that the MD features a high complexity. To mitigate this, a large effort to automate the change of settings through sequencer has been put in place. The MD must be performed in the same way as during the validation fill. Michi confirmed that the automatization is implemented and tested.

Stefano commented on the results from the loss maps. The loss maps quality is good. As expected, increased losses on some collimators are observed when going to the tight settings. The dynamical wire change during levelling is under good control. A good hierarchy in IR7 is preserved.
Stefano concluded that from a collimation point of view, there is no showstopper to have a fill with 3 trains of 36b.

Daniel asked about the hierarchy breakage monitoring. Stefano replied that there are three ingredients regarding the collimation hierarchy: 1.8e11 ppb intensity, smaller crossing angle and tight settings. The results from tracking simulations (phase space distortion plots) show that from an initial margin of 0.6 sigma with nominal collimation settings, no margin on hierarchy breakage is left with the tight collimation settings. In case this situation is confirmed one could retract the one jaw of one TCS by 0.5 sigma.

Christoph commented that the collimation hierarchy must be monitored during the MD. Frederik confirmed that the losses on the secondary and primary collimators will be closely watched using the operational tool. He suggested that in case a hierarchy breakage is observed, a single jaw of a secondary collimator could be taken out by 0.5 sigma.

Yann confirmed that the ASD test results are good and that no showstopper or unexpected behaviour was observed.

Decisions and adjustments to the MD procedure

- The collimation hierarchy will be closely monitored throughout the MD. In case secondary losses exceed the primary losses, the collimation team can retract one jaw of

the corresponding secondary by 0.5 sigma. In case of a persisting breakage of the collimation hierarchy, the beams must be dumped.

- The rMPP agrees that the filling scheme including an additional train of 36b at 1.8e11 ppb will be used, for a total of 122 bunches. The filling scheme reference is "*25ns_122b_109_0_0_36bpi_6inj_forMD12663*".