

LHC Specific BI Systems

This presentation reviews the status of the specific BI systems for the LHC. The work plan between now and the LHC machine cold checkout is described, and areas of concern, where resources still need to be allocated, are high-lighted.

Guy Crockford AB/OP

Contents

- ☐ BI cold checkout coordination plan.
- ☐ BCT Beam Intensity Measurements.
- ☐ BGI Ionization Gas Monitor.
- ☐ BBQ Base Band Tune Measurement.
- ☐ BSRA Abort Gap Monitor.
- ☐ BSRT Synchrotron Light Telescope.
- ☐ BWS Wire Scanner.
- ☐ Conclusions.

BI Cold Checkout Coordination mandate

- ☐ Define and document
 - Commissioning procedures
 - Performance evaluation methods
- ☐ Organize BI-MD time with LHCCWG
 - Based on operational scenarios
- ☐ Report LHC-BI-TB, LHCCWG...
 - Procedures and results
- ☐ Linkman: Michael Ludwig

BI Cold Checkout Coordination mandate (2)

☐ Inside

- All BI-LHC Instruments
- Public SW interface: assessment, reliability, errors...
- Performance assessment (with and without beam)
- Documentation of procedures, evaluation methods, results
- Report to working groups

☐ Outside

- Specific instrument application software development
- Safety and machine protection (but aware of)
- Documentation of software interface (necessary as input for test procedures)
- Extras such as fixed-displays, sequencer tasks, logging

BI Website.

AB-BI-SW Software Section Web Page Quick Links ▾ | Home | Newsletter | Organigram | Contact | Site Map | Help

Domain: **LHC** Instrument: **General**

General : General information for the LHC
General

Coordinator: **Stephen Jackson**

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General LHC Information

- General**
 - Links
 - Issues
 - Timing
 - CTIM
 - eLogBook
 - Machine Schedule
 - Glossary of Terms
 - Up-to-date with the LHC Wiki
- Other**
 - BI-SW EDMS

Dedicated Systems

Class	Description	SW Contact	Fesa Class	Status
General	General information for the LHC	Stephen Jackson		
BCTDCLHC	Beam Current Transformer DC	Michael Ludwig	BCTDCLHC [2.9 / 0]	In progress
BCTFDLHC	Fast Beam Current Transformer for the LHC Dump Lines	Michael Ludwig	BCTFDLHC [2.9 / 0]	In progress
BCTFRLHC	Fast Beam Current Transformer for the Ring	Michael Ludwig	BCTFRLHC [2.9 / 0]	In progress
BGILHC	LHC Ionisation Gas Monitors	Ana Guerrero	BGILHC [2.8 / 0]	Proto ready
BLMLHC	Beam Loss Monitors	Stephen Jackson	BLMLHC [2.9 / 0]	Proto ready
BOBR	Beam Synchronous Timing Receiver	Peter Karlsson	BOBR [2.8 / 0]	In progress
BPMDLHC	LHC Dump Line BPMs	Lars Jensen	BPMDLHC [2.9 / 0]	Proto ready
BPMITLHC	LHC Interlocked BPMs in Point 6	Lars Jensen	BPMITLHC [2.8 / 0]	Not started yet
BPMLHC	Beam Position Monitors	Lars Jensen	BPMLHC [2.8 / 0]	Proto ready
BQBBQLHC	LHC Base-Band Tune Measurement	Peter Karlsson	BQBBQLHC [2.8 / 0]	In progress
BQHTLHC	LHC Head Tail Monitor	Stephane Bart Pedersen	BQHTLHC [2.9 / 0]	Not started yet
BQSLHC	LHC Schottky [Only for LHC Phase II]	Peter Karlsson	BQSLHC [2.8 / 0]	Not started yet
BRASCLHC	LHC Luminosity Monitors [CdTe]	Stephane Bart Pedersen	BRASCLHC [2.9 / 0]	In progress
BRASGLHC	LHC Luminosity Monitors [Gas]	Stephane Bart Pedersen	BRASGLHC [2.9 / 0]	In progress
BSRALHC	LHC Abort Gap Monitor	Stephane Bart Pedersen	BSRALHC [2.9 / 0]	Not started yet
BSRTFLHC	LHC Synchrotron Light Telescope	Ana Guerrero	BSRTFLHC [2.9 / 0]	In progress
BSRTSLHC	LHC Synchrotron Light Telescope	Ana Guerrero	BSRTSLHC [2.9 / 0]	In progress
BSTLHC	BST Master software	Peter Karlsson	BSTLHC [2.9 / 0]	In progress
BTVI	Single turn TV monitors	Ana Guerrero	BTVI [2.9 / 4]	Operational
BTVMLHC	LHC Matching Monitor [only for LHC Phase II]	Ana Guerrero	BTVMLHC [2.8 / 0]	Not started yet
BWSLHC	LHC Wire Scanners	Ana Guerrero	BWSLHC [2.8 / 0]	Not started yet

Shared Systems

Planning

BI Experts and responsibilities

Instrument	Project Leader	Electronics	Software	Monitor Design	Monitor Production	Monitor Installation
<u>BPM</u>	R.Jones	E.Calvo	L.Jensen	C.Boccard	C.Boccard	C.Boccard
<u>BSRT</u>	S.Hutchins	B.Burel	A.Guerrero	G.Burtin	G.Burtin	G.Burtin
<u>BTV</u>	E.Bravin	S.Burger	A.Guerrero	G.Burtin, C.Bal (BTVDD)	G.Burtin, C.Bal (BTVDD)	G.Burtin, C.Bal (BTVDD)
<u>BGI</u>	J.Koopman	J.Koopman	A.Guerrero	M.Sillanoli, J.Koopman(Det.)	M.Sillanoli	M.Sillanoli
<u>BWS</u>	J.Koopman	J.Koopman	A.Guerrero	J.Koopman	M.Sillanoli	M.Sillanoli
<u>BCTDC</u>	P.Odier	P.Odier	M.Ludwig	P.Odier	P.Odier	P.Odier
<u>BCTF</u>	D.Belohrad	D.Belohrad	M.Ludwig	D.Belohrad	D.Belohrad	D.Belohrad
<u>BLM</u>	B.Dehning	<ul style="list-style-type: none"> • C.Zamantzas • E.Effinger • J.Emery 	S.Jackson	E.B.Holzer	E.B.Holzer	G.Feroli
<u>BQK</u>	R.Jones	M.Gasior	P.Karlsson	C.Boccard	C.Boccard	C.Boccard
<u>BOE</u>	R.Jones	M.Gasior	P.Karlsson	C.Boccard	C.Boccard	C.Boccard
<u>BQS</u>	R.Jones	US LARP	P.Karlsson	US LARP	TBD	TBD
<u>BPL</u>	R.Jones	M.Gasior	P.Karlsson	C.Boccard	C.Boccard	C.Boccard
<u>BPAWT</u>	R.Jones	n.a.	n.a.	C.Boccard	C.Boccard	C.Boccard
<u>APWL</u>	U.Raich	U.Raich	TBD	AB/RF	AB/RF	U.Raich
<u>BRAN</u>	E.Bravin	TBD	S.Bart Pedersen	US LARP	US LARP	TBD
<u>BOB</u>	J-J.Savioz	J-J.Savioz	P.Karlsson	n.a.	n.a.	n.a.

Commissioners per instrument




□ Close collaboration between BI/OP/ABP


Instrument	Commissioners	OP GUI Responsible	Concentrator Resp.
BPM	J.Wenninger(OP) W.Herr(ABP)	.	.
BSRT	H.Burkhardt S.Gilardoni M.Giovannozzi(ABP)	.	.
BTV	H.Burkhardt G.Arduini (ABP)	.	.
BGI	H.Burkhardt S.Gilardoni M.Giovannozzi(ABP)	.	.
BWS	H.Burkhardt S.Gilardoni M.Giovannozzi(ABP)	.	.
BCTDC	H.Burkhardt J.Jowett(ABP)	.	.
BCTE	H.Burkhardt J.Jowett(ABP)	.	.
BLM	R.Hassmann H.Burkhardt S.Gilardoni(ABP) L.Ponce (OP)	.	.
BQK	S.Fartoukh O.Berrig(ABP) J.Wenninger(OP)	.	.
BQE	S.Fartoukh O.Berrig(ABP) J.Wenninger(OP)	.	.
BQS	E.Metral C.Carli F.Zimmermann(ABP)	.	.
BPL	S.Fartoukh O.Berrig(ABP) J.Wenninger(OP)	.	.
BPAWT	.	.	.
APWL	BI Longitudinal Meas. Phase II	.	.
BRAN	R.Assmann F.Zimmermann(ABP)	.	.
BOB	.	.	.

Test Procedures, documentation. EDMS

- Work in progress. Expect for end of this year.

AB-BI LTB HW Commissioning


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AB-BI LTB HW Commissioning

866349 v.0.1	INDIVIDUAL SYSTEM TESTS OF THE LHC BEAM SYNCHROTRON RADIATION MONITORS	In Work
EDMS Id 866349 No description		
Doc. page	LHC-BSRT-TP-0001-rev0.1 doc (260 Kb)	0 sub-doc 1 version Steve Hutchins, Jean-Jacques GRAS 2007-09-04 Procedure - Test
866369 v.0.1	INDIVIDUAL SYSTEM TESTS OF THE LHC FAST BEAM CURRENT TRANSFORMERS	In Work
EDMS Id 866369 No description		
Doc. page	LHC-BCTF-TP-0001-rev0.1 doc (295 Kb)	0 sub-doc 1 version David Delohrad, Jean-Jacques GRAS 2007-09-04 Procedure - Test
866379 v.0.1	INDIVIDUAL SYSTEM TESTS OF THE LHC BEAM DC CURRENT TRANSFORMERS	In Work
EDMS Id 866379 No description		
Doc. page	LHC-BCTDC-TP-0001-rev0.1 doc (267 Kb)	0 sub-doc 1 version Patrick Odier, Jean-Jacques GRAS 2007-09-04 Procedure - Test
866380 v.0.1	INDIVIDUAL SYSTEM TESTS OF THE LHC BEAM TV MONITORS	In Work
EDMS Id 866380 No description		
Doc. page	LHC-BTV-TP-0001-rev0.1 doc (270 Kb)	0 sub-doc 1 version Stephane Burger, Jean-Jacques GRAS 2007-09-04 Procedure - Test
866395 v.0.1	INDIVIDUAL SYSTEM TESTS OF THE LHC WIRE SCANNERS	In Work
EDMS Id 866395 No description		
Doc. page		0 sub-doc 1 version Jan Koopman, Jean-Jacques GRAS 2007-09-04 Procedure - Test

MTF, View online status of test progress

**MTF**
Equipment Management Folder

Home | Help | EDMS site | News | Logi

User: CROCK

Search : Equipment | Location | Slot | System


Custom Report

Created on Friday, 2007-10-26 for CROCKHwC Slots Step Report
HwC Step report for slots

[Export data to an excel file.](#)

BI Fast Beam Current Transformer

Slot Name	Slot Other Identifier	10-BCTF Cables Test	20-BCTF Alignment Test	30-BCTF Interlocks Test	40-BCTF Front End Electronic Test	50-BCTF Calibration Electronic Test	60-BCTF Observation System Test	70-BCTF Beam Synchronous Timing Test	80-BCTF Full Acquisition Chain Test	90-BCTF Beam Presence Flag Transmission Test	95-BCTF Final Check	IN010. Initial alignment
BCTFD.623130.B2		Done Not Ok	Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending
BCTFD.623139.B2		Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending
BCTFD.683130.B1		Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending
BCTFD.683139.B1		Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending
BCTFI.29125		Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending
BCTFI.400344		Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending
BCTFR.A6R4.B1		Done Not Ok	Done Ok	Done Ok	Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending
BCTFR.A6R4.B2		Done Not Ok	Done Ok	Done Ok	Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending
BCTFR.B6R4.B1		Done Not Ok	Done Ok	Done Ok	Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending
BCTFR.B6R4.B2		Done Not Ok	Done Ok	Done Ok	Pending	Pending	Pending	Pending	Pending	Pending	Pending	Pending

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OP days, 7/2/2007

G.Crockford CERN

Our Wiki page

General

- [Beam Instrumentation Readiness](#)  [Jean-Jacques Gras]
- [Cold Checkout BI coordination mandate](#)  [Michael Ludwig]
- [BI Website \(interfaces agreed with OP, tool, responsible, issues, FEC status...\)](#) 
- [BI Test procedures](#)  [work in progress]
- [BI MTF](#)  [online test status reporting]

BCTDCLHC (DC Current BCT)

BCTFDLHC (Fast BCT Dump line)

BCTFRLHC (Fast BCT Ring)

BGILHC (Ionisation Gas Monitor)

BCT: Beam Current Transformer

- ❑ BCTDCLHC: DC Transformer, 4
 - Loss rates, DC beam lifetime
 - Injection, Acceleration and Coasting beam
- ❑ BCTFDLHC: Fast BCT, Dump lines, 4
- ❑ BCTFRLHC: Fast BCT, ring, 4
 - Bunch by bunch measurements
 - ❑ Bunch currents, lifetimes and loss rates
 - Turn by turn measurements
 - ❑ Intensity during first n turns
 - ❑ Intensity information for beam presence flag

BCT: Status

- Among the better documented instruments.
- Hardware
 - P.Odier (slow), D.Belohrad (fast)
- Real-time and front-end software
 - Michael Ludwig
- OP dedicated application, fixed display
 - Markus Albert

BSRA: Abort Gap monitor

- Continuous verification of abort-gap
 - 3 μ s rise time of the Dump extraction kicker (MKD)
 - 2 BSRA installed
- Responsible
 - Hardware: S.Hutchins
 - Real-time front-end: S.Bart-Pedersen
 - Application: Black-box for OP/CCC (?)

BGI: Ionization Gas Monitor

- ☐ H & V beam profile measurements
- ☐ Works for Ion beams (BSRT does not)
- ☐ Hybrid instrument
 - Instrumentation controls, BI
 - B-field magnet controls, AB/PO, LSA
 - Gas injection controls, AT/VAC
 - Controls for the latter 2 to be clarified.
- ☐ 2 BGI's burnt during bake out (June)
 - Should be replaced in time for checkout!

BGI: Ionization Gas monitor (2)

- ☐ Installed in LSSR4
- ☐ Integration time 20ms
 - H or V profile and position, B1, B2
 - Rest gas ionization signal
- ☐ Measurement frequency 1Hz
- ☐ Emittance measurement
 - Given accurate knowledge of linear optics
- ☐ Responsible
 - Hardware: J.koopman
 - Front-end software: A.Guerrero
 - Operational application: ???

BQBBQLHC: Base Band Tune Measurement

- QH,QV measurements, B1, B2
 - Hardware for both FFT and PLL measurement systems.
 - 14 BPL pickups, 4 BQK kickers
 - Sensitive equip, install late as possible
- Both slow controls and fast-feedback
- Various excitation methods
 - Chirp over range of frequencies
 - Simple kick
 - PLL

BQBBQLHC (2)

☐ Responsible

- Hardware: M.Gasior
- Real-time & Front-end: P.Karlsson
- Feedback: R.Steinhagen
- Application software: R.Steinhagen
 - ☐ Help from OP for both requirements and software effort requested

BQHTLHC: Head Tail monitor

☐ Chromaticity measurement

- Relies upon periodic de-phasing and re-phasing between the head and tail of a bunch with non-zero chromaticity
- Requires turn-by-turn beam position measurement using a stripline coupler

☐ Responsible

- Hardware: R.Jones
- Front-end software: S.Bart-Pedersen
- Application software: R.Steinhagen + OP?

BQSLHC: Schottky pickup

- ☐ Foreseen for phase II
 - But pickups ready and installed
 - ☐ 4 BQS Schottky pickups
 - Hardware developed at Fermilab
 - Uses same front-end software as BBQ system.
 - Application software
 - ☐ No HR effort defined at present
 - ☐ Possible future LAFS collaboration effort?

BSRT: Synchrotron Light Telescope

- Beam image collected by cameras
 - From Synch radiation emitted by beam
 - Ondulator magnet required for signal enhancement up to 2TeV
 - Requires control and calibration of ondulator current vs beam energy, LSA software.
- Separate slow and fast device in 2 FEC
 - Implemented as separate FESA class
 - Fast camera device triggered by BST turn clock, 1 image every 25ns

BSRT: Synchrotron Light Telescope (2)

- ☐ Responsible

- Hardware: S.Hutchins

- Front-end software: A.Guerrero

- Application software: E.McCrory

- ☐ LAFS

BWS: Wire Scanner

- Profile measurement
 - H or V projections, B1 and B2
 - Individual bunches up to whole beam
 - The calibration device for other transverse profile monitors (BSRT, BGI, BTV)
- Delicate instrument, not for standard operation.
 - Normally to be used with a single bunch
 - Strict intensity vs energy limitations
 - Risk of burning wire, exceed quench limit

BWS: Wire Scanner (2)

- Responsible

- Hardware: J.Koopman
- Front-end software: A.Guerrero
- Application software. E.McCrory
 - As part of the LAFS collaboration

Conclusions

- ❑ BI have a clear framework in place to prepare for the cold-checkout.
- ❑ A close collaboration between BI, OP and ABP is encouraged!
- ❑ Some instruments still missing manpower for application software.
- ❑ OP fixed display requirements for BI need to be defined.
- ❑ Interfaces to BIC, Sequencer need to be clarified.