

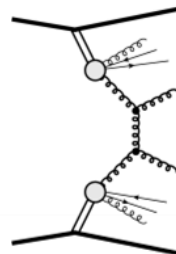
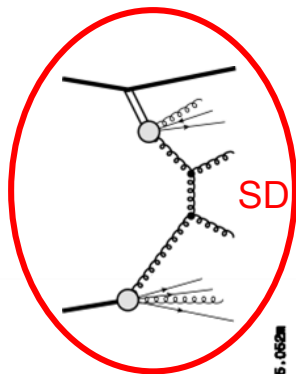
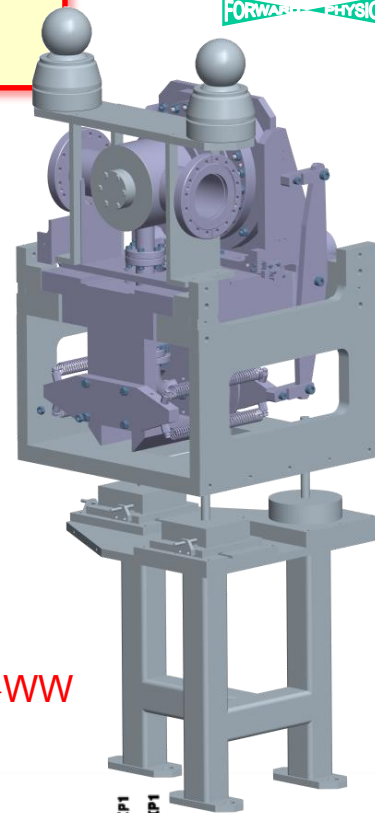
AFP BBA and Insertion Limits

Beam-based alignment & Loss maps

- Results
- Proposed Physics Positions and Limits

Next steps:

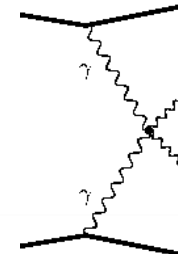
- Complete Loss Maps
- Intensity qualification



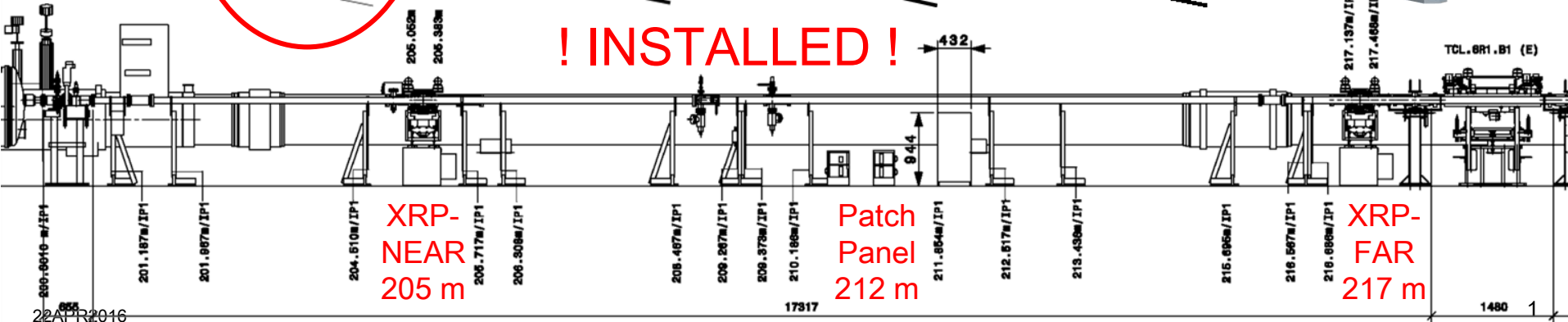
DPEjj



CEPjj


$$YY \rightarrow WW$$

! INSTALLED !



Summary AFP BBA Results

- Number of sigmas:

– at TCP: $n_{\sigma, \text{TCP}} = (L - R) / 2\sigma_{\text{beam, Nominal, TCP}}$

– at pot: $n_{\sigma, \text{Pot}} = (n_{\sigma, \text{TCP, before}} + n_{\sigma, \text{TCP, after}}) / 2$

- Predicted beam center: $B = \text{Left}_{\text{RP}} - n_{\sigma, \text{TCP}} \sigma_{\text{RP}}$

Time	Element		Left Jaw	LVDT	Right Jaw	σ_{beam} (Nom)	n_{σ}	B (Beam Center)	B + 20 σ
(eLOG - LHC-OP)			[mm]	[mm]	[mm]	[mm]		[mm]	[mm]
19/04/2016 21:22	TCP.C6L7.B1		0.955		-1.935	0.280	5.16		
19/04/2016 22:06	XRPH.B6R1.B1 (FAR)		0.909	0.876	N/A	0.108	5.07	0.362	2.522
	TCP.C6L7.B1		0.900		-1.885	0.280	4.97		
	TCP.C6L7.B1		0.900		-1.885	0.280	4.97		
19/04/2016 22:37	XRPH.A6R1.B1 (NEAR)		2.489	2.436	N/A	0.202	4.92	1.495	5.535
	TCP.C6L7.B1		0.865		-1.860	0.280	4.87		

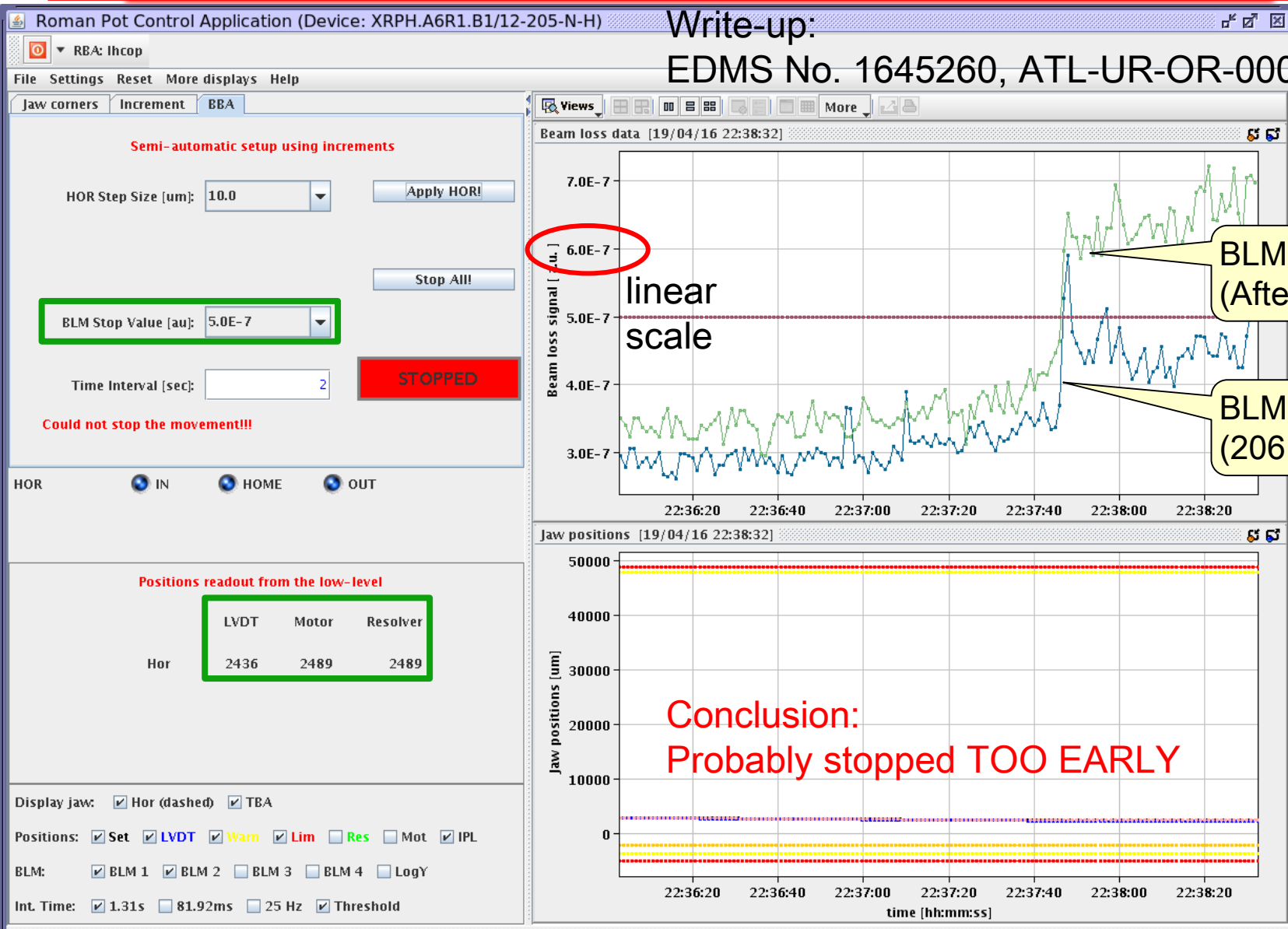
- Proposed Physics Insertion Depths and Inner Limits:

Element		Inner Physics position		recalculate in terms of # σ from TCT setting ...			
				Inner Warning Limit		Inner Dump Limit	
		Motor	LVDT	Motor	LVDT	Motor	LVDT
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
XRPH.B6R1.B1 (FAR)		2.522	2.489	2.322	2.289	2.222	2.189
XRPH.A6R1.B1 (NEAR)		5.535	5.482	5.335	5.282	5.235	5.182

BBA Result NEAR Station 205 m

Write-up:

EDMS No. 1645260, ATL-UR-OR-0002



Next Steps:

- Complete Loss Maps:
 - betatron maps done (physics only);
 - off-momentum & dump must be done ... Other modes?
 - When ?
 - can we re-align the AFP NEAR pot? (takes 30')
- Qualification as function of increasing n_b in the machine and for a certain optics
 - standard #protons/bunch, standard β^* \rightarrow high μ
 - in steps of increasing n_b : 3 fills: 1 fill w/o insertion, 1 fill with insertion in after ~2 hrs, 1 fill (4-6 hrs) with continuous insertion
 - if qualified at a certain n_b , then qualified for other filling schemes $\leq n_b$
 - intensity ramp-up starts soon ...

Backup



Beam-Based Alignment

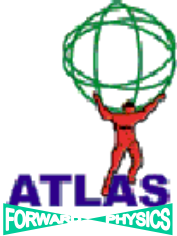


(See TOTEM EDMS 1525164 v. 0.2, July 2015), AFP Write-up: EDMS No. 1645260, ATL-UR-OR-0002

- Start: Monday - Tuesday 18-19 April
 - BYPASS key is OFF (USA15), OVERRIDE key must be ON (ACR)
- Note Beam conditions:
 - e.g.: $E=6.5$ TeV, standard optics, $\beta^*=40$ cm, normalized emittance $\epsilon_n=2.5 \mu\text{m}\cdot\text{rad}$
 - σ_H at 205 m and 217 m for normalized emittance $\epsilon_n=3.5 \mu\text{m}\cdot\text{rad}$
 - $\sigma_{\text{TCP},H}$ for normalized emittance $\epsilon_n=3.5 \mu\text{m}\cdot\text{rad}$ for the TCP.B6L7.B1 (?)
- Note filling scheme; per bunch: bucket#, N_p , ϵ_n , colliding?
 - e.g.: Single_7b_1_1_1_2cNom5ncPilots_LossMaps
- Move TCP in to touch/define the beam
 - Note jaw positions
- Move RPs in to touch/see the beam (monitored by BLMs)
 - Note insertion depth (Motor, Resolver, LVDT), BLM rates, AFP rates

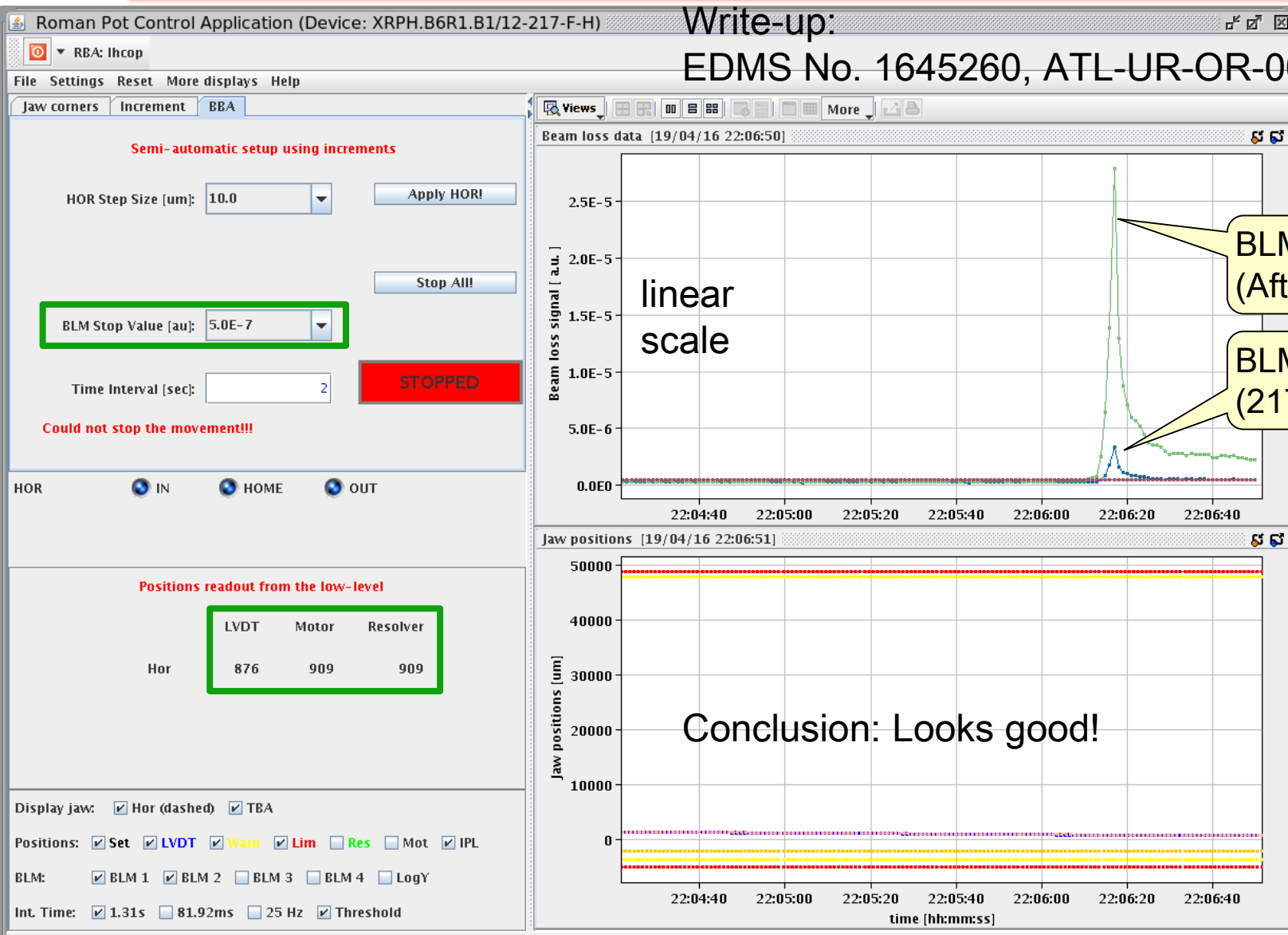
DONE ON 19.04.2016,
INCLUDING MOST OF THE
LOSS MAPS IN COLLISION

BBA Result FAR Station 217 m



Write-up:

EDMS No. 1645260, ATL-UR-OR-0002



Next Step: AFP Qualification

- Qualification must be done as function of increasing n_b in the machine and for a certain optics
 - standard #protons/bunch, standard β^* \rightarrow high μ
 - in steps of increasing n_b : 3 fills: 1 fill w/o insertion, 1 fill with insertion in last 2 hrs, 1 fill (4-6 hrs) with continuous insertion
 - if qualified at a certain n_b , then qualified for other filling schemes $\lesssim n_b$
 - intensity ramp-up starts soon ...
- Qualification runs give us **high- μ stand-alone data**
 - for the study of the beam environment
 - as function of n_b
 - possibly also low- $\mu \sim 0.1$ physics data?
 - Special filling schemes or beam separation at ATLAS?
- To keep ALFA integrated dose increase $\lesssim 10\%$:
 - $n_b \lesssim 500$
 - ATLAS wants AFP qualification at least to $n_b = 500$