



Gian Luca Orlandi :: Electron Beam Instrumentation :: Paul Scherrer Institut

Electron Diagnostics for 2 bunches and Athos beamline

Athos Machine Commissioning Workshop

1st February 2019

Overview

- *Bunch Compression Monitors*
- *Beam-Loss and Charge Monitors*
- *Screen Monitors*
- *Wire Scanners*
- *Synchrotron Radiation Monitors*
- *Accelerator-on-a-Chip*

Bunch Compression Monitors

System Expert: F. Frei

Instrument type	HL-list acronym/ number of devices	ARAMIS-2- bunch/ ATHOS	Functionality/upgrade/limitations	Installation status/Hardware	IOC-interface/High-Level Application (HL-App)	Operation status
BC1-BCM	SINBC02-DBCM410	ARAMIS-2-bunch	<ul style="list-style-type: none"> ND filters to be set according to the bunch with strongest signal. This might affect the resolution of the other bunch. If filters have to be changed due to an increasing signal of one bunch, this might cause the feedback to be off also for the other bunch. Could try to prevent this by characterizing the transmission of the different filter-settings. However, this would probably decrease the performance. 	HW installed	FW modification needed (AEK) SM modification needed (FF81) Panels to be adapted (FF81)	Commissioning needed (2+2 shifts)
BC2-CDR	S10MA01-DCDR080	ARAMIS-2-bunch	<ul style="list-style-type: none"> The polarizer has to be set according to the bunch with the stronger signal. This might affect the resolution of the other bunch. If the polarizer has to be changed due to an increasing signal of one bunch, this might cause the feedback to be off also for the other bunch. Could try to prevent this by characterizing the transmission of the different polarizer angle. However, this would probably decrease the performance. 	HW installed	FW: modification needed (AEK) SM: modification needed (FF81) Panels to be adapted (FF81)	Commissioning needed (2+2 shifts)
BCM	SATDI01-DBCM010	ATHOS	Planning 2019/Installation 2020 (Q4)			

Beam-Loss and Charge Monitors

System Expert: C. Ozkan-Loch

Instrument type	HL-list acronym/ number of devices	ARAMIS (2-bunches) or ATHOS	Functionality/upgrade	Installation status	IOC interface/ Control software	Operation status
Loss Monitors	DBLM	<ul style="list-style-type: none"> DBLM in ARAMIS: ready for 2-bunch operations (already tested in test exp.) DBLM in ATHOS: 1-bunch, but commissioning with 2-bunches in ATHOS needed for setting MPS alarm levels for both bunches 	<ul style="list-style-type: none"> refine ROI accurately around each bunch to improve discrimination set/refine ROI for each bunch to improve 2-signal discrimination 	To be installed : <ul style="list-style-type: none"> 5x before ATHOS beam stopper 4x after ATHOS beam stopper scintillator+fiber IN&OUT tunnel 	On place/ready	<ul style="list-style-type: none"> Semi-parasitic commissioning with stable beam conditions (2-bunch preferred, intentional beam-losses may be required) Semi-parasitic commissioning with 2-bunches in ATHOS for MPS alarm level setting
Longitudinal Loss Monitors (Cerenkov fiber)	DLLM	<ul style="list-style-type: none"> ARAMIS: operational ATHOS 	No update	To be installed: <ul style="list-style-type: none"> 2x after ATHOS beam stopper fiber IN&OUT tunnel 	On place/ready	Non-parasitic commissioning with stable beam conditions (beam-losses produced at different z for DLLM position calibration)
Dose Monitors	DDRM	ATHOS	No update	To be installed: <ul style="list-style-type: none"> 16x after beam stop (including cables) 	On place/ready	Parasitic commissioning (No shift requested) for basic functionality check
Charge Monitors	DICT	<ul style="list-style-type: none"> DICT in ARAMIS: ready for 2-bunch operations (timing already set in test exp.) DICT in ATHOS: 1-bunch, but commissioning with 2-bunches in ATHOS needed (setting timing) 	No update	<ul style="list-style-type: none"> First ICT installed and cables connected Last ICT is on girder but not connected (including cables) 	On place/ready	<ul style="list-style-type: none"> Commissioning of last ICT to be done Parasitic 2-bunch commissioning of ATHOS ICTs



Screen Monitors

System Expert: R. Ischebeck

Instrument type	HL-list acronym/ number of devices	ARAMIS-2- bunch/ ATHOS	Application/specs	Installation status	IOC-interface/High- Level Application (HL- App)	Operation status
View-Screen	DSCR/3 before beam stopper	ATHOS	Beam monitoring/optics matching	<ul style="list-style-type: none"> • HW installed • Lens focused calibration needed (?) 	On place/ready	Commissioning: 1.5 shifts
View-Screen	DSCR/3 after beam stopper	ATHOS	Beam monitoring/optics matching	<ul style="list-style-type: none"> • HW to be installed • Lens focusing and calibration to be done 		

Wire Scanners

System Expert: G.L. Orlandi

Instrument type	HL-list acronym/ number of devices	ARAMIS-2-bunch/ ATHOS	Functionality/upgrade	Installation status	IOC-interface/High- Level Application (HL- App)	Operation status
Wire-scanners	DWSC/3 SATSY03-DWSC110 z=326m SATDI01-DWSC065 z=342m SATBD01-DWSC110 z=493m	ATHOS	Beam monitoring/optics matching	<ul style="list-style-type: none"> 2 WSC (z=326m and 342m) installed and calibrated 1 WSC (z=493m) to be installed (April2019 shut-down) DBLM for WSC@z=342m and 493m to be installed 	Operational: timing update needed bunch-1→bunch-2	½ shift for basic commissioning
Wire-scanners	DWSC/9 (z=84m→z=273m)	ARAMIS-2-bunch	<ul style="list-style-type: none"> Beam monitoring/ emittance measurements/optics matching 2-bunch discrimination already tested (DBLM time windowing to be refined) 	<ul style="list-style-type: none"> All ARAMIS WSC on place and calibrated 1 defective Delta-Tau: not BS-record of the encoder readout 4 WSC affected (z=184m→273m) SARUN20-DWSC010 (z=587m): not in BS_READ network 	<ul style="list-style-type: none"> Operational: either 1st bunch or 2nd bunch; HL-App: improve automatized PMT gain setting below saturation level Upgrade needed for simultaneous 2-bunch data processing and saving Defective Delta_Tau: (1) replacement with spare unit or (2) repair at company (6month-1year) 	<ul style="list-style-type: none"> 2x1/2 shift commissioning: HL-App upgrade to simultaneous 2-bunch processing 1/2 shift for improvement of automatized PMT gain setting

Synchrotron Radiation Monitors

System Expert: G.L. Orlandi

Instrument type	HL-list acronym/ number of devices	ARAMIS-2-bunch/ ATHOS	Functionality/upgrade	Installation status	IOC-interface/High- Level Application (HL- App)	Operation status
BC1-SRM	SINBC02-DSRM310 (z=75m)	ARAMIS-2-bunch: <ul style="list-style-type: none"> System upgrade planned (new sCMOS camera with MCP as a triggered fast shutter) Imaging beam profile of either 1st or 2nd bunch 	<ul style="list-style-type: none"> Beam energy and energy spread measurements (1st or 2nd bunch) 	<ul style="list-style-type: none"> Order placed to company (end 2018). Photocathode selection to be finalized (mid Feb.) 	To do: <ul style="list-style-type: none"> Camera configuration Camera-box upgrade Tunnel cabling IOC enhancement CS to be adapted 	Installation planned beginning 2020
BC2-SRM	S10BC02-DSRM310 (z=203m)	ARAMIS-2-bunch: No system upgrade planned				
BC1/2-SRM			100Hz operation and BS_READ need to be verified			Dep. On Controls
SRM-HE-Coll	SARCL02-DSRM410 (z=469m)	ARAMIS-1-bunch	Design study 2019			
SRM-ATHOS	SATCL01-DSRM105 (z=327m)	ATHOS	Design study 2019			



Accelerator-on-a-Chip

System Expert: R. Ischebeck

Instrument type	HL-list acronym/ number of devices	ARAMIS-2- bunch/ ATHOS	Functionality/upgrade	Installation status	IOC-interface/High- Level Application (HL- App)	Operation status
Wire Scanner	DLAC/1	ATHOS	Tests on sub- μm wire scanners	<ul style="list-style-type: none"> Wire scanners installed on Hexapod 	Software written by Orell Hürzeler ready	Measurements: 2 shifts
Screen Monitor	DLAC/1	ATHOS	Beam monitoring/optics matching	<ul style="list-style-type: none"> YAG screen installed Camera installation to be done 	To be done	
Laser	DLAC/1	ATHOS	For laser-based acceleration	<ul style="list-style-type: none"> Laser room in preparation 	To be done	
Laser transport	DLAC/1	ATHOS		<ul style="list-style-type: none"> Will be installed in the April shutdown 	IOC done, HLA to be done	
Quadru- poles	DLAC/6	ATHOS	Focusing of the beam	<ul style="list-style-type: none"> Will be installed in the April shutdown 	IOC done, HLA to be done	
Accelerator structures	DLAC/several	ATHOS	Laser-based acceleration, streaking and modulation	<ul style="list-style-type: none"> Will be installed in Summer 	—	

Thank you for your attention

