

Introduction to LHC (Collimation) Layout

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Motivation

- Collimation in the LHC is an enterprise by itself
 - cold superconducting machine
 - huge amount of stored energy (up to 75 MJ foreseen in 2012)
 - Channeling the halo particles away from the beam core by means of crystals would be certainly beneficial to keep the machine safe
- Understand how and when a crystal cleaning test can be introduced in the LHC

UA9 in the LHC

Former plan was to install during the long shutdown of 2012

Long shutdown has been postponed to 2013

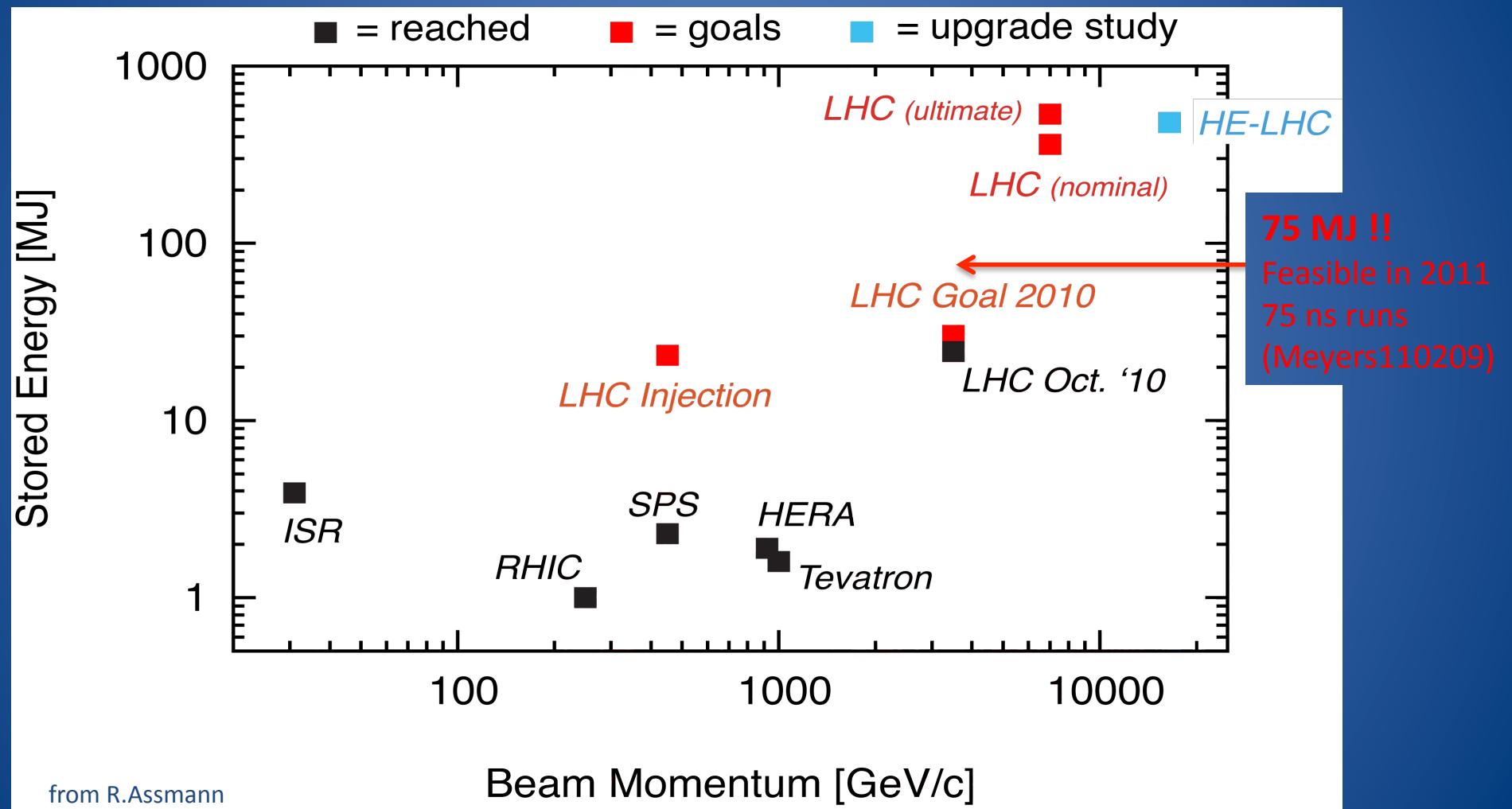
No major changes in the hardware layout in the next future

If we could

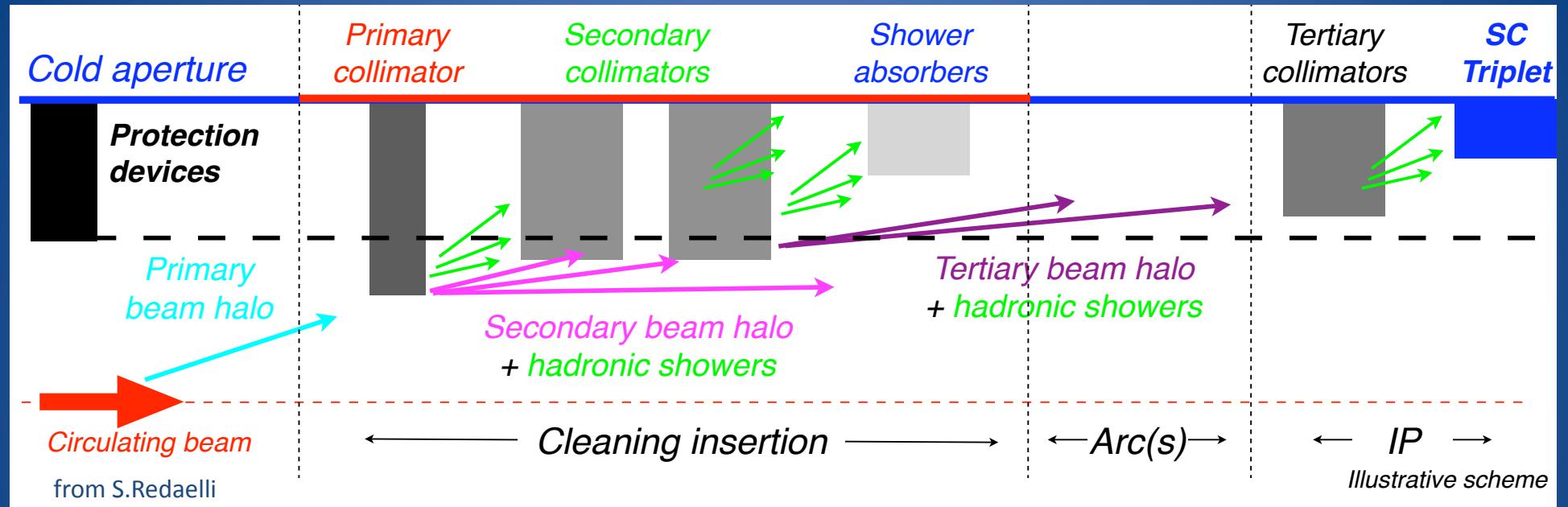
- find suitable positions to install our experimental setup without changing the existing layout
- conceive and quickly develop a minimal highly reliable hardware setup (goniometer, instrumented roman pots, ...),
- fulfill LHC quality standards,
- pass approvals within due time,

We might install in the LHC next winter
and be ready for 2012 run.

LHC Stored Energy Challenge



LHC Multistage Collimation Scheme

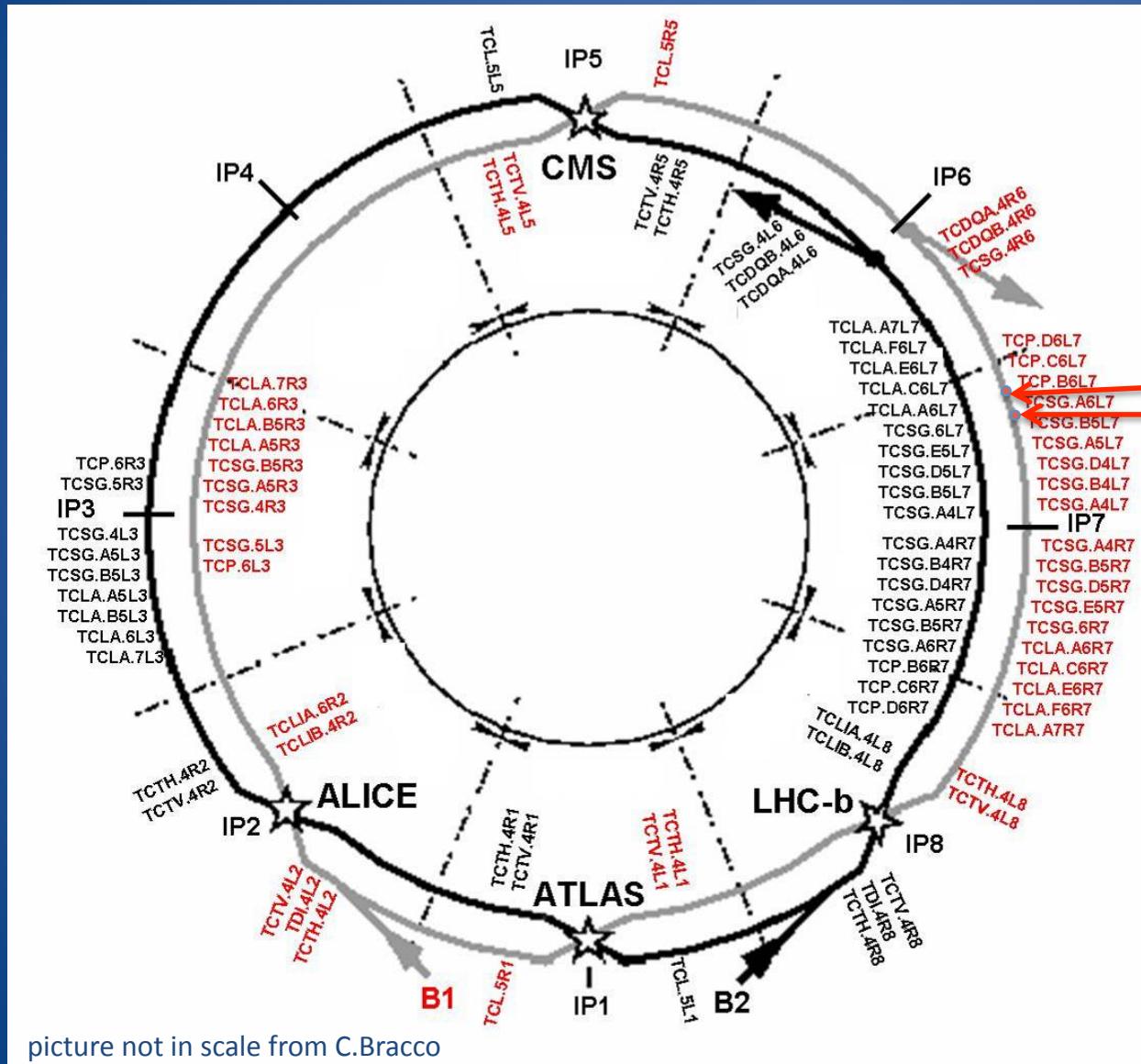


108 Collimators in PHASE 1

IR7 = Betatron Cleaning

- 3 primary collimators
- 11 secondary collimators
- 5 shower absorbers per beam

UA9 in LHC Collimation system



Try in Beam 1
first

CRYSTAL

ROMAN POT

picture not in scale from C.Bracco

Position of Crystal Goniometer – Beam 1



TCP.A6L7.B1

-199.718 m from IP7
or
19794.444 m from IP1

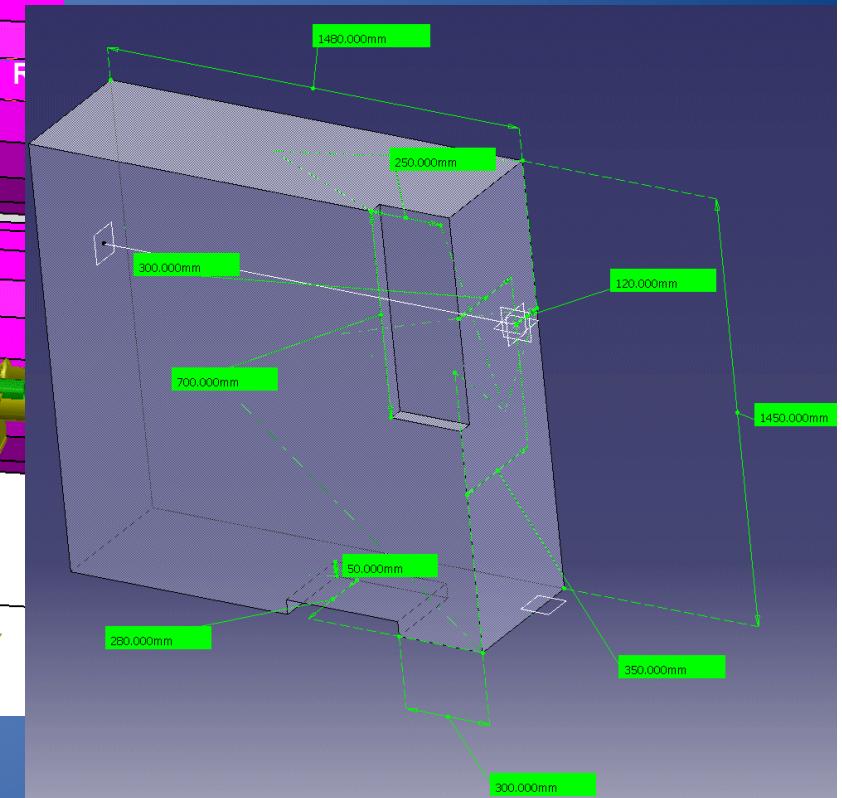
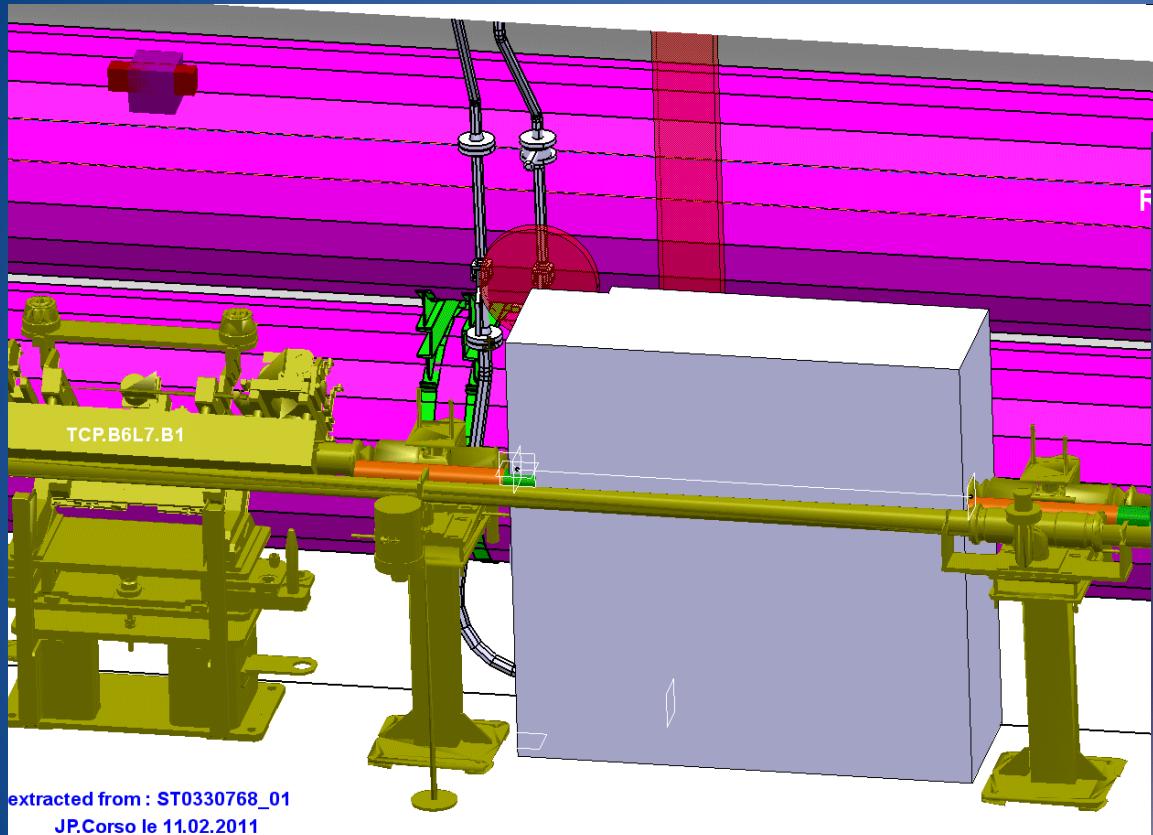
Just after the
3 primary collimators
of Phase I

Space for Goniometer on Beam 1

TCP.A6L7.B1

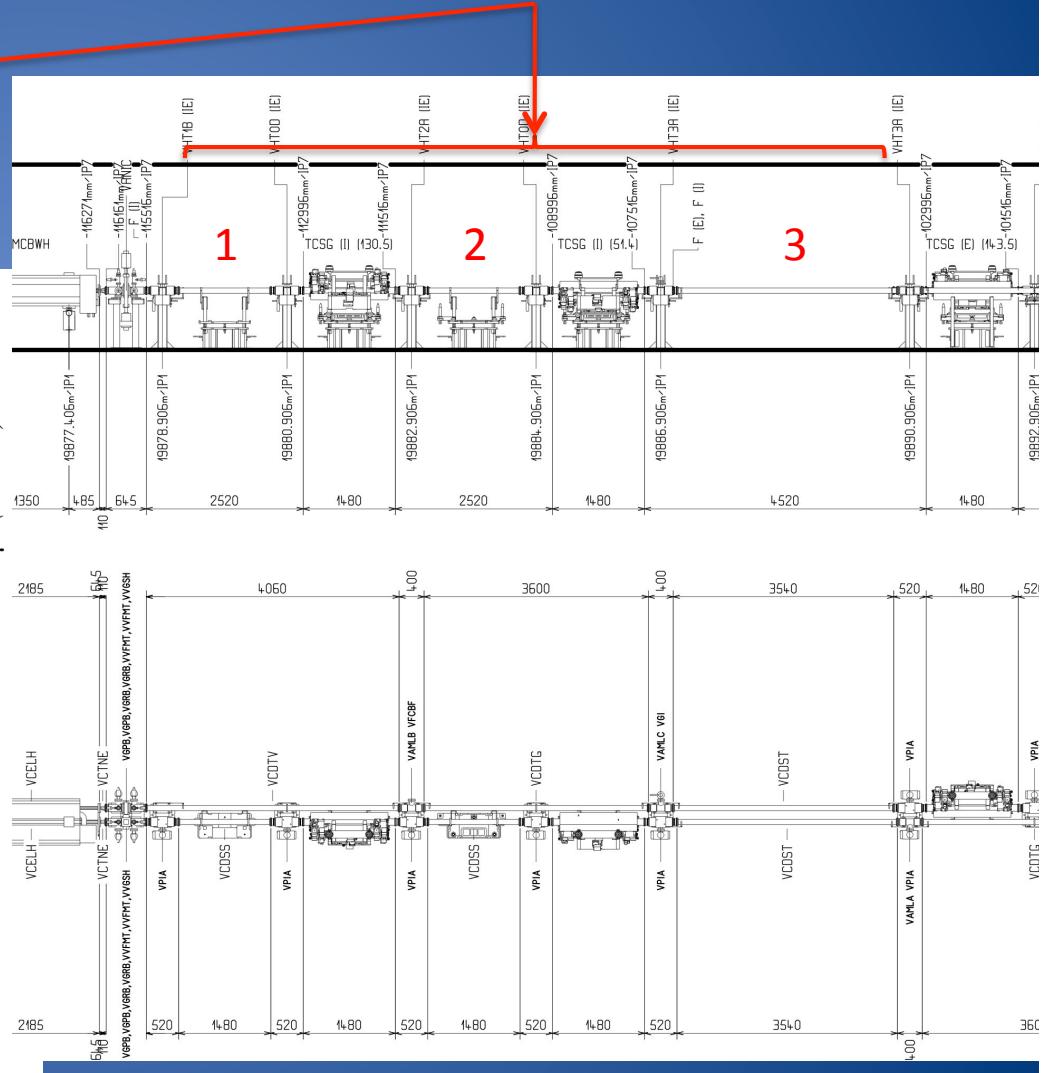
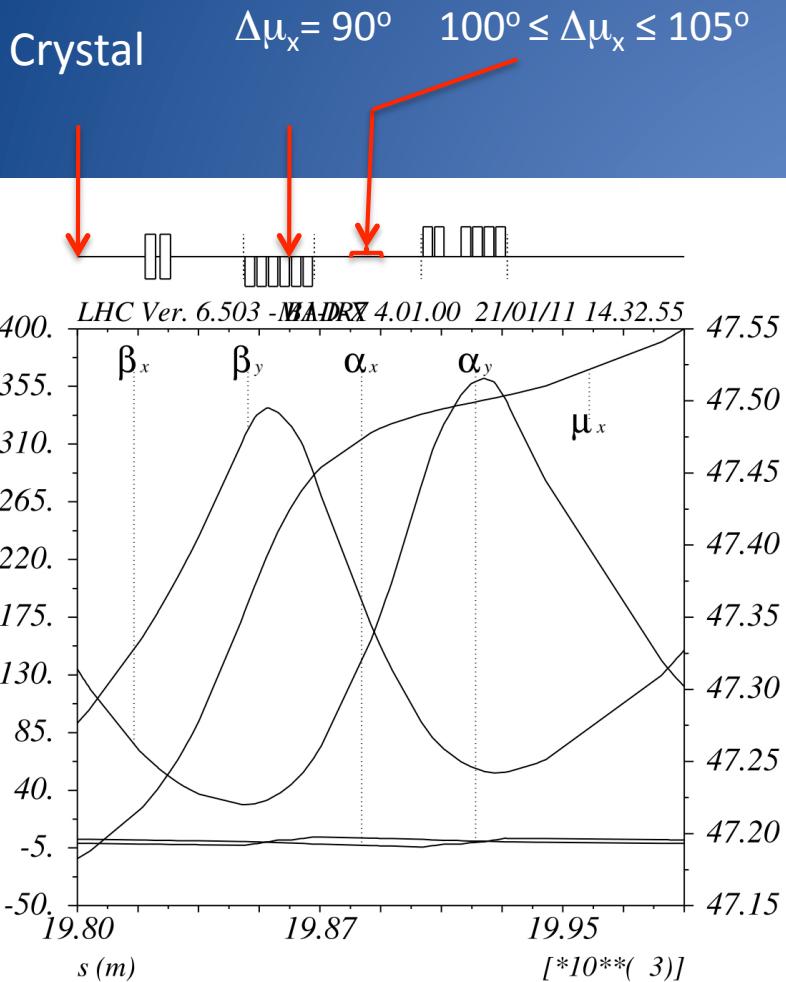


Available space in TCP.A6L7.B1

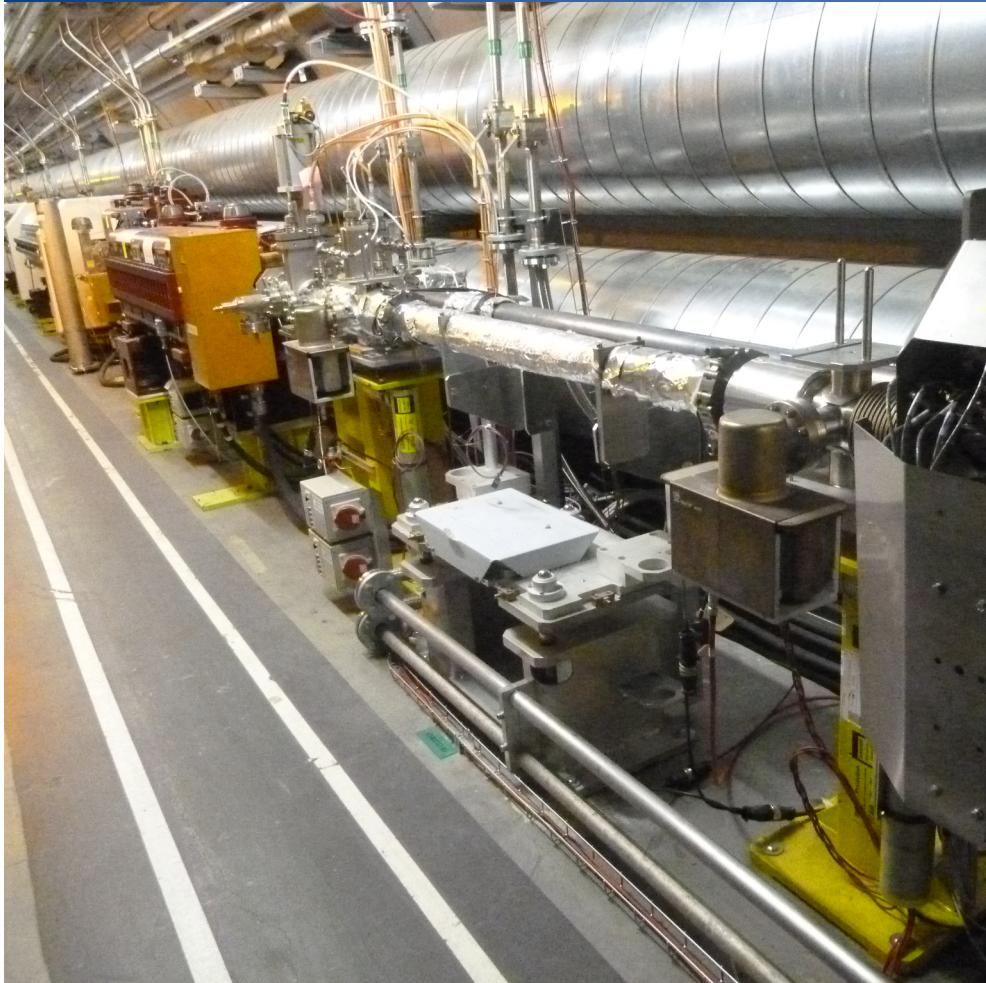


Space available: **148 cm along the beam pipe**
35 cm from beam to 'wall'
12 cm from beam to B2 beam pipe

Selection of Roman Pot Position



Roman Pot Position 1



TCSM.E5L7.B2

19879 m from IP1 , $\Delta\mu_x \approx 100^\circ$

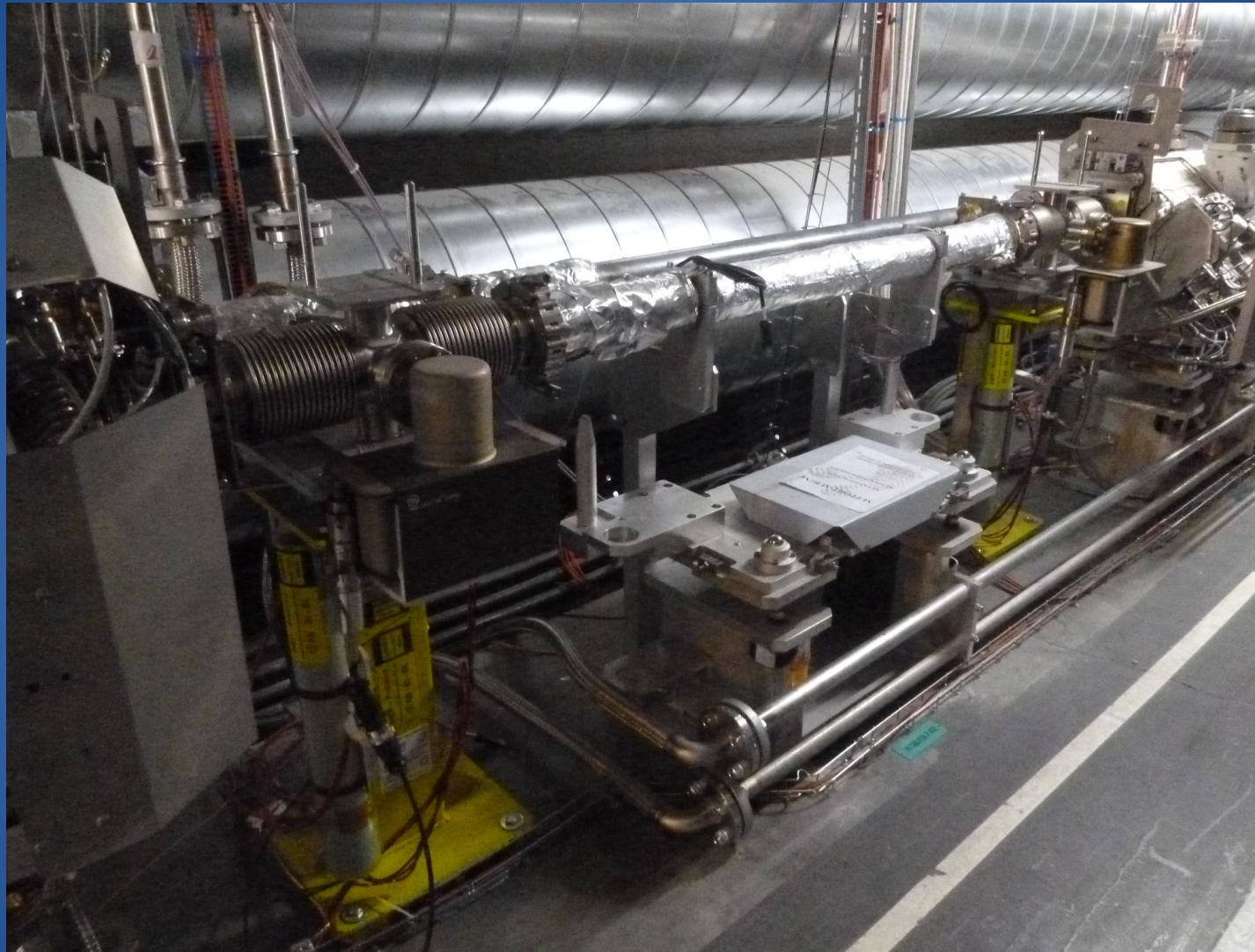
F. Galluccio



UA9 Crystal Collimation Workshop
Roma - Feb 23-25, 2011

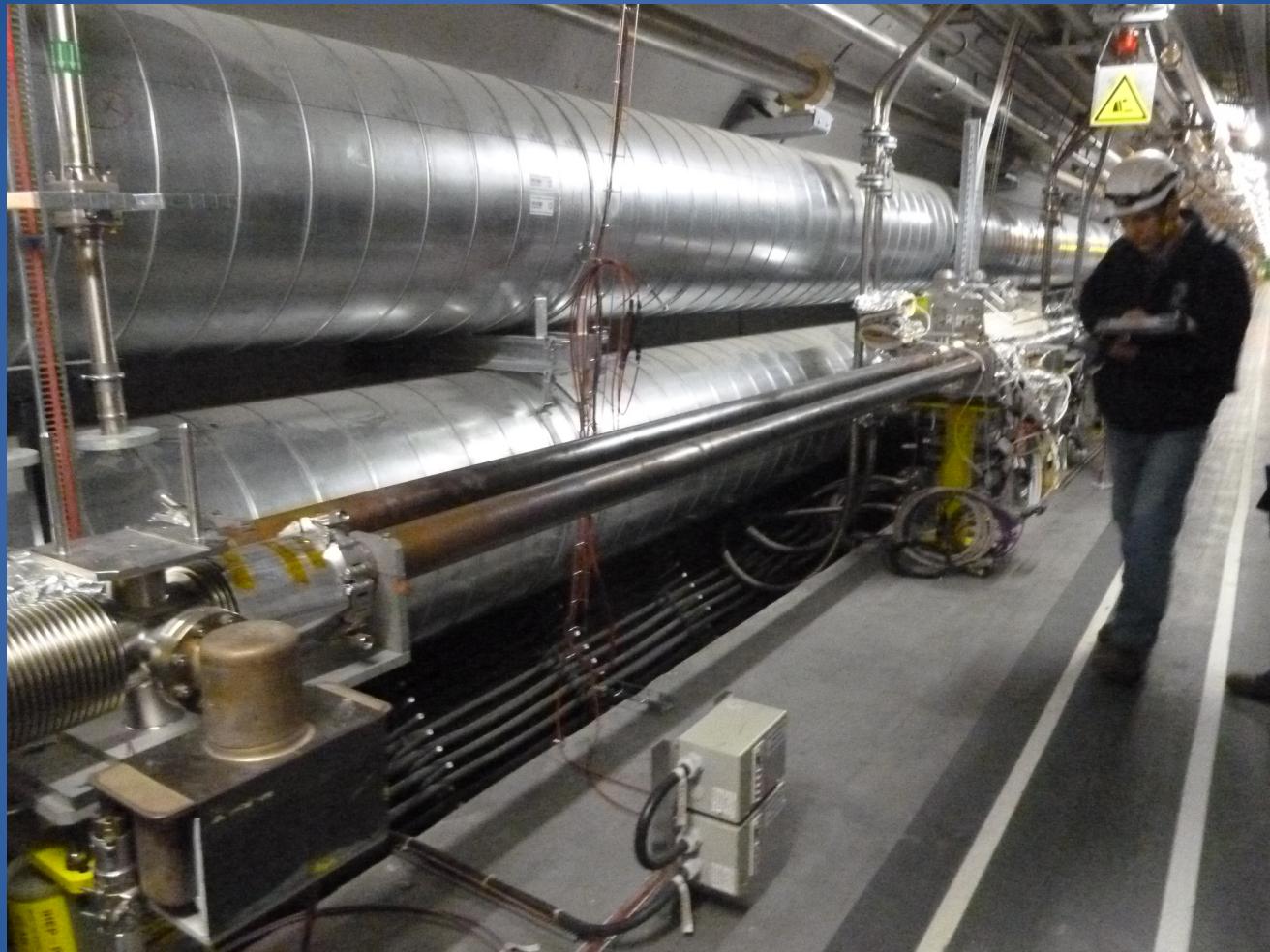
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Roman Pot Position 2



TCSM.D5L7.B2
19883 m from IP1

Roman Pot Position 3



TCSM.C5L7E.B2+TCSG.C5L7E.B2 (phase4)
19888 m from IP1
 $\Delta\mu_x \cong 105^\circ$

Absorbers

Beam Line L7.B1	Location s [m]	α [deg]	$\Delta\mu_x$
TCP.D6L7.B1	19789.184	90.0	
TCP.C6L7.B1	19791.184	0.0	
TCP.B6L7.B1	19793.184	127.5	
CRYSTAL	19795.184		0
TCSG.A6L7.B1	19832.679	141.1	
ROMAN POT	~19885		~102
TCSG.B5L7.B1	19891.906	143.5	107
TCSG.A5L7.B1	19895.906	40.7	108
TCSG.D4L7.B1	19917.236	90.0	113
TCSG.B4L7.B1	19987.162	0.0	129
TCSG.A4L7.B1	19991.162	134.6	131

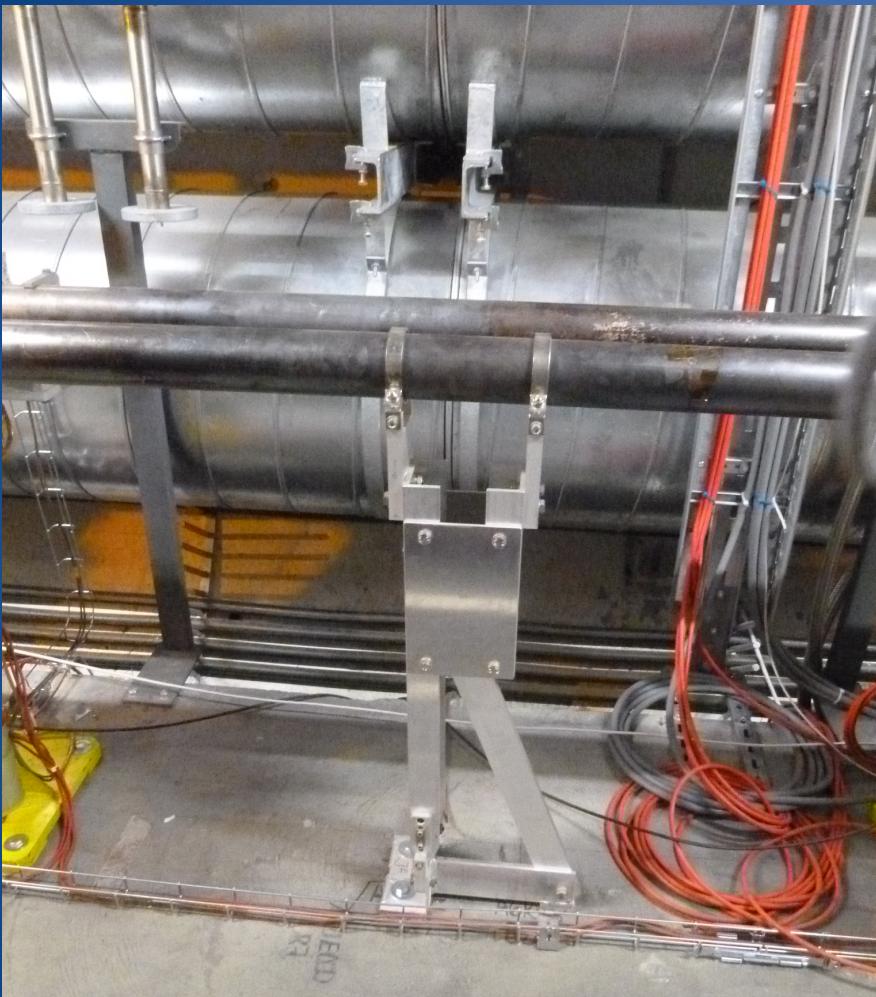
Many secondary collimators as absorbers, with many different collimation planes

which may not be ideal for UA9 Experiment.

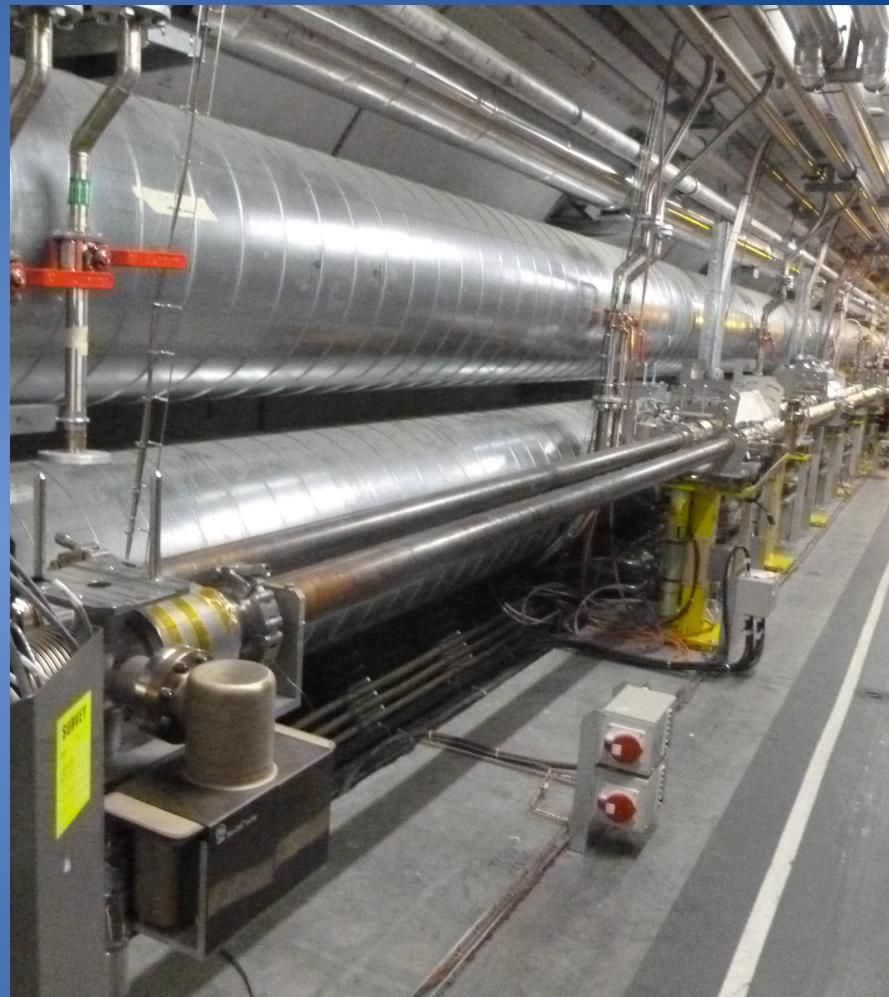
Better:

A simple horizontal absorber right after the Roman Pot

Crystal and Roman Pot position 3 in Beam 2



TCP.A6R7.B2 at 20193 m from IP1



TCSM.C5R7.B1+TCSG.C5R7.B1 at 20098 m

Space for Goniometer on Beam 1

TCP.A6L7.B1



Drawings of space allowance for goniometer on Beam2 toward the corridor requested, but not yet available: roughly 2 man feet



Conclusion

- In the LHC suitable locations can be found to accommodate the hardware for a crystal based collimation system test
- We have gained experience enough (and more will be gained in 2011) to feel confident proposing to move UA9 to LHC.

This could even happen in 2012, with the conditions:

- a very compact goniometer with the angle reproducibility $\leq 1.2 \mu\text{rad}$ is made available soon,
- a minimum set of radiation hard detectors is available,
- we can start making the first steps toward approval TOMORROW.

THANK YOU

and

HAPPY LHC RUNS TO ALL OF US