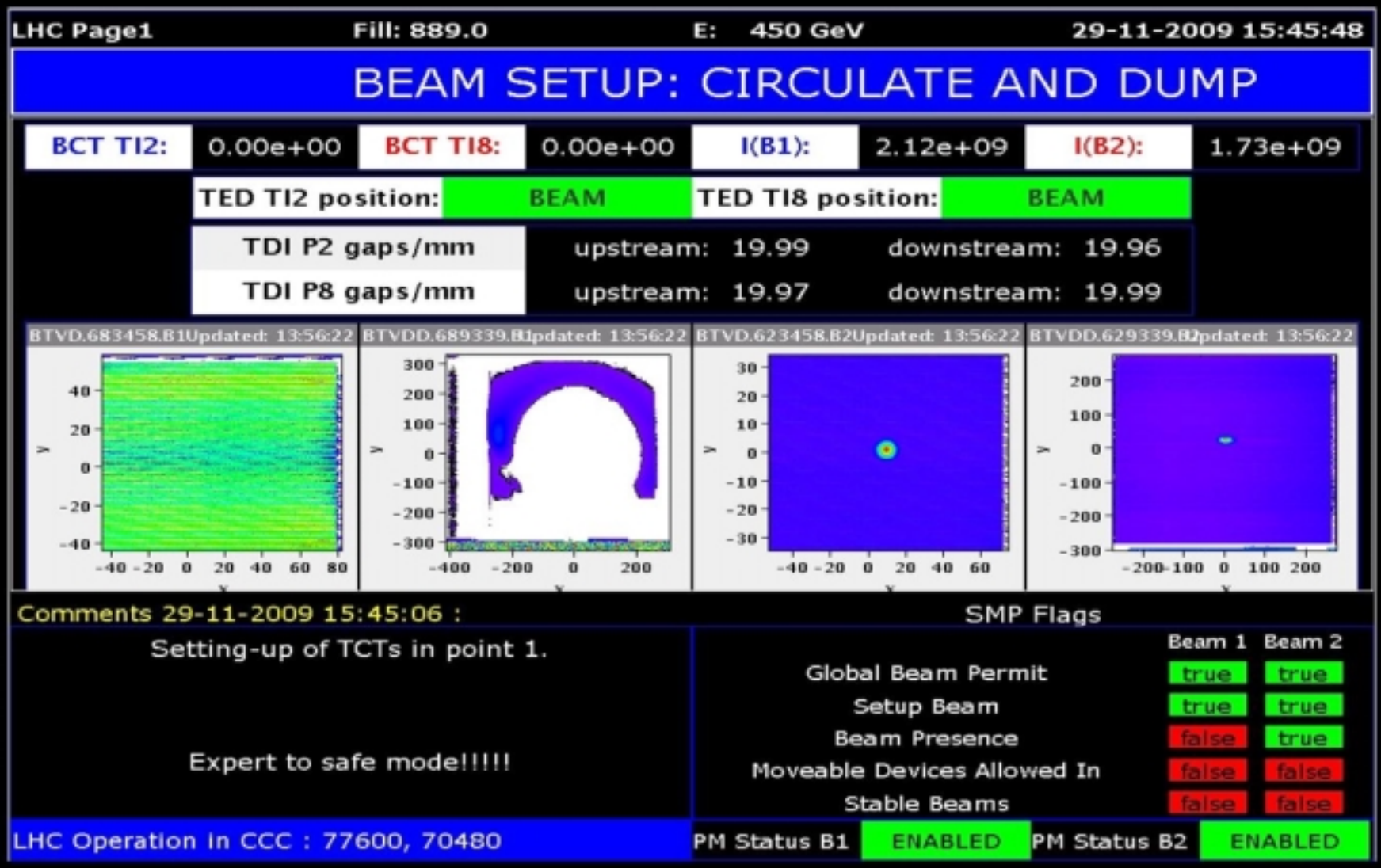
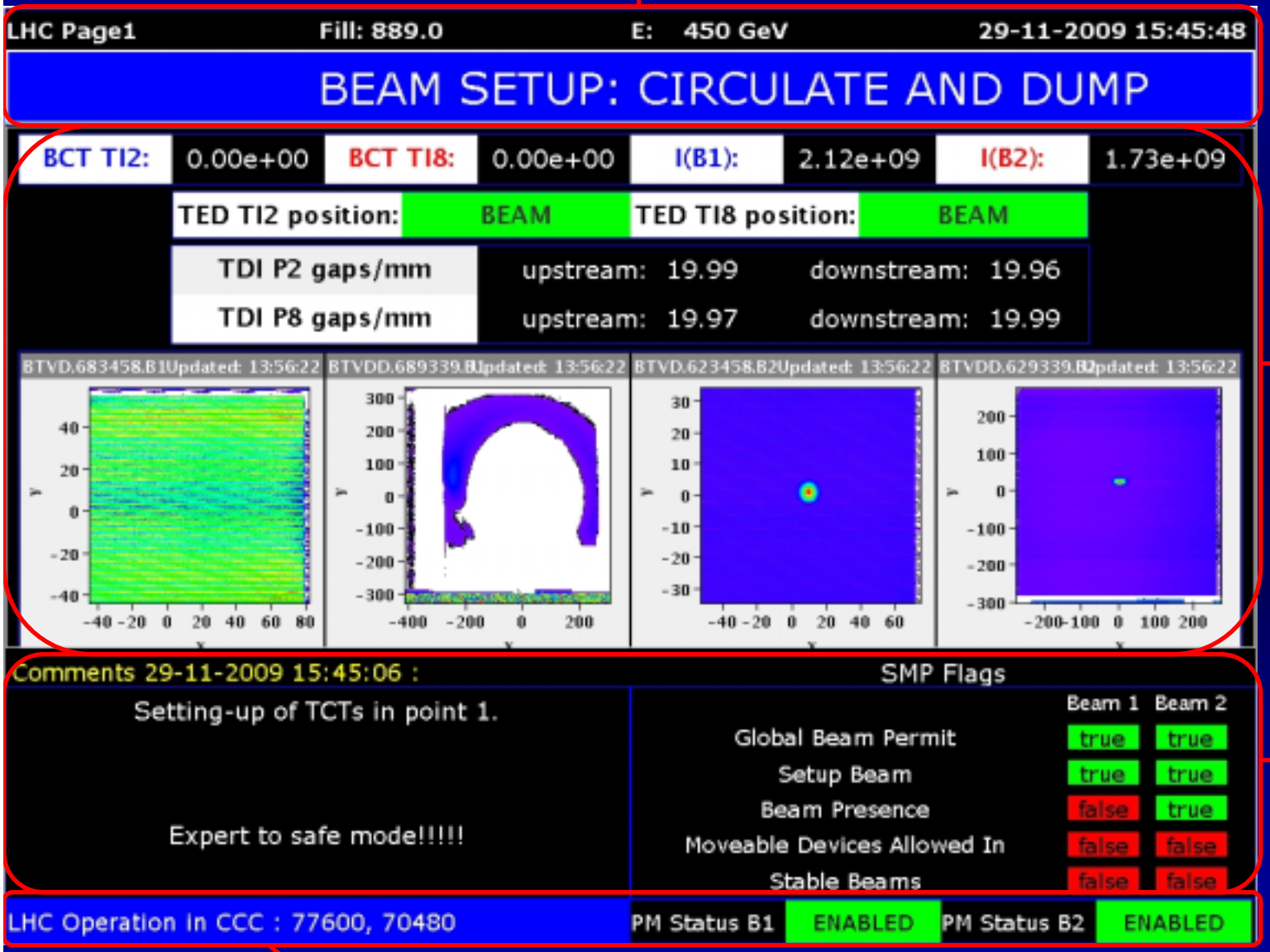
LHC Page 1

M. Albert – AB/OP/LHC



Header: Fill #, Energy, Date & Time, Machine Mode : Beam Mode



Body:

Changes according to Beam Mode

OP comments and status of **SMP** flags

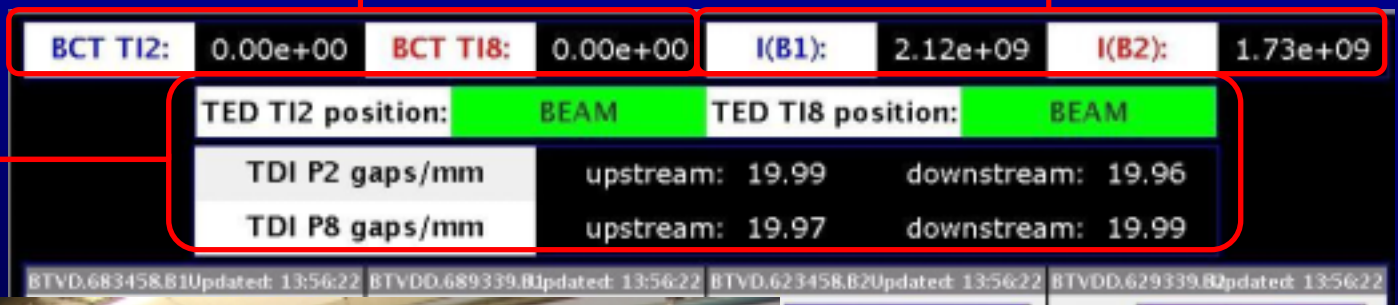
(SMP: Safe Machine Param)

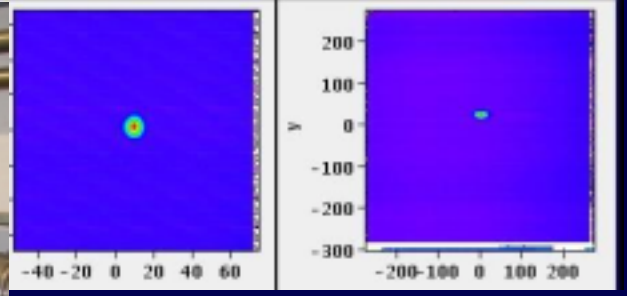
CCC phone numbers and status of post mortem trigger

LHC Page1

Beam current measurement in TI2 & TI8

B1 & B2 Ring DC-Beam current acquisition





<u>TED</u>: Beam stoppers in TI2 & TI8 (BEAM := out, DUMP := in)

<u>TDI</u> : Injection protection devices for both injection points

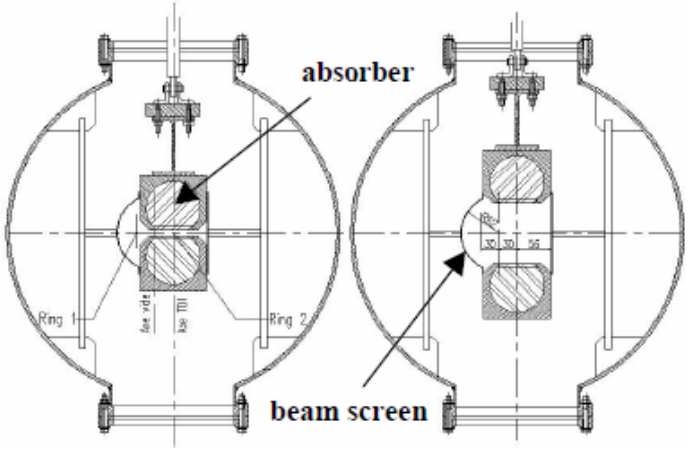
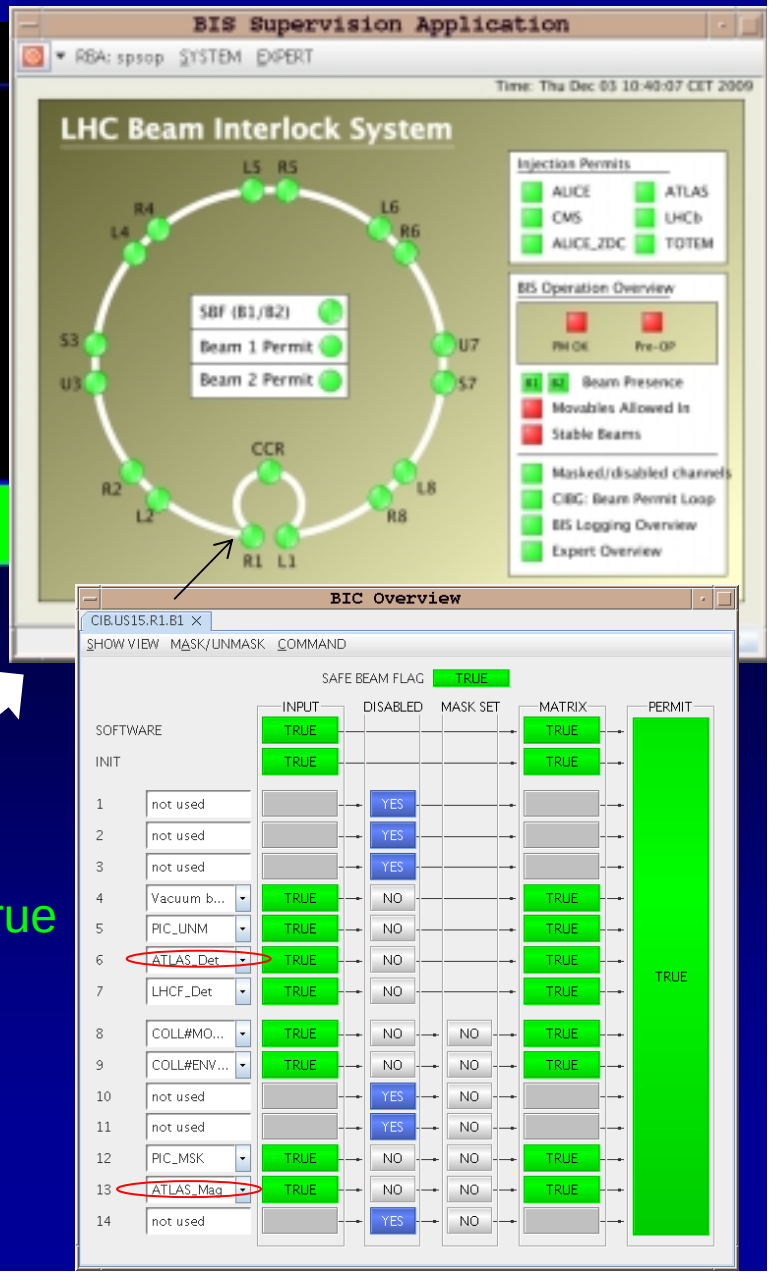


Figure 5: Cross section of the TDI (left: during injection, right: during acceleration and physics).

LHC Page 1: Global Beam Permit

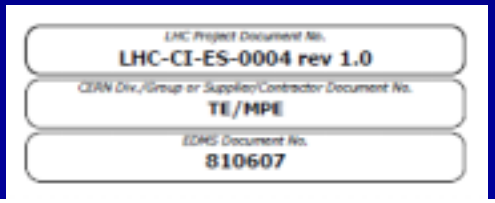
SMP Flags (Safe Machine Parameters)

	Beam 1	Beam 2
Global Beam Permit	true	true
Setup Beam	true	true
Beam Presence	false	true
Moveable Devices Allowed In	false	false
Stable Beams	false	false
PM Status B1	ENABLED	PM Status B2	ENABLED



Global Beam Permit:
we can arm the Beam Interlock Systems of B1 & B2 independently
If B1 (B2) BIS is all green ➔ Global Beam Permit = true

More info on SMP:



LHC Page 1: Setup Beam

SMP Flags (Safe Machine Parameters)

	Beam 1	Beam 2
Global Beam Permit	true	true
Setup Beam	true	true
Beam Presence	false	true
Moveable Devices Allowed In	false	false
Stable Beams	false	false

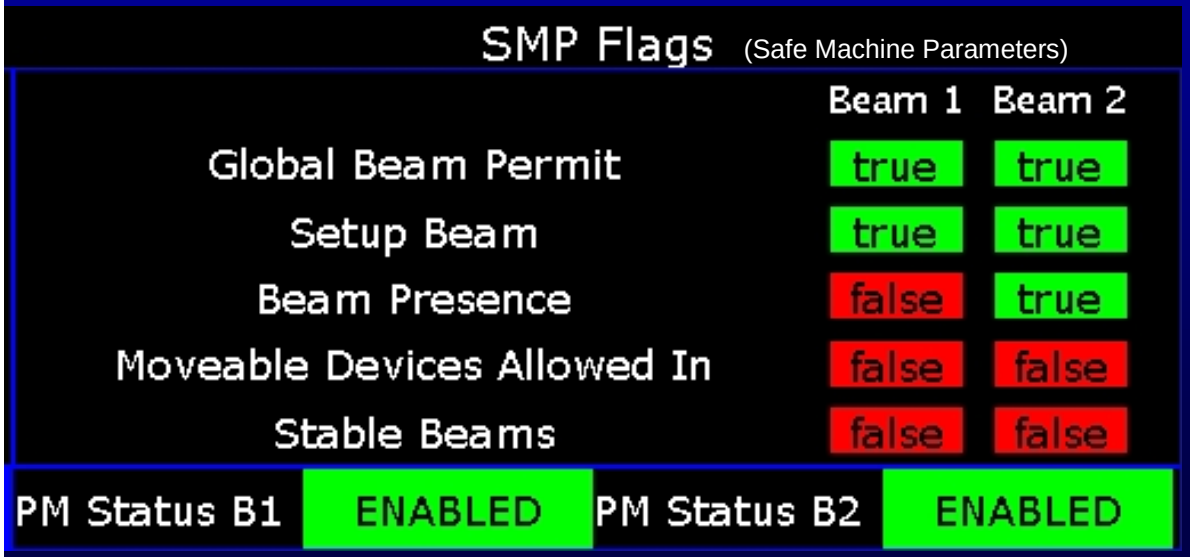
PM Status B1	ENABLED	PM Status B2	ENABLED

Setup Beam: (is what we used to called Safe Beam Flag) is a function of the E_{beam}.
For E_{beam}=450 GeV the Setup Beam = true if the $I_{beam} < 10^{12}$.
General formula:

If (NBEAM1 · (Energy/450)$^{1.7}$ < SBI_TH1) then "SBF1 = .TRUE." (or is forced ".FALSE."), else "SBF1 = .FALSE."
If (NBEAM2 · (Energy/450)$^{1.7}$ < SBI_TH2) then "SBF2 = .TRUE." (or is forced ".FALSE."), else "SBF2 = .FALSE."

where NBEAMi is the beam intensity measured by the DCBCT in IR4, and Energy is the beam energy as measured by the energy tracking system of the Beam Dump System (dipole current in S45, S56, S67 and S78 + Q4 + Septa)

LHC Page 1: Beam Presence



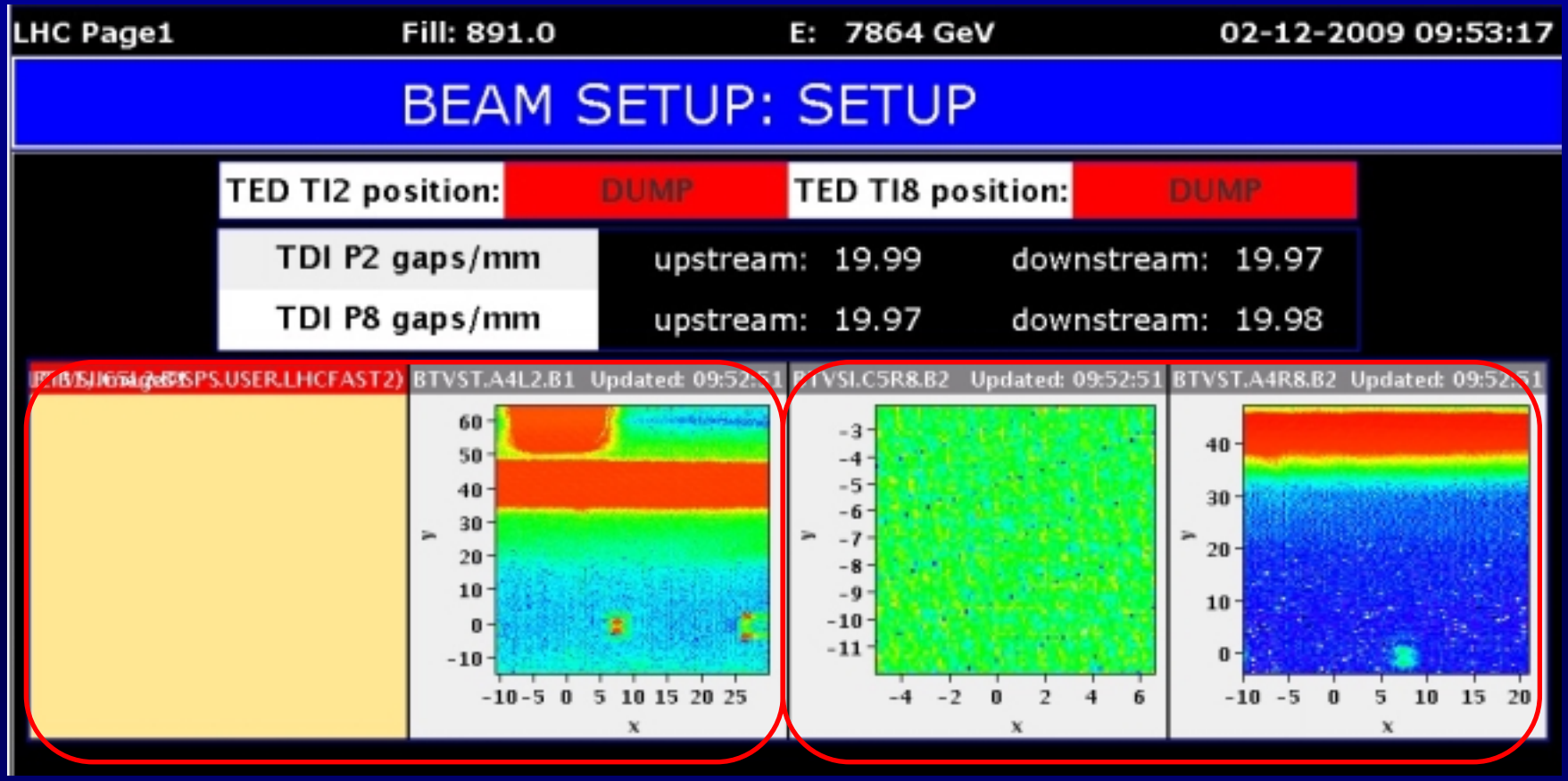
Beam Presence: is calculated according to the beam intensity measured by the Fast BCT in IR4.

General formula:

```
If (NB1 < MINIMUM_BEAM_INTENSITY) then "BPF1=.FALSE.", else "BPF1=.TRUE."
If (NB2 < MINIMUM_BEAM_INTENSITY) then "BPF2=.FALSE.", else "BPF2=.TRUE."
```

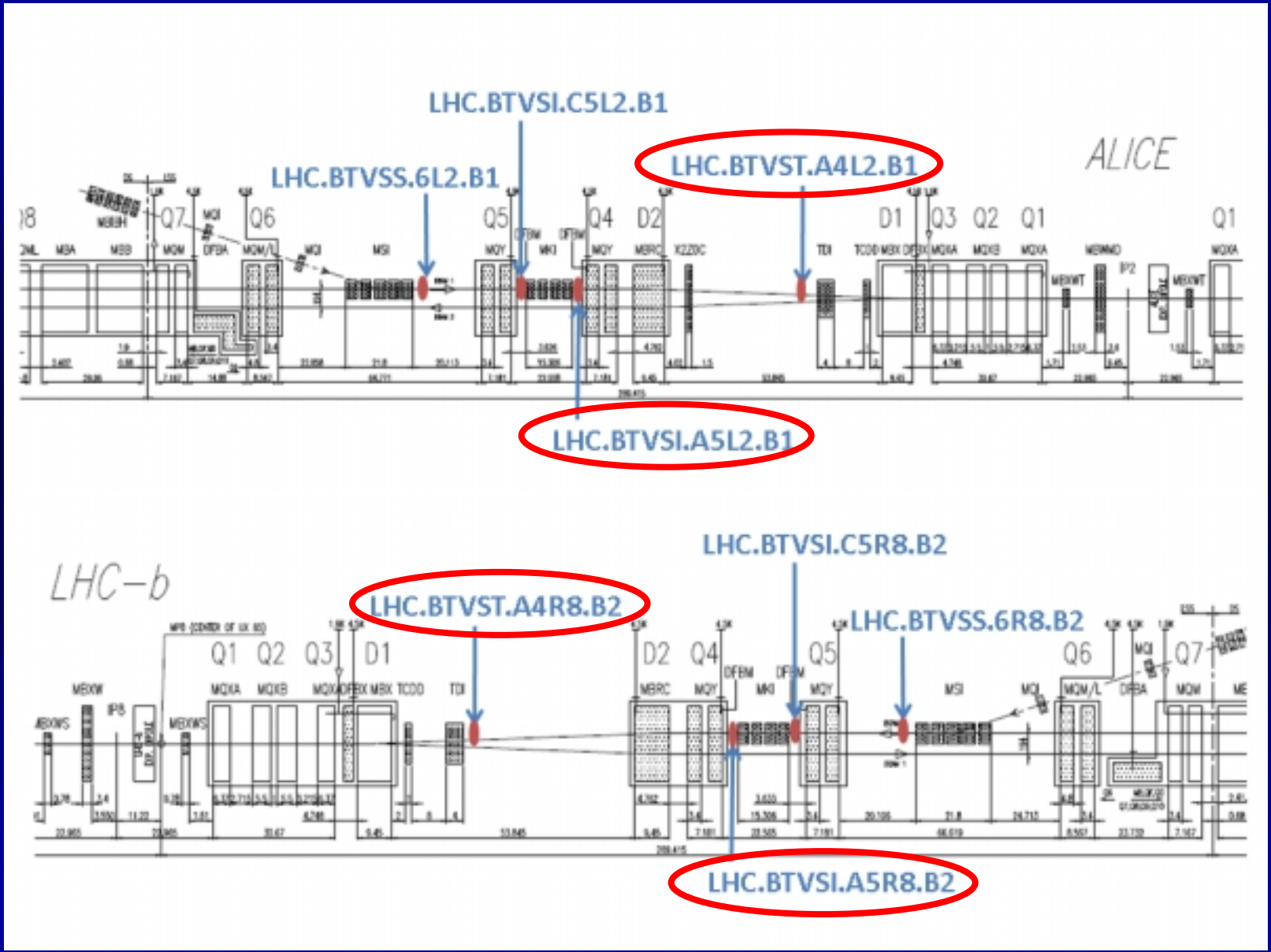
The beam presence flag is crucial to determine if we can inject high intensity beams in the machine. Only if this is true we can do. Since the Fast BCT are the instruments used to define the flag, if there is unbunched beam in the machine the flag will be false.

LHC Page1 – Body 1

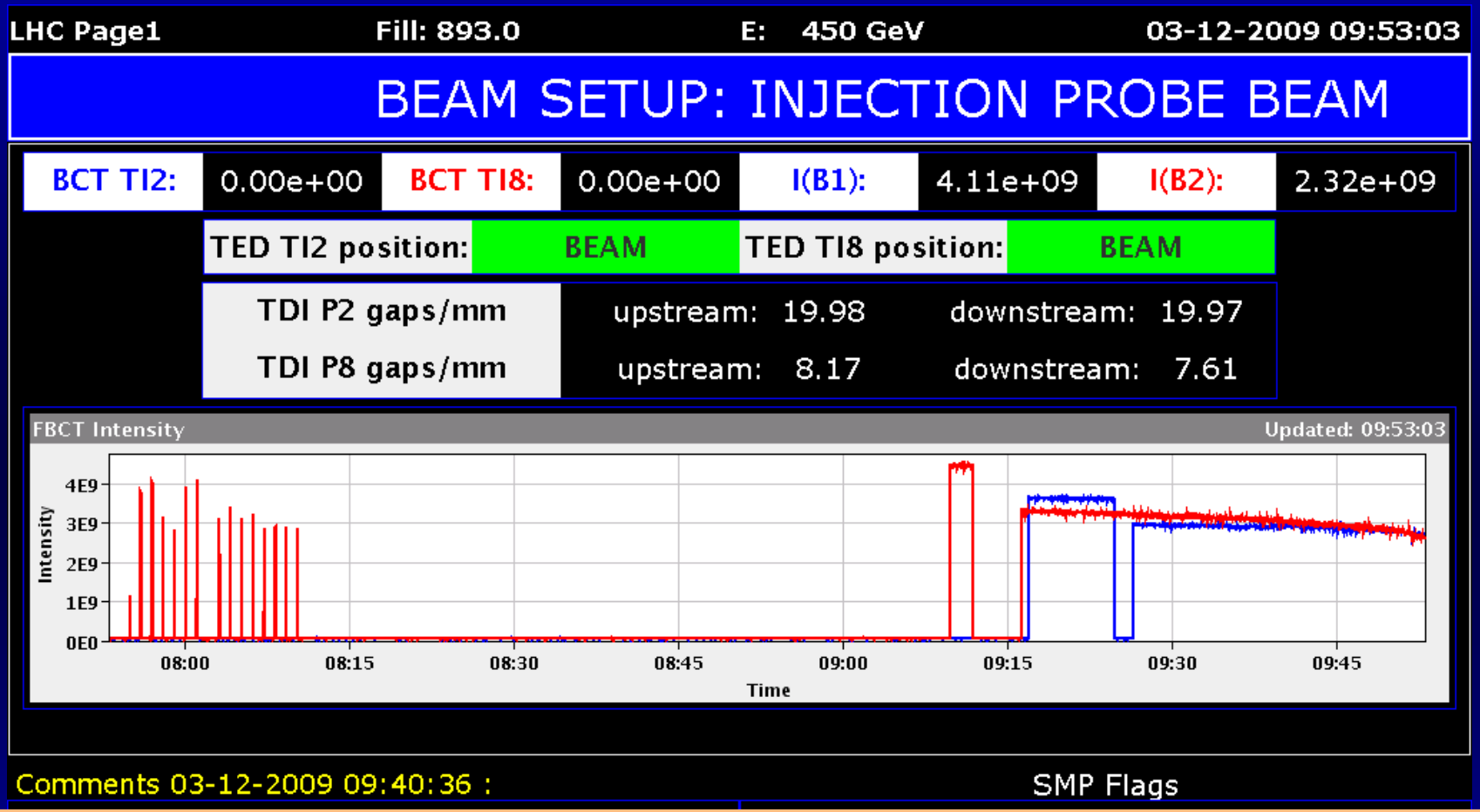


BTV in injection part appear for Beam Modes = SETUP during which transfer line and injection setup is done, i.e. Beam to TEDs and then to TDIs.

LHC Page1 – Body 1



LHC Page1 – Body 2



Total ring beam current measurement of B1 and B2 from **F**ast **B**eam **C**urrent **T**ransformer

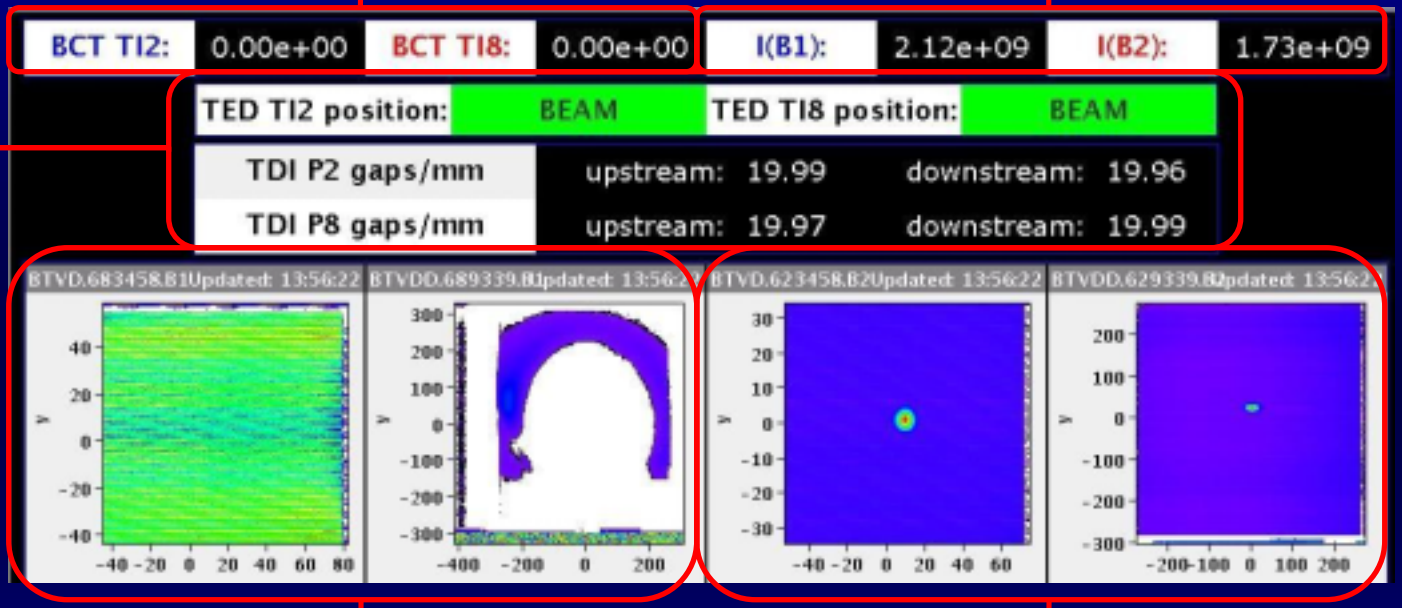
Update rate: 1Hz Time interval covered: 2h currently

Displayed during injection modes = INJECTION PROBE BEAM, INJECTION SETUP BEAM, INJECTION PHYSICS BEAM

LHC Page1 – Body 3

Beam current measurement in TI2 & TI8

Ring DC-Beam current measurement of B1 and B2



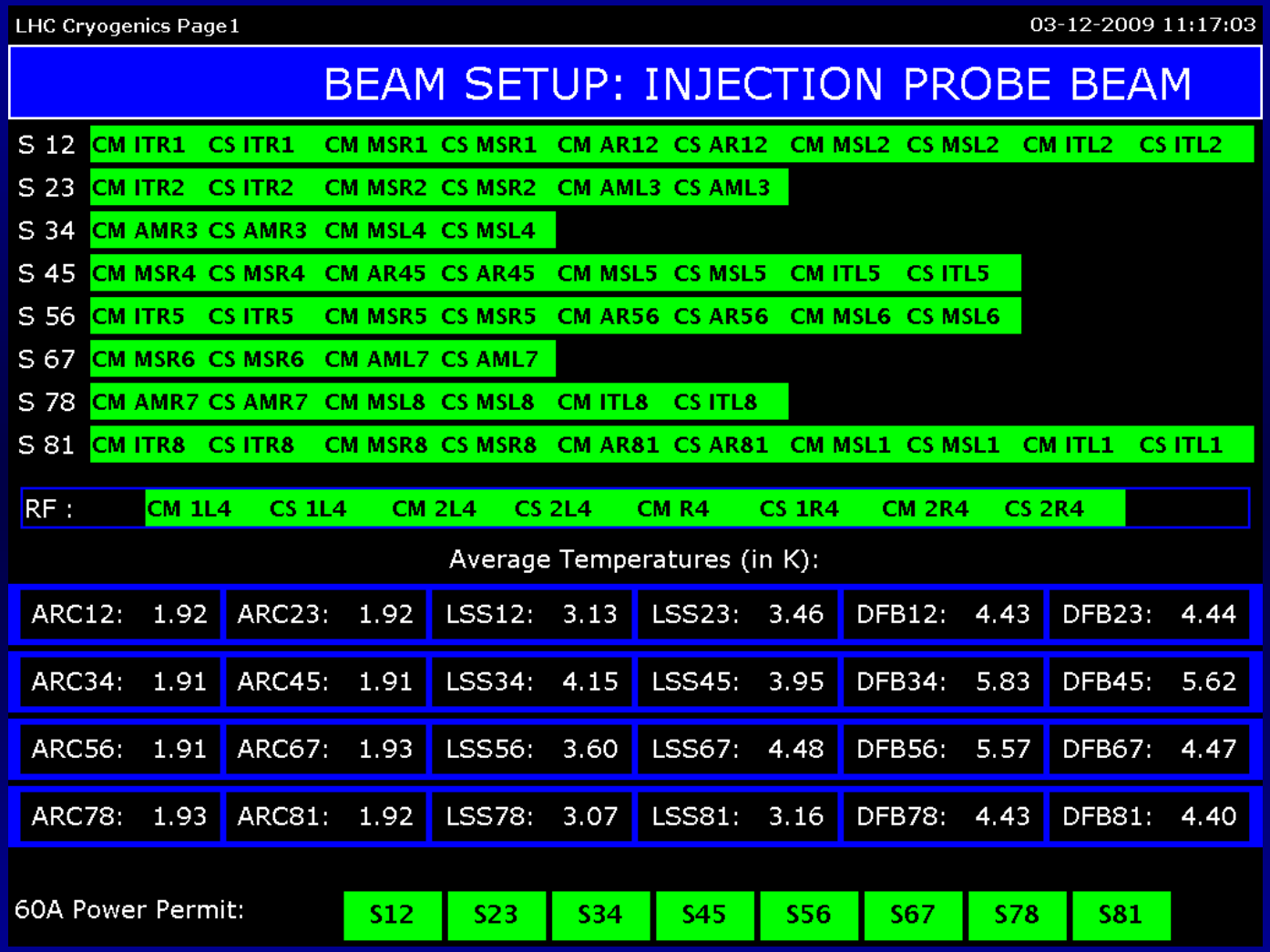
Beam screens in dump line for B1

Beam screens in dump line for B2

BTV in the dump lines appear for Beam Modes = BEAM DUMP, INJECT & DUMP, CIRCULATE & DUMP

TED: Beam stoppers in TI2 & TI8 (BEAM := out, DUMP := in)
TDI : Injection protection devices for both injection points

LHC Page 2: Cryo status



CM: Cryo maintain ➔ if false the circuits that are powered follow a Fast Power Abort
CS: Cryo start ➔ if false we cannot start powering the circuits, but if they are already powered and becomes false, they stay powered

LHC Page 3: LHC operations

By Alick McPherson
(EDMS: **LHC-OP-ES-0018** Data Exchange for the Fixed Display of Experimental conditions)