



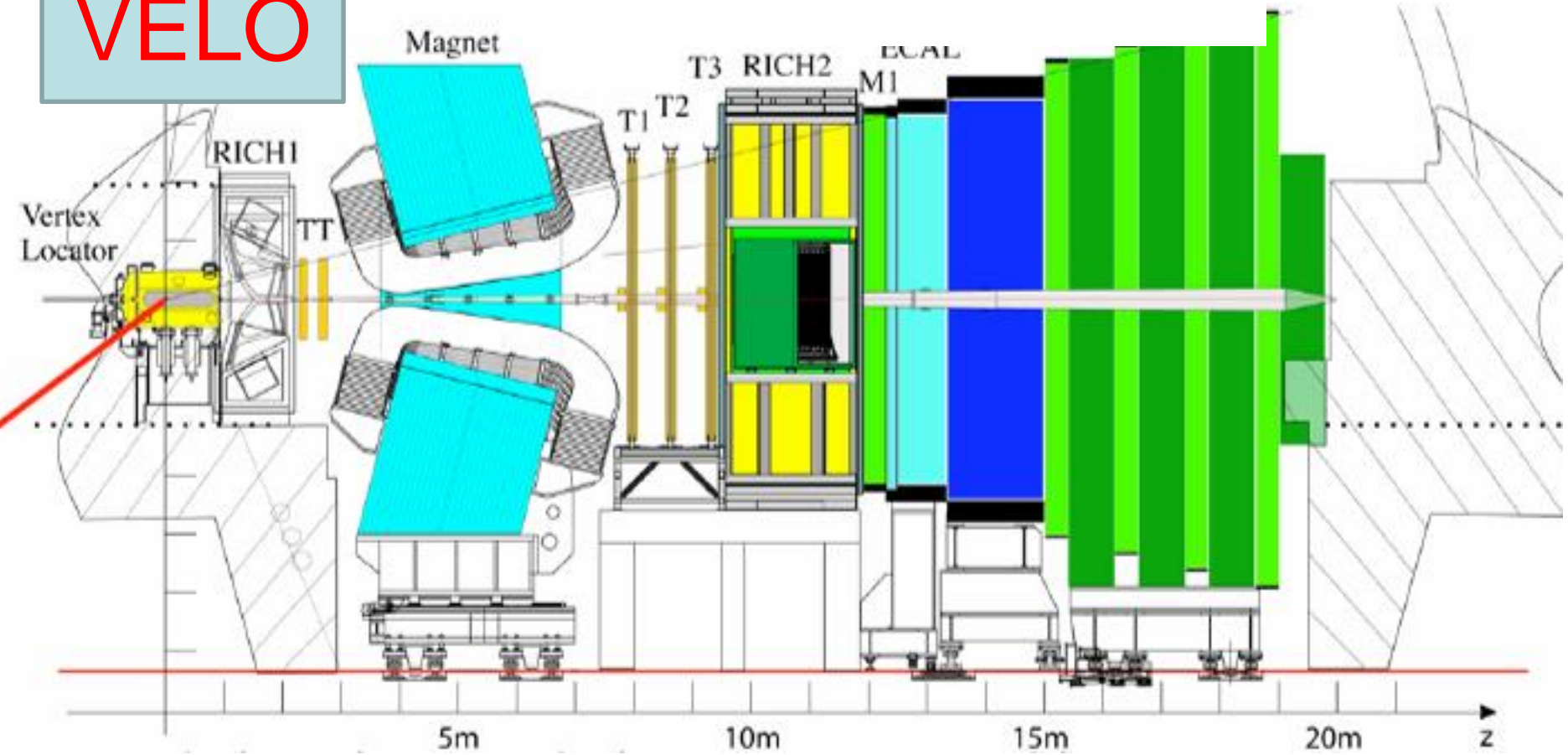
LHCb VELO

Operation With Beam

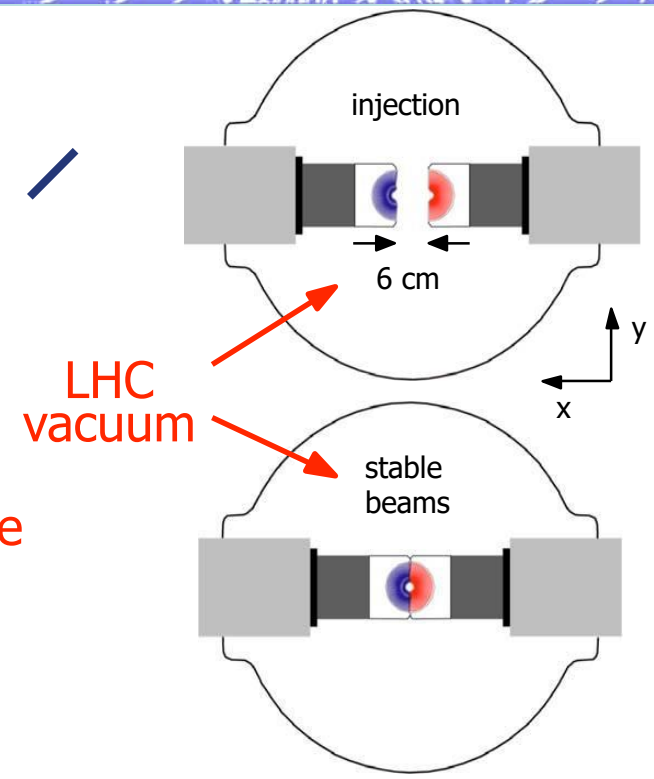
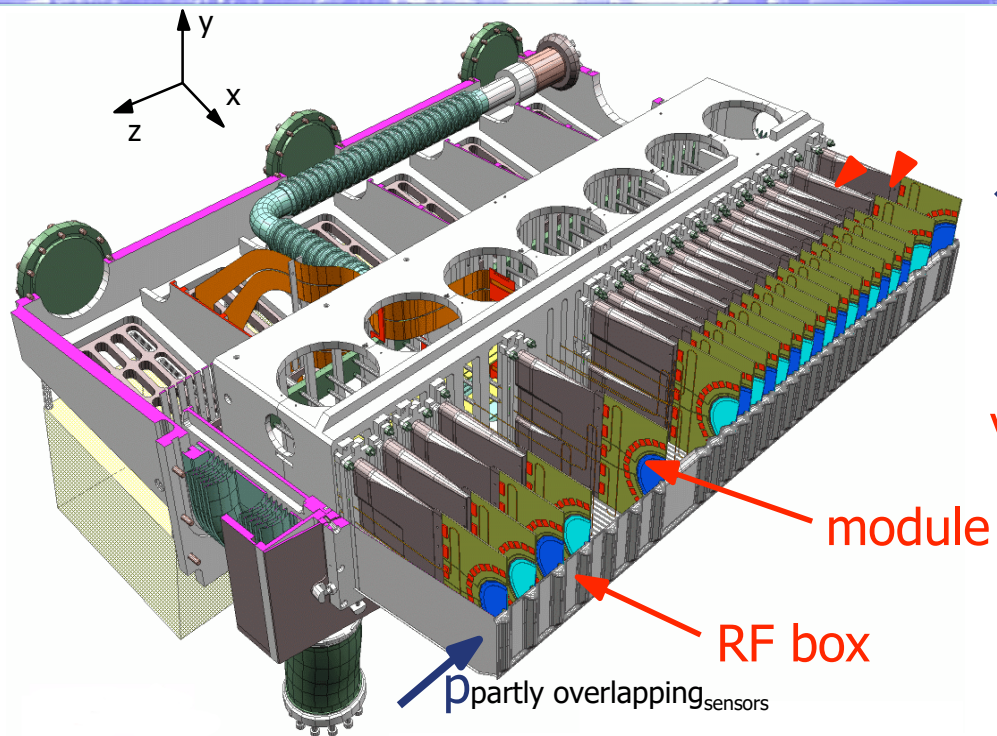
T. Bowcock

LHCb: Spectrometer

VELO



VELO: Mechanics Overview

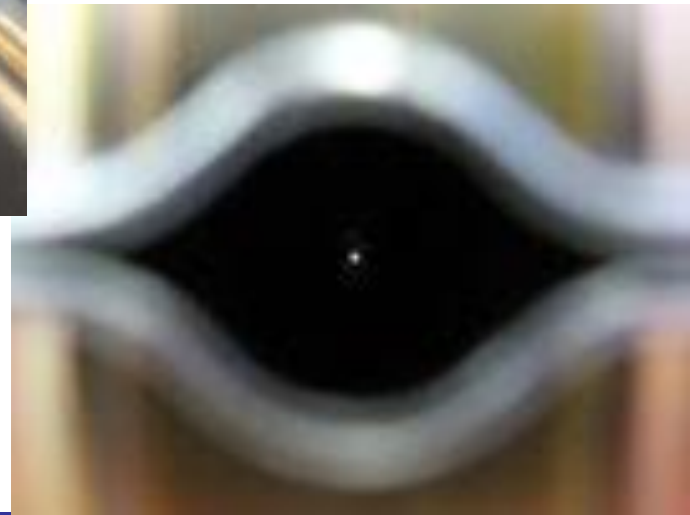
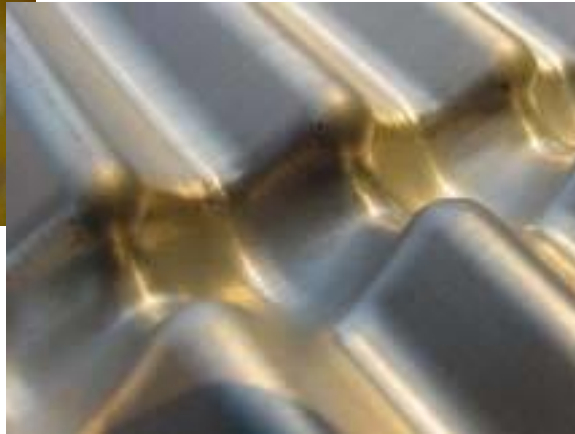
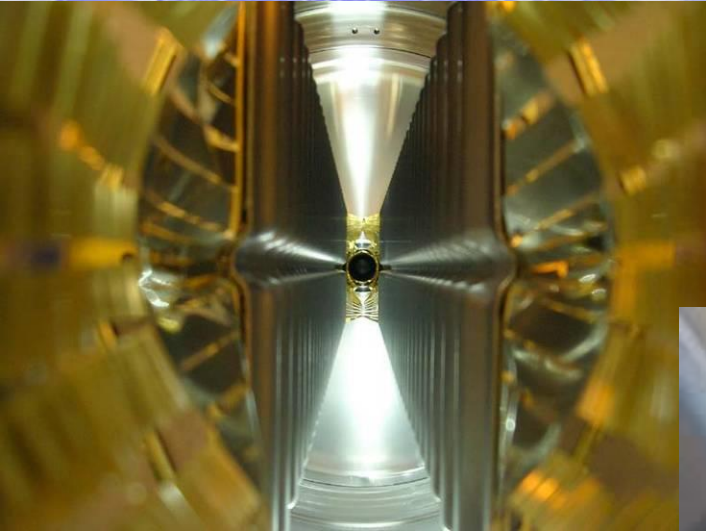


- 2 retractable detector halves
- 21 stations per half with an R and sensor

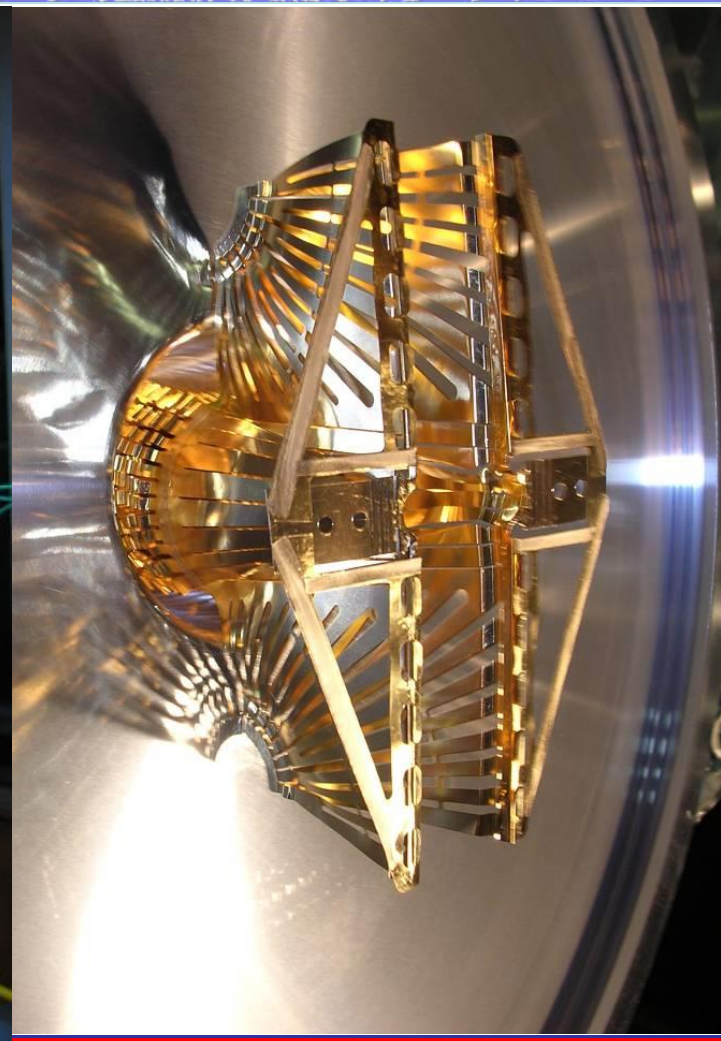
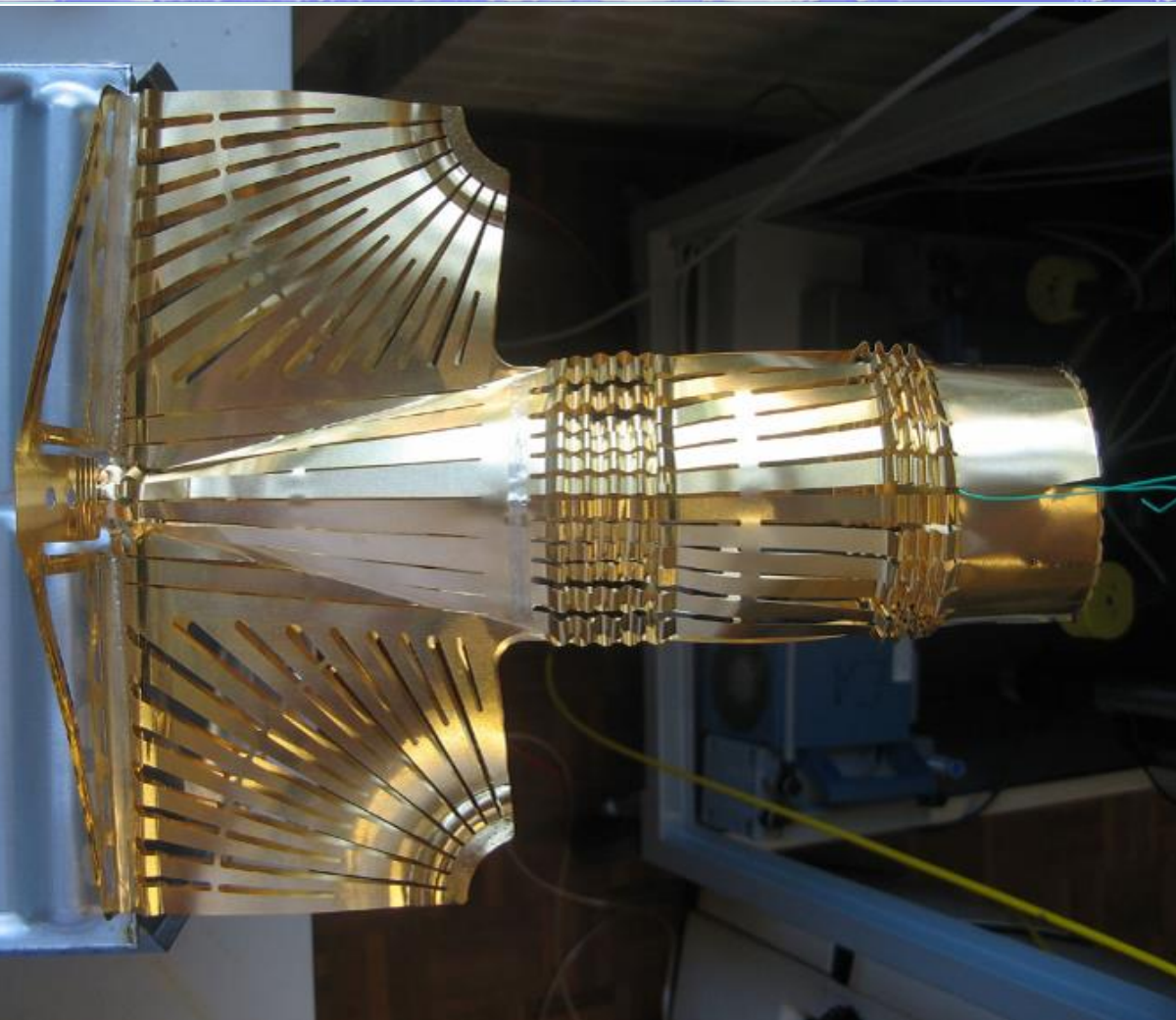
VELO: Foils



VELO: Foils

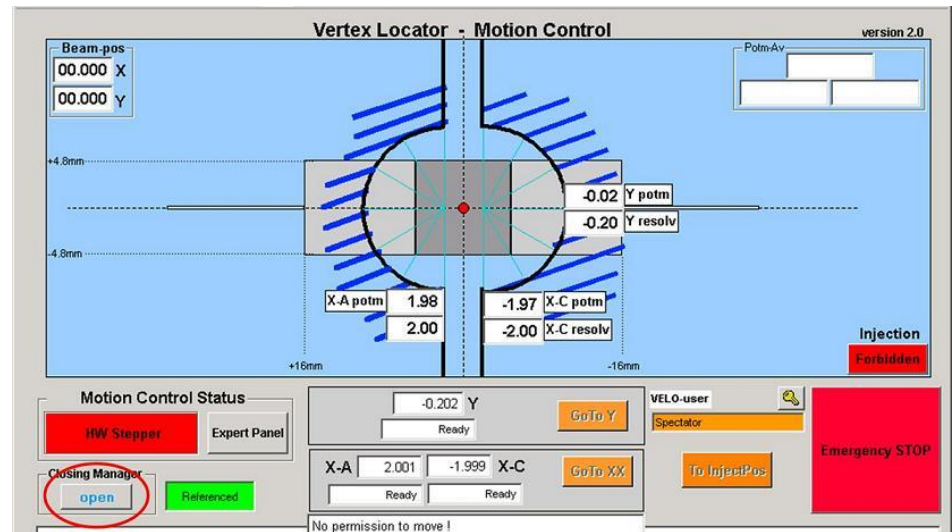


VELO: Wake Field Suppressor



Closing Control

- Two halves centred around beam
 - 9.60 x 32.00mm
 - Precision a few μm
 - Cannot “crash” into each other
- First (slow) closing
 - In contact with CCC



Monitoring

- Procedures
- Three types monitoring
 - Active
 - Environmental
 - External Devices

Module: fwFSMuser\ClosingProcedure.pnl (VEDCSVMC - VEDCSVMC; #2)

Module Panel Scale Help

en_US iso08591

MONITORING

Silicon Bias Current (uA)

VL01_AB	VL01_CB	VL02_AT	VL02_CT
0.0	0.0	0.0	0.0

Velo Resolvers (mm)

XA	XC	YAC
2.001	-1.999	-0.202

BCM (%)

S0_RS2	S0_RS32	S1_RS2	S1_RS32
0.048	0.014	0.131	0.032

Beam Position A-side (mm)

X0A	Y0A	Z0A
-24.620	0.120	0.970
S0A	S1A	S2A
0.072	0.068	6.950

Beam Position C-side (mm)

X0C	Y0C	Z0C
24.070	0.138	0.097
S0C	S1C	S2C
0.040	0.059	7.080

BPM (mm)

B1L8(ver)	B1L9(ver)	B2L8(ver)	B2L9(ver)
-1.545	-1.544	-1.508	-1.511
B1R8(ver)	B1R9(ver)	B2R8(ver)	B2R9(ver)
-1.450	-1.459	-1.513	-1.509

Welcome Spectator!

#	Quantity	ActualValue	Criterion	Status	Enabled
1.	L.VL01AB	0.0 uA	< 3 uA	OK	<input checked="" type="checkbox"/>
2.	L.VL01CB	0.0 uA	< 5.5 uA	OK	<input checked="" type="checkbox"/>
3.	L.VL02AT	0.0 uA	< 4.5 uA	OK	<input checked="" type="checkbox"/>
4.	L.VL02CT	0.0 uA	< 7.5 uA	OK	<input checked="" type="checkbox"/>
5.	D(B1L8H), D(B1R8H)	0 um, 0 um	< 200 um	OK	<input checked="" type="checkbox"/>
6.	D(B1L8V), D(B1R8V)	0 um, 0 um	< 200 um	OK	<input checked="" type="checkbox"/>
7.	D(B2L8H), D(B2R8H)	0 um, 0 um	< 200 um	OK	<input checked="" type="checkbox"/>
8.	D(B2L8V), D(B2R8V)	0 um, 0 um	< 200 um	OK	<input checked="" type="checkbox"/>
9.	[XVA + XVC]	50.0 um	< 200 um	OK	<input checked="" type="checkbox"/>
10.	[XVA + XVA + XC + XVC]	44090.0 um	< 200 um	NOT OK	<input checked="" type="checkbox"/>
11.	SXA	72 um	< 600 um	OK	<input checked="" type="checkbox"/>
12.	SYA	68 um	< 600 um	OK	<input checked="" type="checkbox"/>
13.	SZA	6950 um	< 9000 um	OK	<input checked="" type="checkbox"/>
14.	SXC	40 um	< 600 um	OK	<input checked="" type="checkbox"/>
15.	SYC	59 um	< 600 um	OK	<input checked="" type="checkbox"/>
16.	SZC	7080 um	< 9000 um	OK	<input checked="" type="checkbox"/>
17.	S0_RS02	0.048 %	> 0 && < 100	OK	<input checked="" type="checkbox"/>
18.	S0_RS32	0.014 %	> 0 && < 100	OK	<input checked="" type="checkbox"/>
19.	S1_RS02	0.131 %	> 0 && < 100	OK	<input checked="" type="checkbox"/>
20.	S1_RS32	0.032 %	> 0 && < 100	OK	<input checked="" type="checkbox"/>

Go to the INITIAL POSITION: VELO OUT

Wanted distance from the BEAM

STEP 8

XA 1.0 mm

XC -1.0 mm

YAC 7 mm

Check Criteria

Wanted Velo position

XA_wantedPos = 1.025 mm

XC_wantedPos = -0.975 mm

YAC_wantedPos = 7 mm

ActualStep STEP 7

Acknowledge

2009.10.08 10:41:43.556 CLOSING PROCEDURE STARTED
 2009.10.08 10:41:43.556 Panel initialization done.
 2009.10.08 10:41:43.556 User Spectator logged in.
 2009.10.08 10:41:43.556 XA=2.001 mm, XC=-1.999 mm, Yy=-0.202 mm

Close

Monitoring

- Active
 - Detector occupancies
 - Vertex positions (both halves in 3D)
 - Sensor Diode Currents
- Environmental
 - Foil Temps
 - Vacuum in and outside r.f. boxes
- External Devices
 - The LHCb diamond-based Beam Conditions Monitor (BCM)
 - The LHC Beam Position Monitors (BPMSW) on both sides of the experiment

Motion and Interlocks

- Motion
 - In steps
 - Conditions
 - silicon currents nominal
 - silicon $< 1^{\circ}\text{C}$ of nominal
 - occupancy $< 2\%$
 - foil $< 4^{\circ}\text{C}$ of nominal
 - Vac *in* r.f box $< 10^{-5}\text{mbar}$
 - BCM < 0.02
 - BPM position $< 4\text{mm}$ nominal
 - BPM “drift” $< 0.5\text{mm /m}$ minute
- VELO protected by a hardware interlock
 - Cuts off power if module temps are exceeded
 - No motion

VELO Interaction with LHC

- HV is powered during the ADJUST period before STABLE BEAMS
- Moves into the closed position with STABLE BEAM
- Moves out before exiting the STABLE BEAM mode.
 - LHC handshakes.
- Position transmitted to the machine via DIP
 - displayed on the LHC Page 2 (OP page)
- Motion system is on UPS
 - retracts automatically in case of a power cut.

VELO Config 2010/2011

- 450+450 GeV technical fills: VELO powered but remain in garage position for data taking.
- 3.5+3.5 TeV, squeezed/unsqueezed/LHCb magnet ON/OFF
 - VELO powered and closed during Stable Beams
 - Learning procedure in place especially as intensity increases
 - Conservative