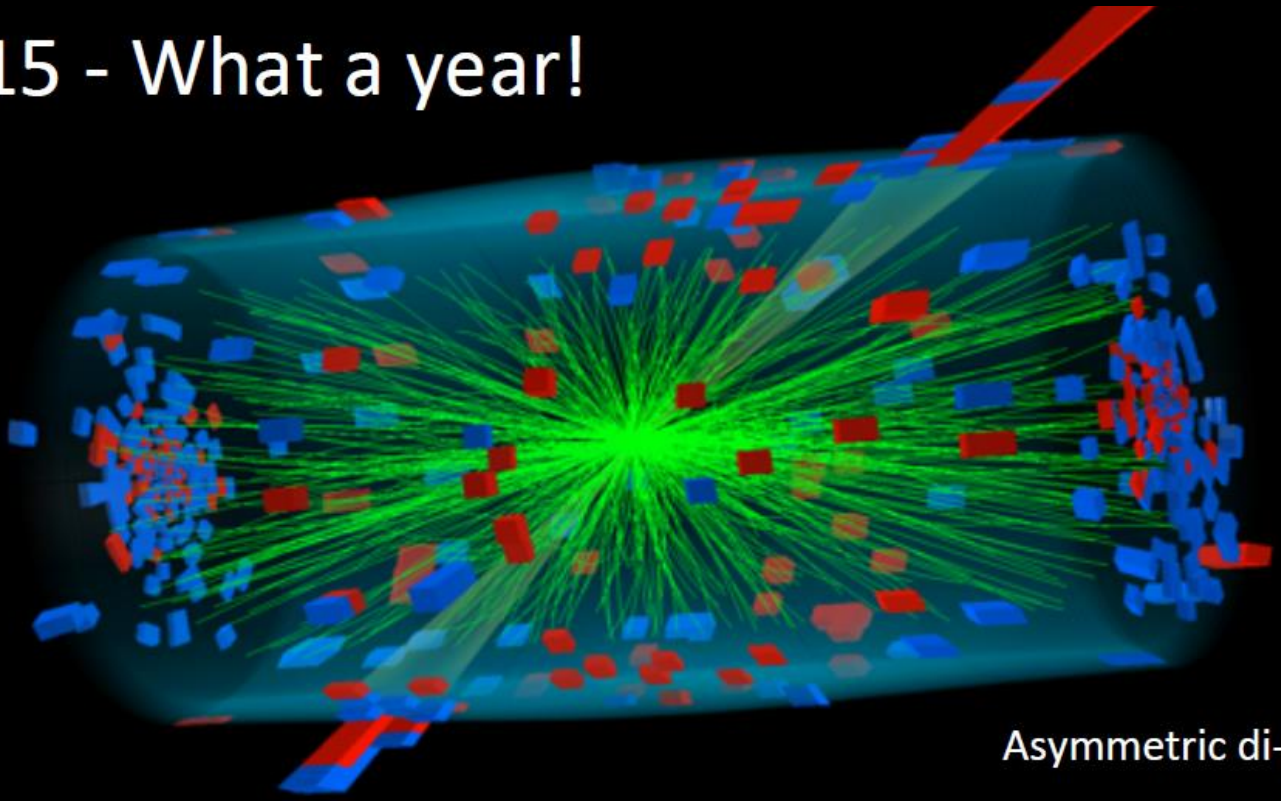
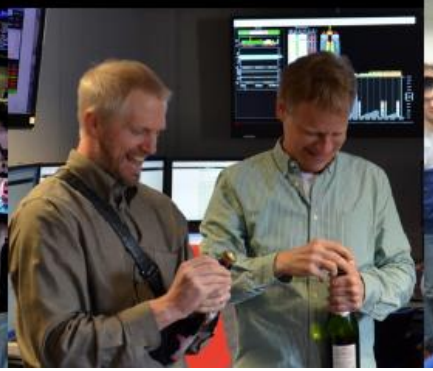
Experiment perspective

2015 - What a year!



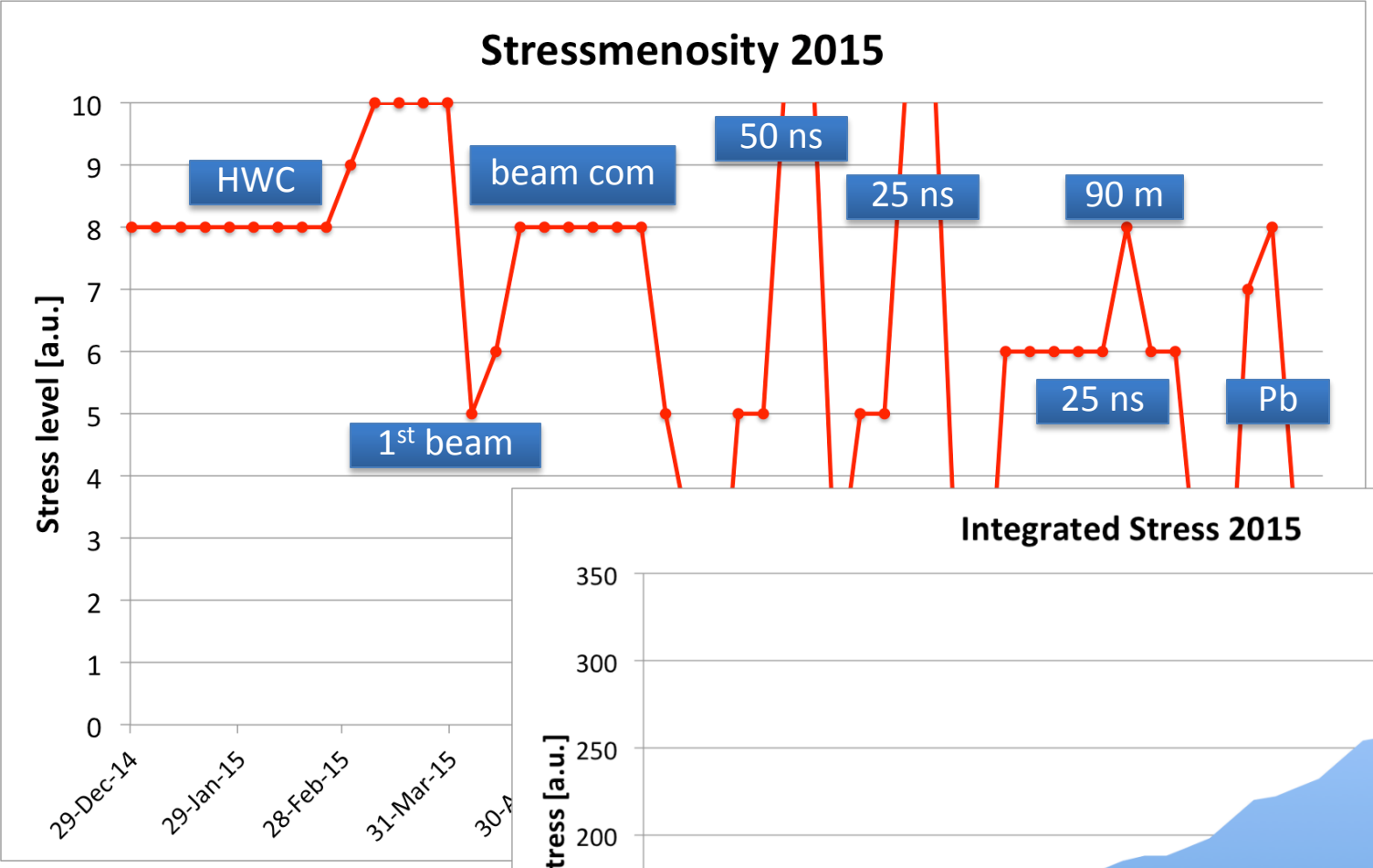
Asymmetric di-jet event PbPb

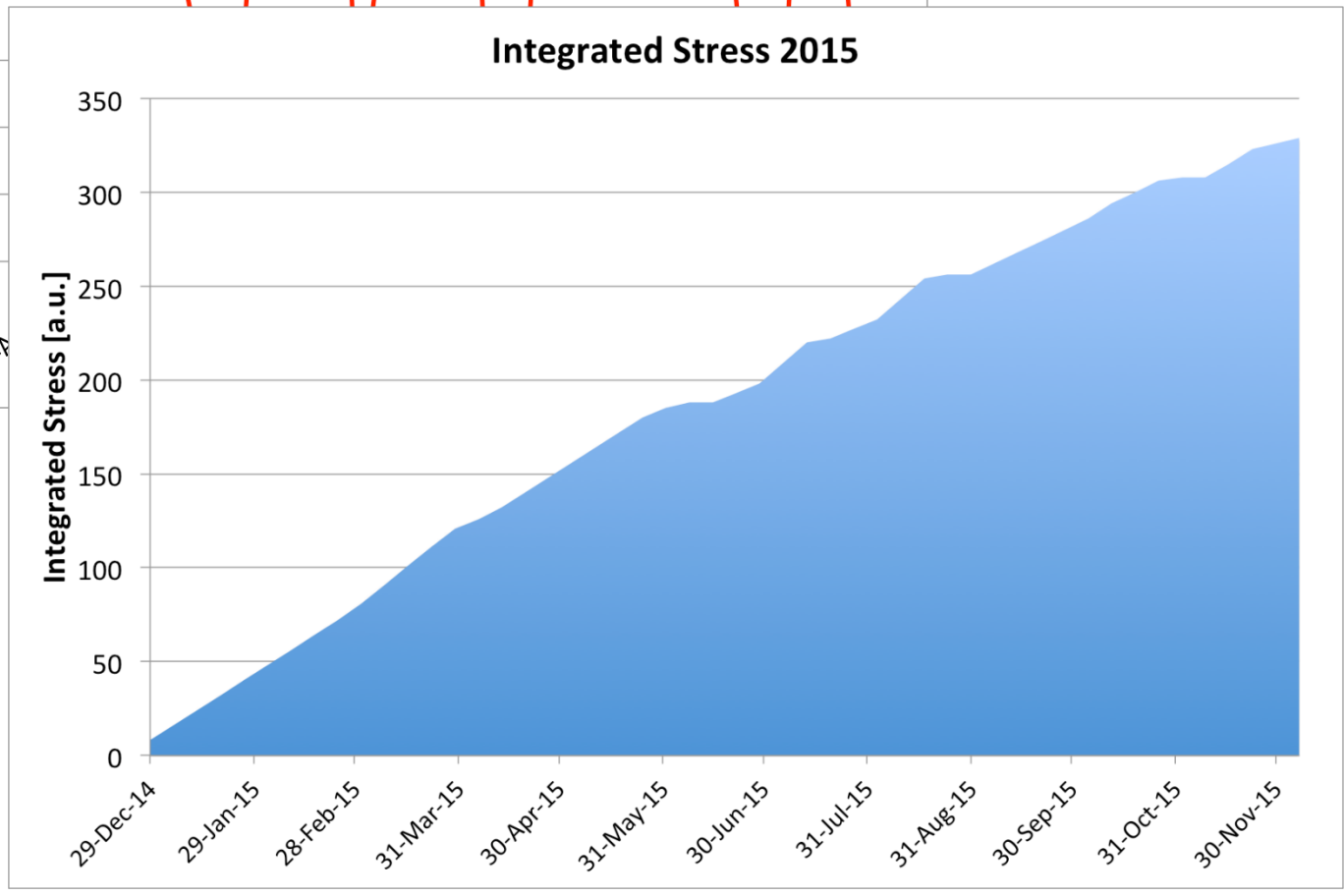


Machine perspective

2015 our side in a nutshell

“I have nothing to offer but blood, toil, tears and sweat”


Stressmenosity 2015
Stress level [a.u.]
10
9
8
7
6
5
4
3
2
1
0
HWC
1st beam
beam com
50 ns
25 ns
25 ns
90 m
Pb
29-Dec-14
29-Jan-15
28-Feb-15
31-Mar-15

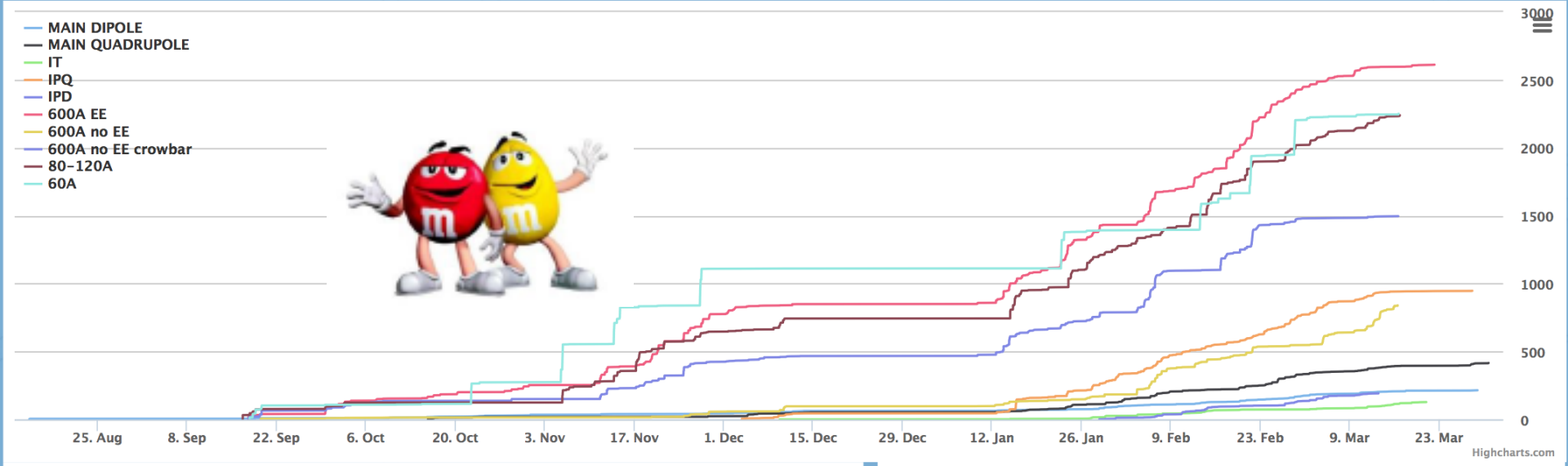

Integrated Stress 2015
Integrated Stress [a.u.]
350
300
250
200
150
100
50
0
29-Dec-14
29-Jan-15
28-Feb-15
31-Mar-15
30-Apr-15
31-May-15
30-Jun-15
31-Jul-15
31-Aug-15
30-Sep-15
31-Oct-15
30-Nov-15

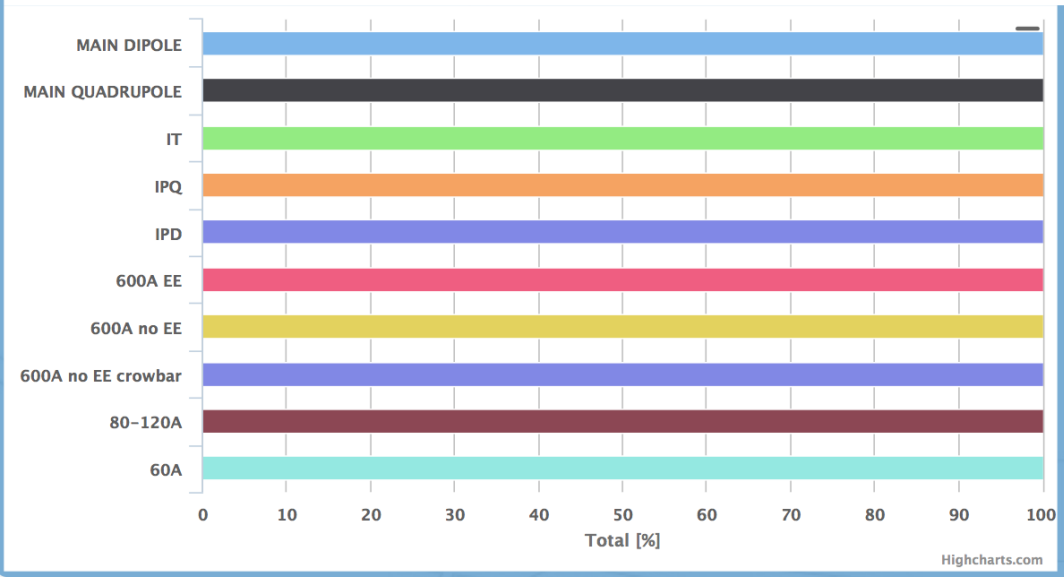
Irritability 2015

Not shown: frustration at management/coordination

LHC Powering Tests

Last update: 02 April 2015 05:40:36





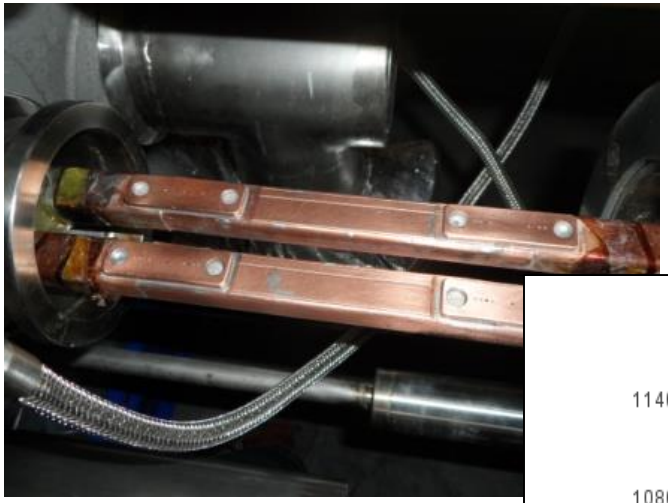
Latest Quenches

Sector	MAX I [A]	MAX E [TeV]	Date	N of Quenches
1-2	11080	6.55	19-01-2015	7
2-3	11080	6.55	28-02-2015	17
3-4	11080	6.55	02-04-2015	14
4-5	11080	6.55	28-03-2015	49
5-6	11080	6.55	08-02-2015	16
6-7	11080	6.55	10-12-2014	20
7-8	11080	6.55	12-03-2015	16
8-1	11080	6.55	22-02-2015	25

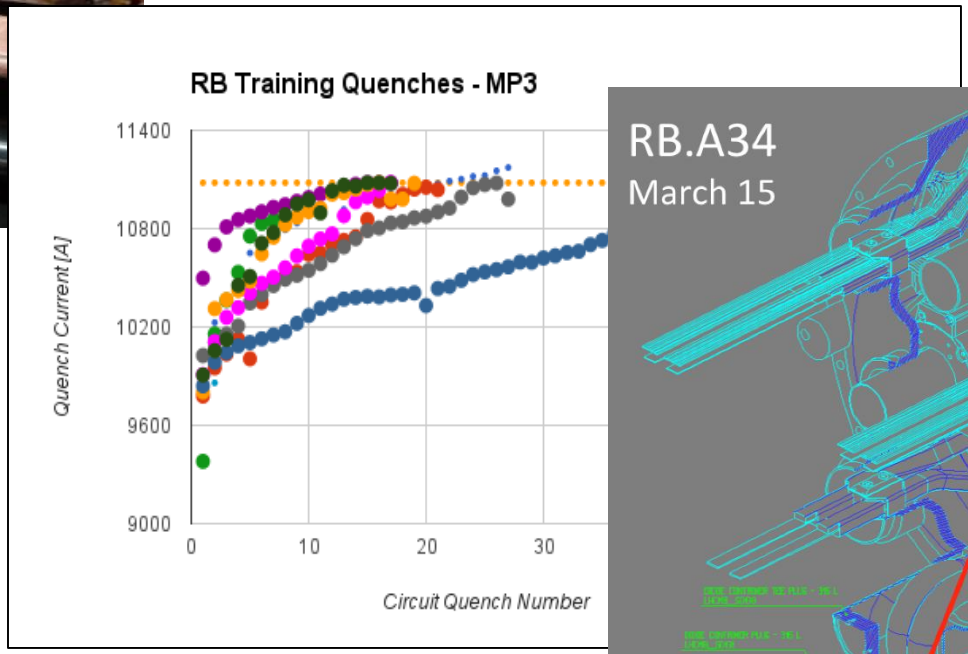
The target for 2015 is 10980 A <=> 6.5 TeV, with 100 A of margin for stable operation. Once the circuit has reached 11080 A, the training quench campaign is closed in the concerned sector.

Quench protection system, power converters, energy extraction, UPS, interlocks, electrical quality assurance, magnets, machine protection….

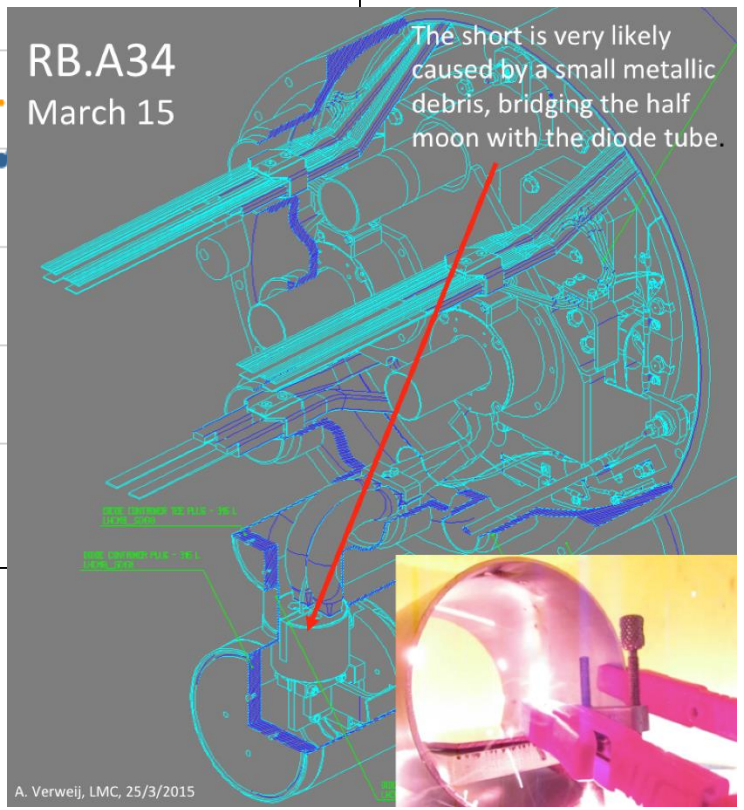
Coming out of LS1



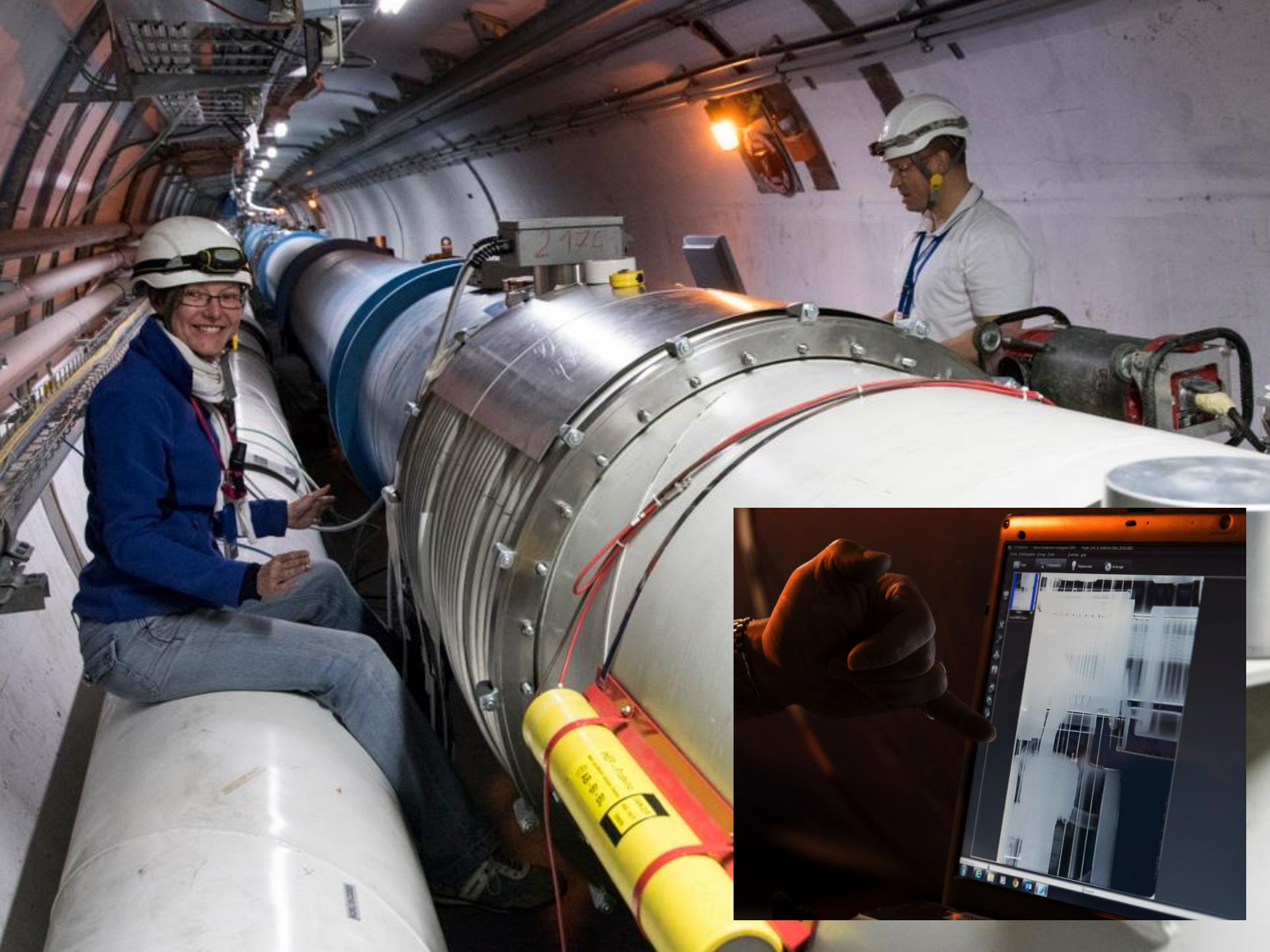
Copper Stabilizer Continuity Measurements (CSCM) using modified Quench Protection System (mQPS)



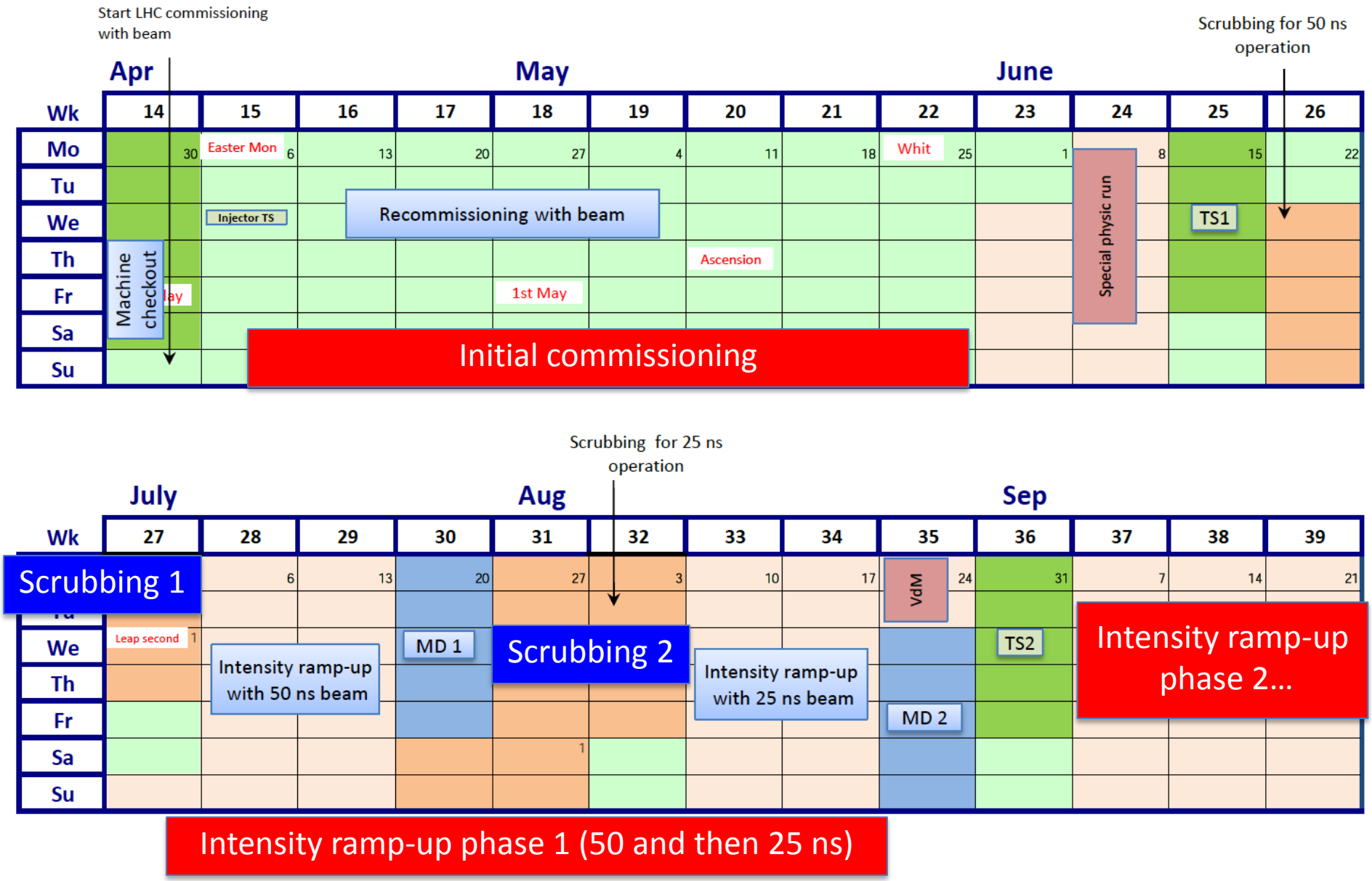
Dipole training



Earth fault

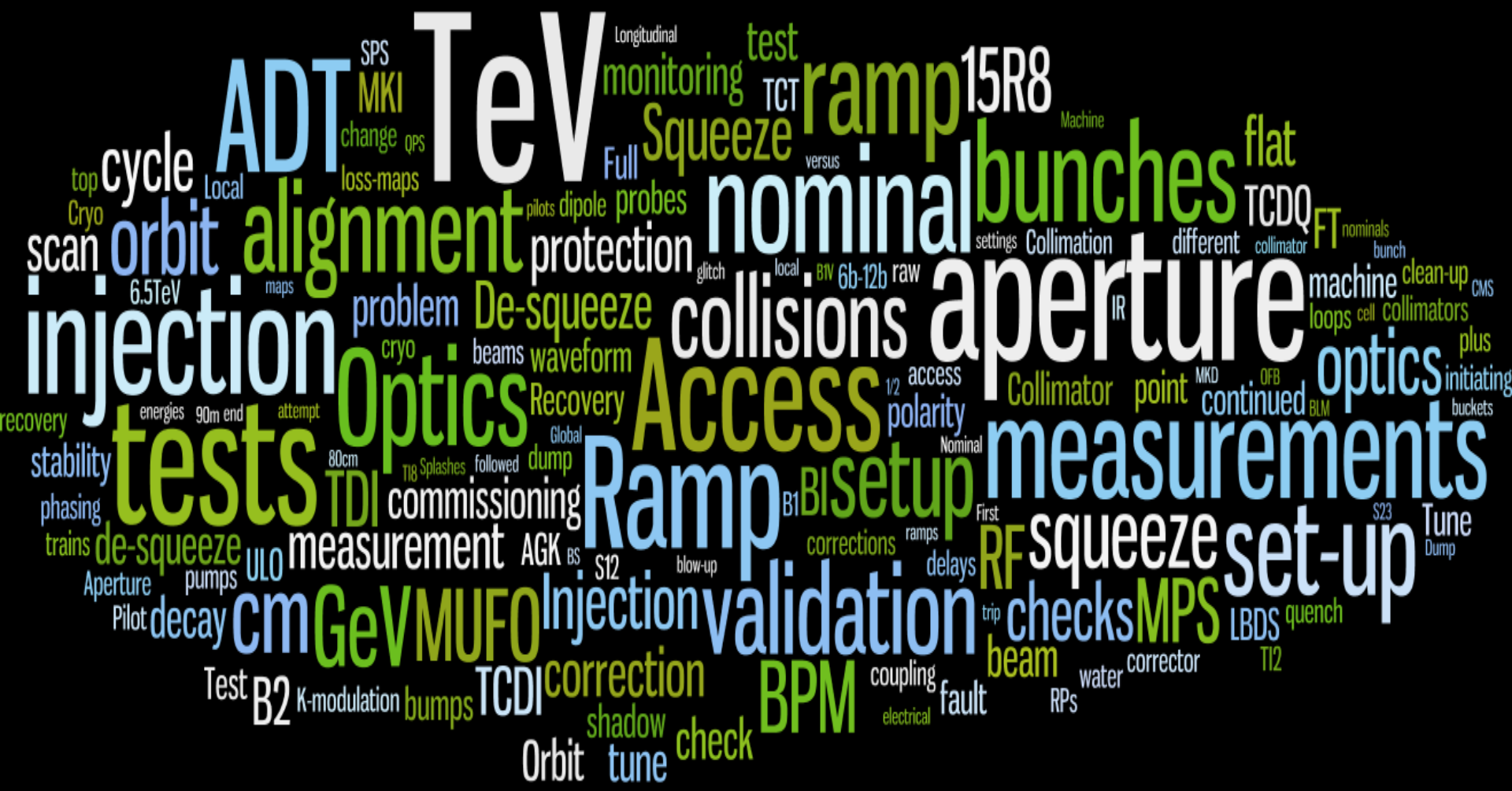


2015 schedule Q2/Q3



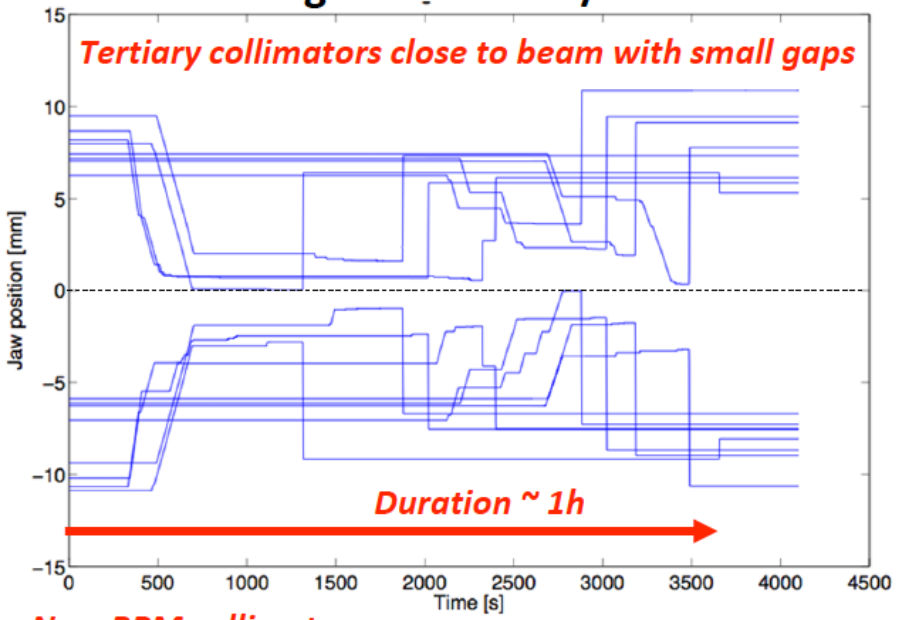
Beam commissioning

- 59 days - 177 shifts
- 9 weekends
- 4 public holidays
- 133 loss-maps

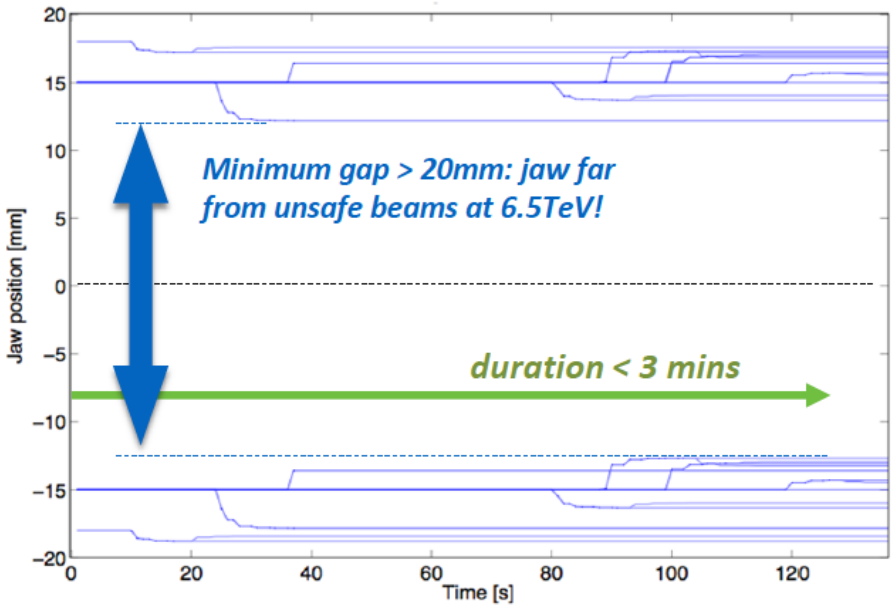


Improving Efficiency: Collimator Alignment

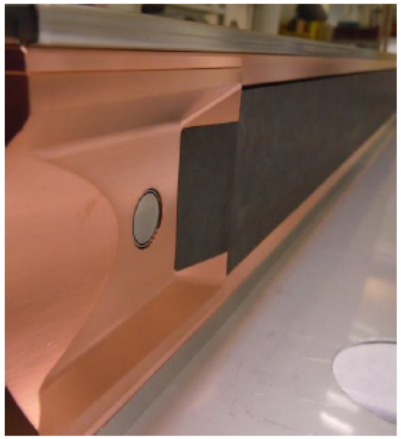
BLM-alignment in IR1/5 in 2012

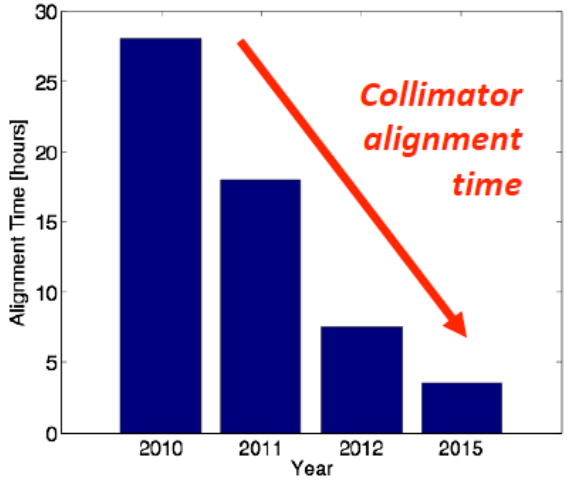


BLM-alignment in IR1/5 in 2015



New BPM collimators commissioned in 2015!

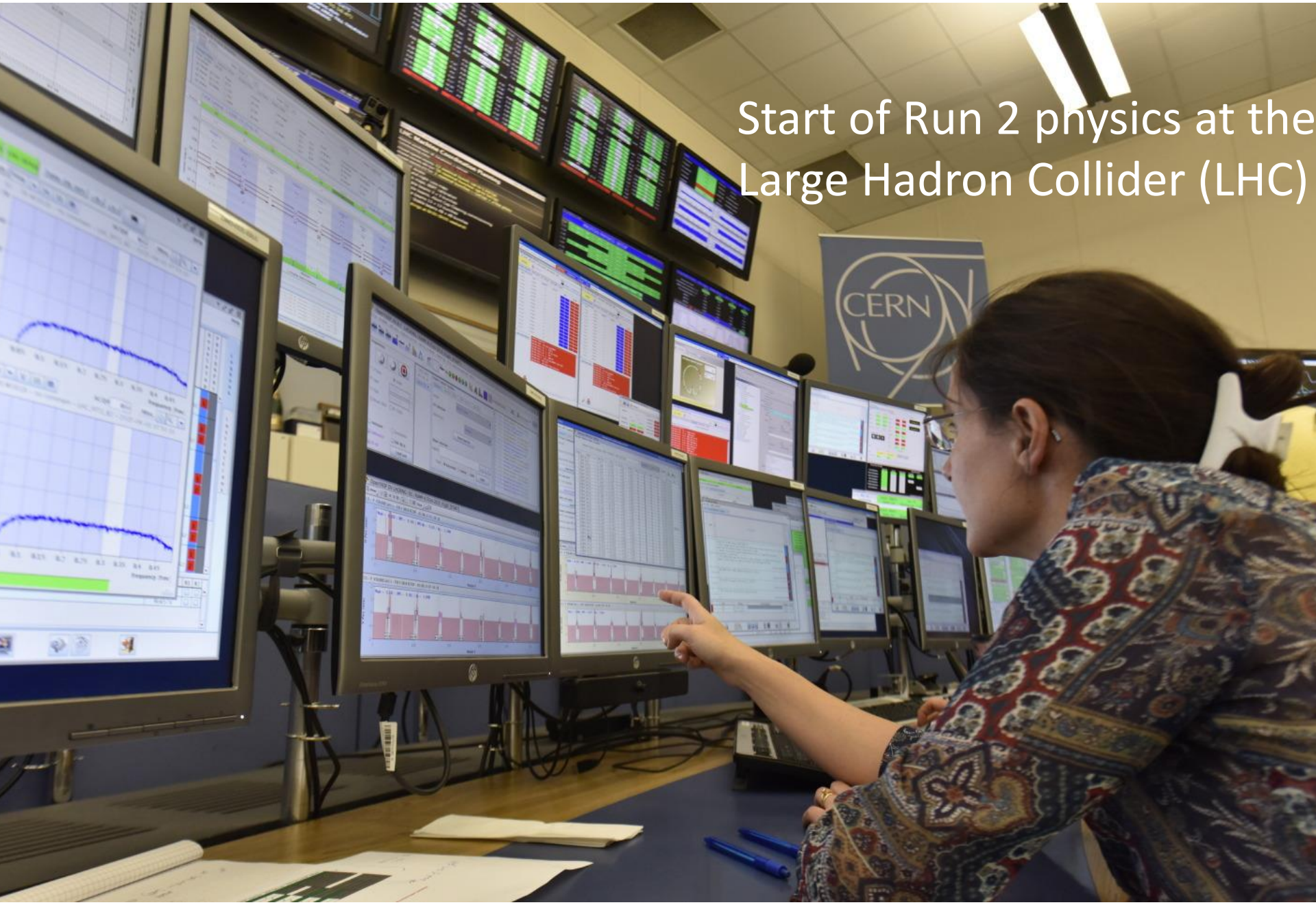




- ☑ BPM alignment used for all IR collimator alignment after July 2015
- ☑ Further improvements of software for standard BLM alignment
- ☑ Deployment of gentle loss maps: saved a huge amount of beam time

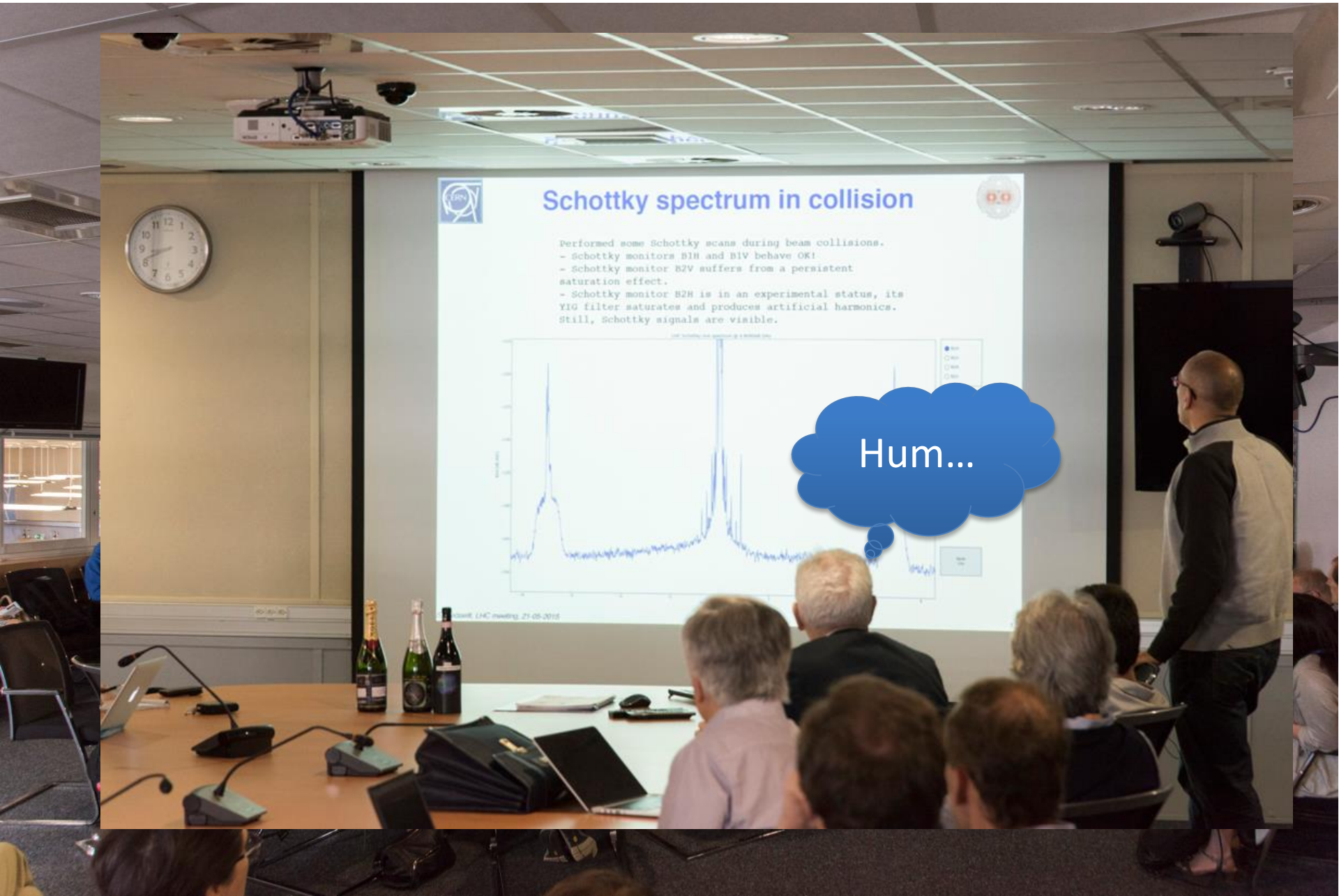
First beam at 6.5 TeV - 1 o'clock in the morning

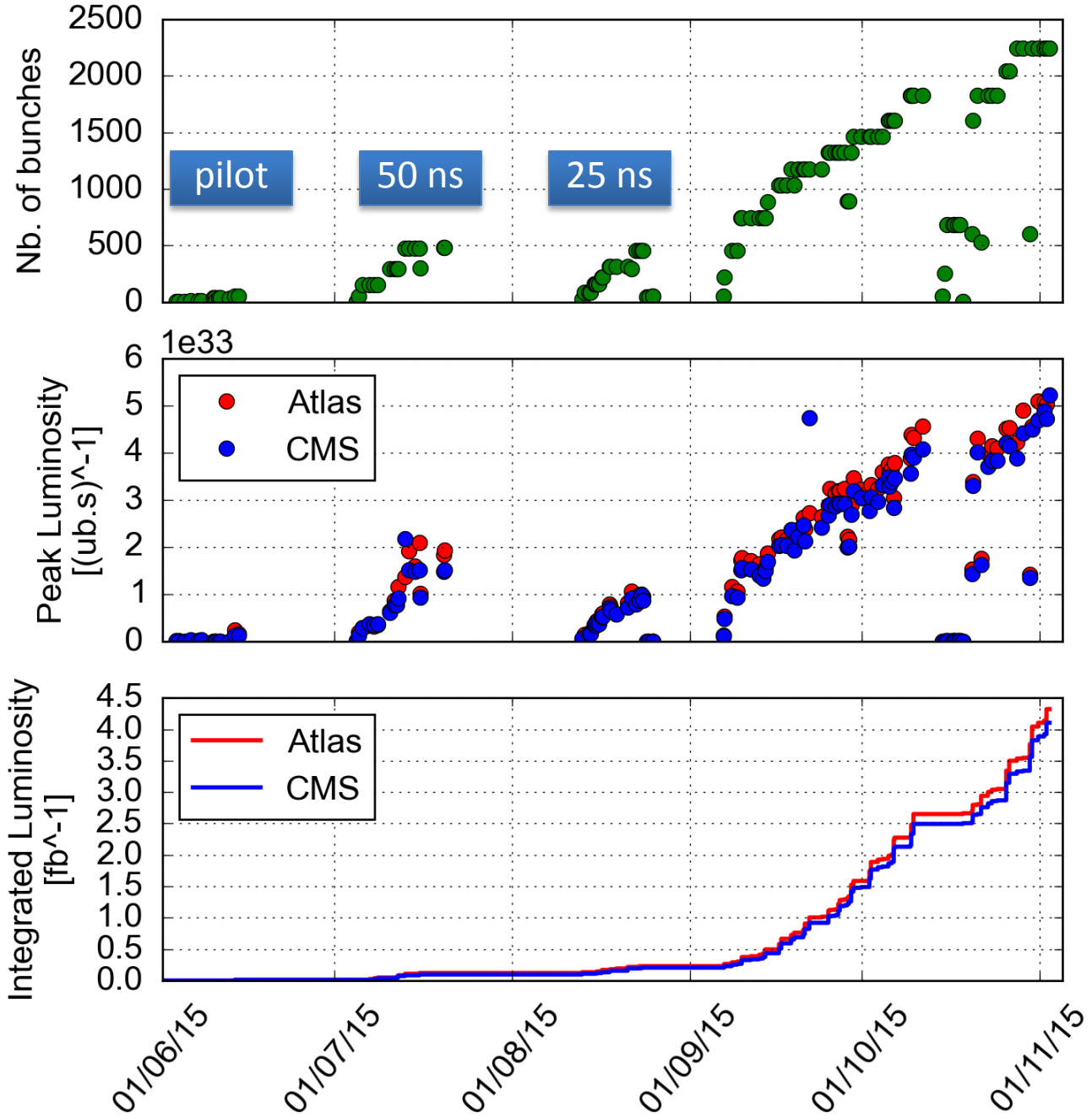
First Stable Beams – office hours


Start of Run 2 physics at the
Large Hadron Collider (LHC)
CERN

… and this is called a phone Paul

First 13 TeV Stable Beams – 8:30 meeting




Nb. of bunches
2500
2000
1500
1000
500
0
pilot
50 ns
25 ns
1e33
Peak Luminosity [(ub.s)^-1]
6
5
4
3
2
1
0
Atlas
CMS
Integrated Luminosity [fb^-1]
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Atlas
CMS
01/06/15
01/07/15
01/08/15
01/09/15
01/10/15
01/11/15

Initial 50 ns ramp-up – mid July

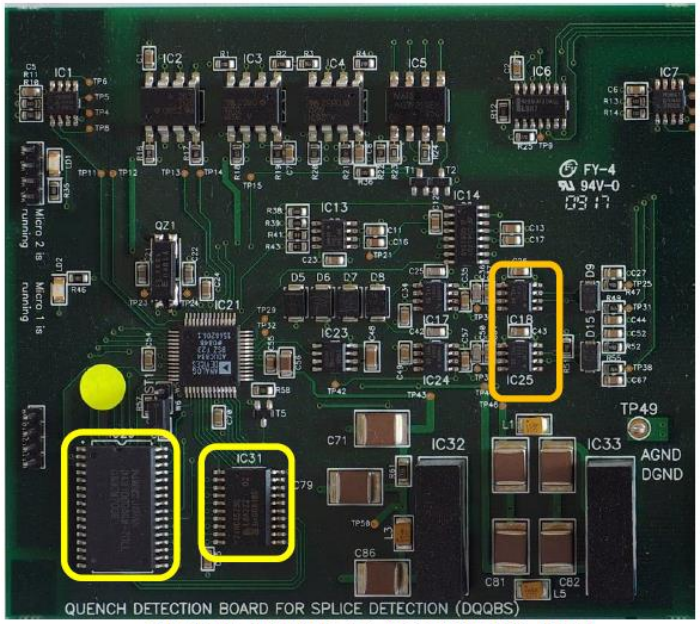
Fill	Time in Stable beams /Lost	bunches	dumped by
3992	5h18m	476	QPS RB.A81
3994	Top of ramp	476	UFO 10L3
3995	Flat top	476	UFO with quench, 34L8
3996	4h4m	476	QPS SEU in B29R2
4000	Ramp 2.0 TeV	476	UFO with quench at ULO
4001	69s	476	QPS SEU in B11.L1
4003	Ramp 2.2 TeV	476	UFO at ULO
4006	10m	476	QPS SEU in B16R1
4008	2h34m	298	QPS SEU in B29R2
4013	Ramp 6.1 TeV	476	RCS.A78B2 earth fault
4015	Ramp 6.2 TeV	476	RCS.A78B2 earth fault
4018	Flat-top	476	UFO 12L6
4019	31m	476	UFO 15L2

Initial 25 ns ramp-up – end August

Fill	Stable beams /Lost	bunches	dumped by
4224	10m	315	Cryo MSR8
4225	2h23m	315	Cryo MSR8
4228	Squeeze	315	QPS SEU
4230	Adjust	315	RF trip
4231	5h26m	315	QPS SEU S34
4237	Flattop	315	QPS SEU L1
4243	4h23m	315	BPMS low intensity
4246	10h25m	296 (50 ns)	OP dump
4249	19m	459	QPS SEU S81
4252	Ramp	459	QPS SEU
4254	37m	458	Cryo comms
4256	2h18m	458	UFO 19R2
4257	19m	458	QPS SEU

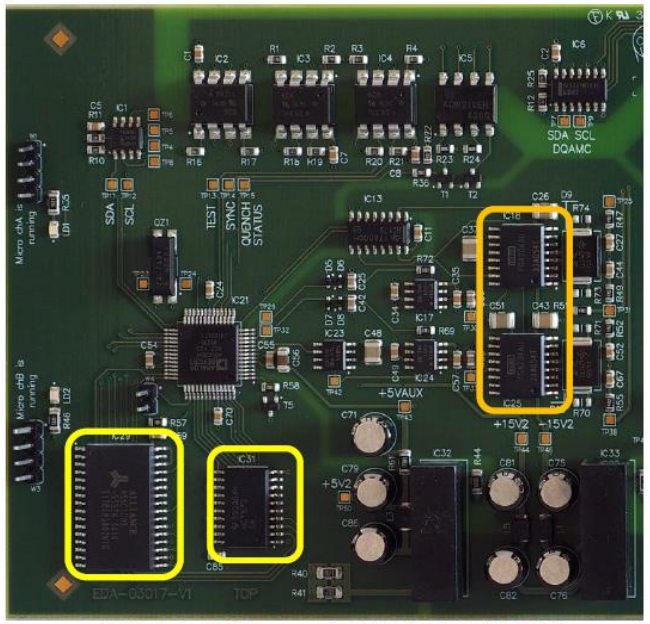
Origin of the SEU problem – recall
Relevant differences between mDQQBS and DQQBS

DQQBS



SRAM: NEC D431000AGW-70LL
D-Latch: NXP 74HCT573
Amplifier: INA141

mDQQBSv2/v3



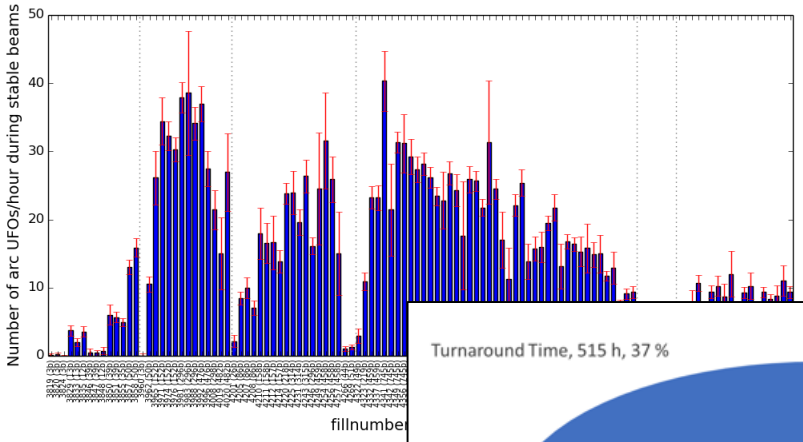
SRAM: Alliance AS6C1008-55SIN
D-Latch: TI 74HCT573
Amplifier: PGA204
Different batch of ADuC834

- **Huge, critical system**
- **Small team**
- **Pushed to the limits (again)**

Unidentified lying objects

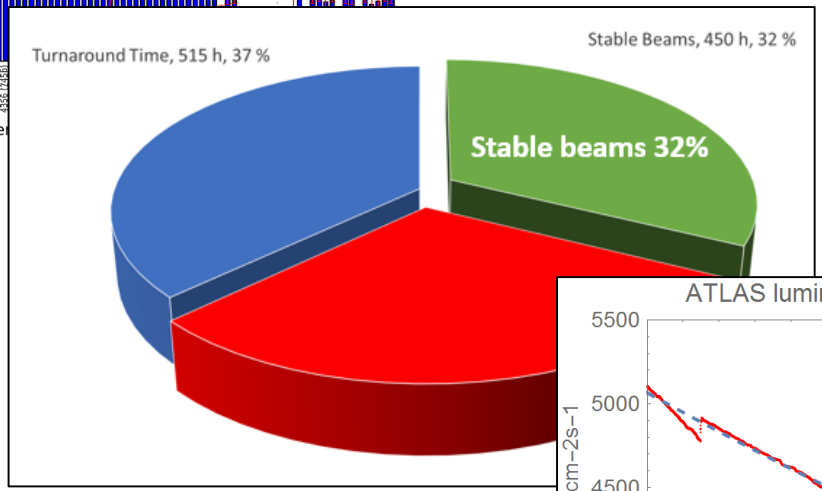
1. **Preparation**: tools, monitoring, simulations, understanding, beams (vacuum, cryogenics, RF, injectors, ABP, OP)
2. **Scrubbing** - execution
3. **Exploitation** given the limits (heat-load, instabilities...)

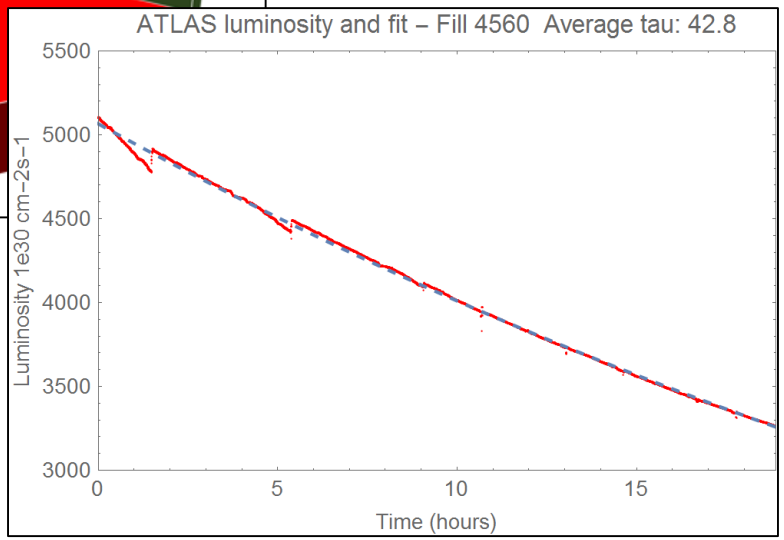
25 ns ramp-up phase 2



UFOs got better

OK Availability



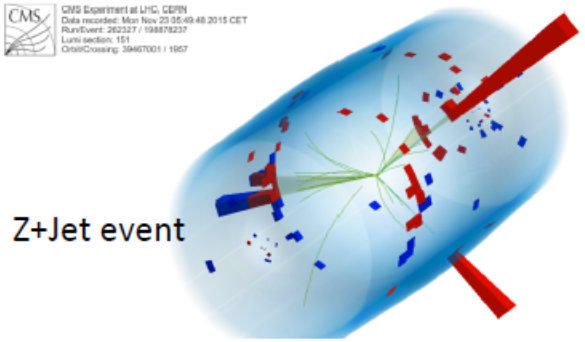


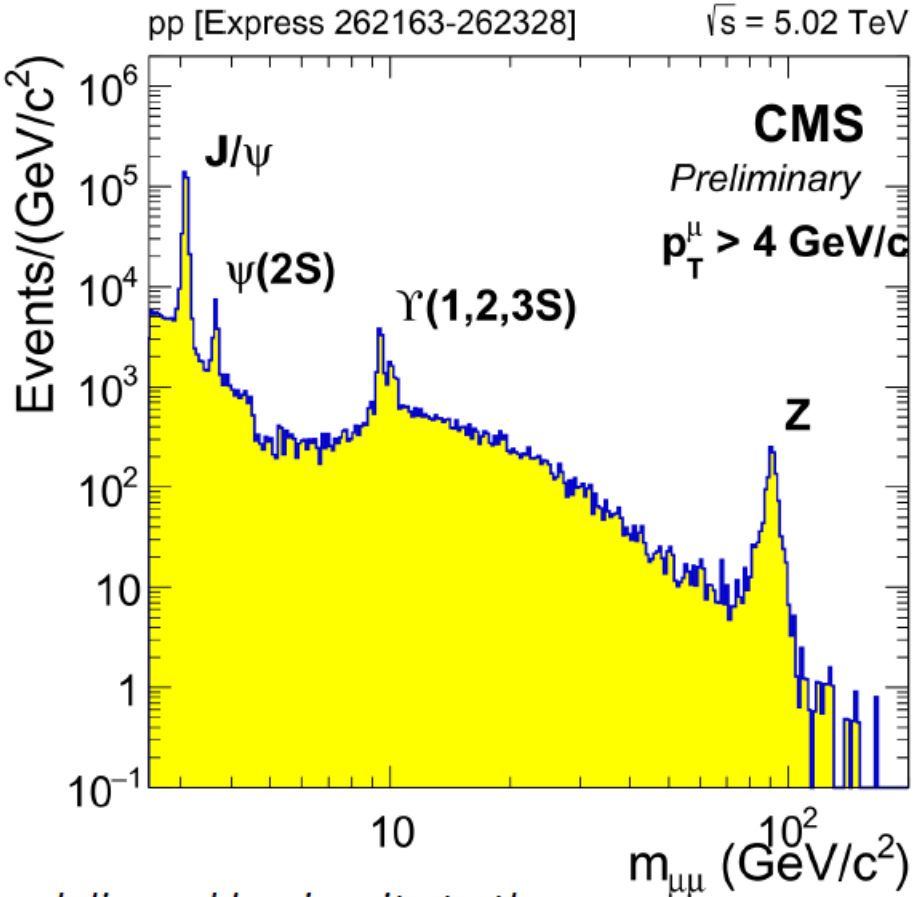
Excellent luminosity lifetime

End of 13 TeV Run

Proton-Proton reference run @ 5.02 TeV

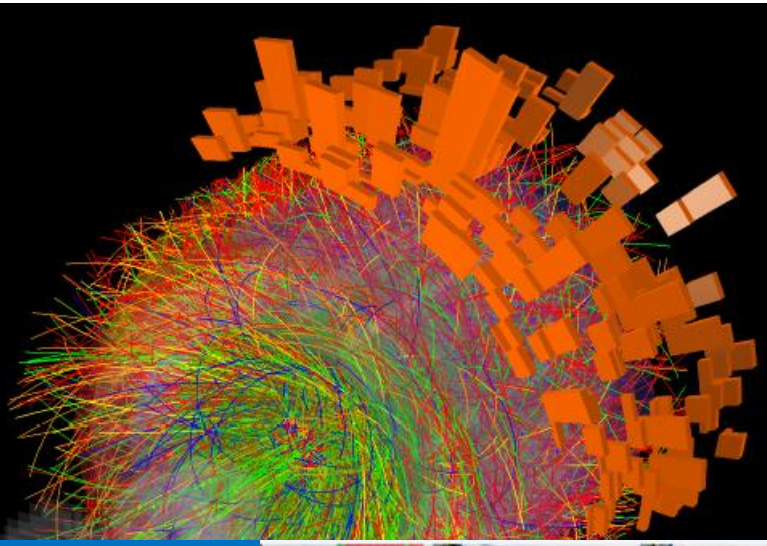
- ***28 pb^{-1} of data recorded for physics - all with B=3.8 T in 5 days!***
- ***Crucial for HI physics run***

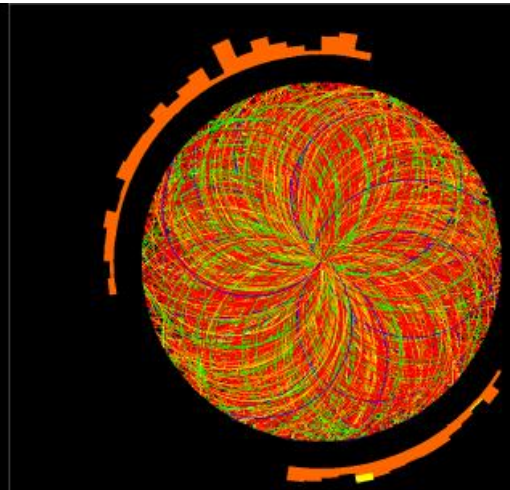


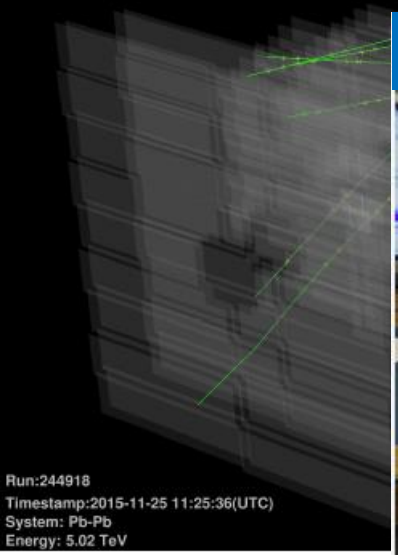


✓ *… excellent availability of the LHC to maximise delivered luminosity to the experiments! Thank you and congratulations to LHC crew!*

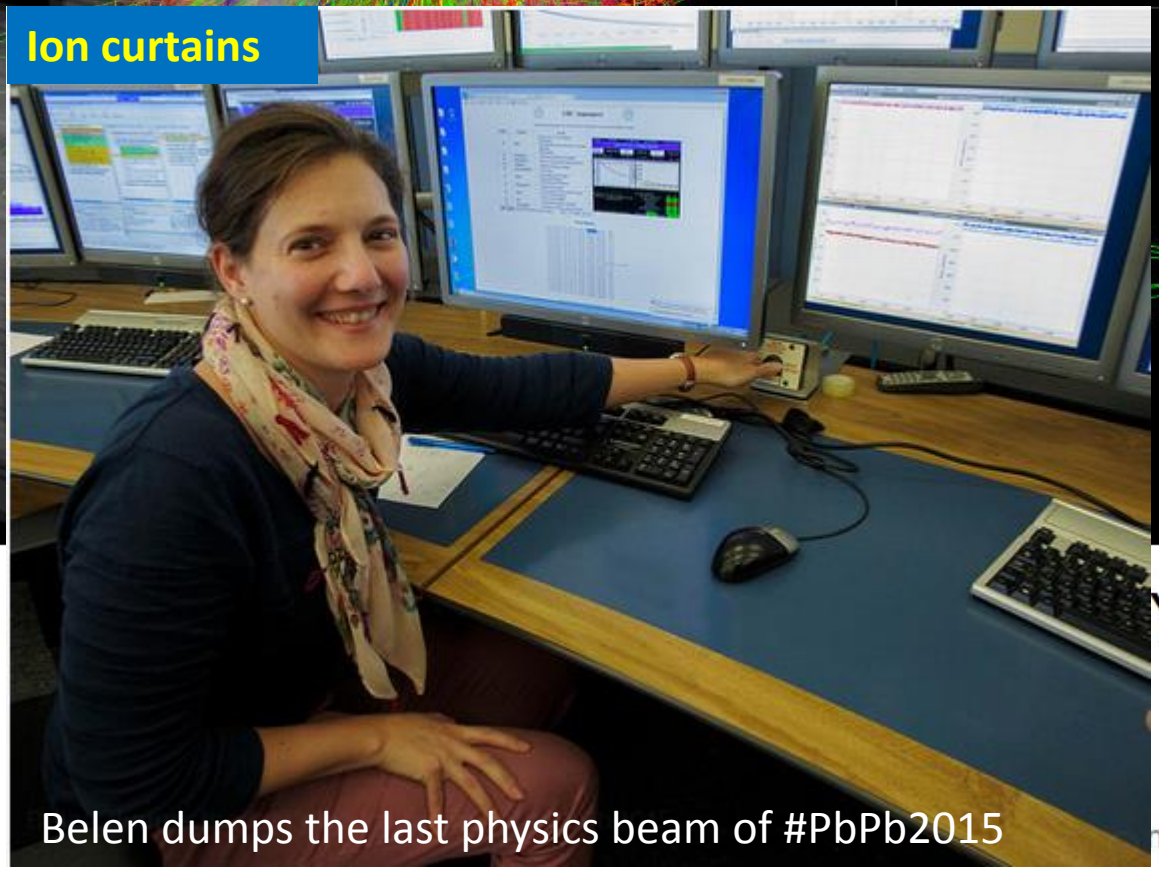
ALICE



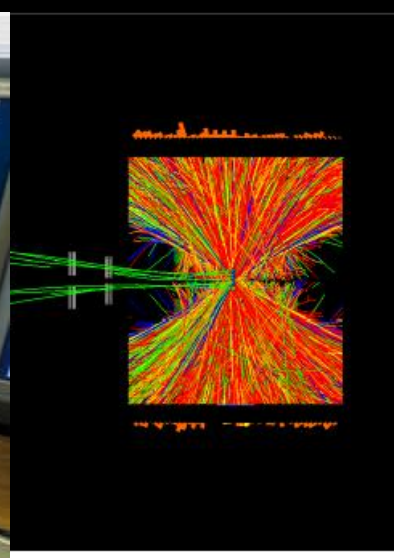




Ion curtains



Belen dumps the last physics beam of #PbPb2015

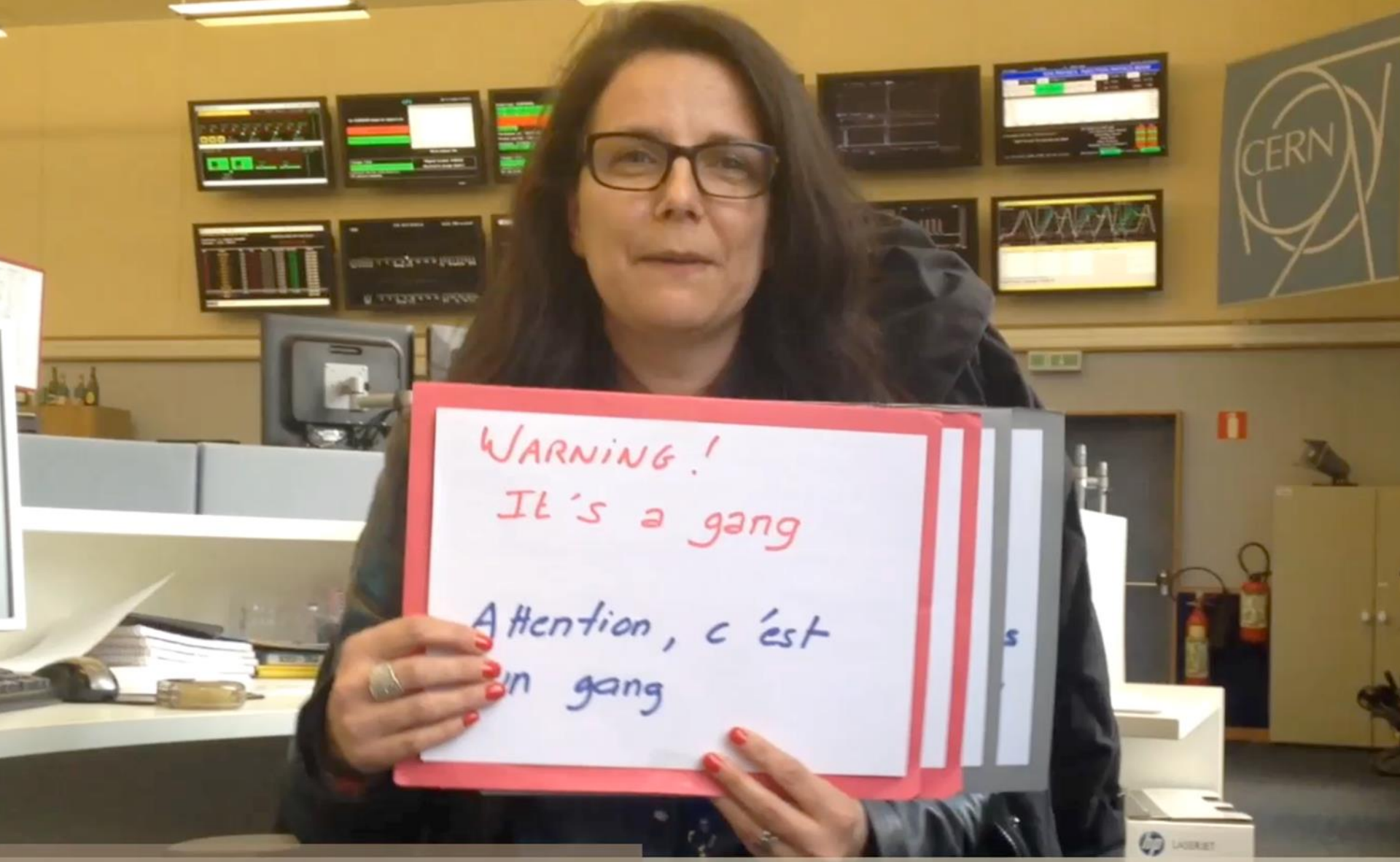


Y

Injectors

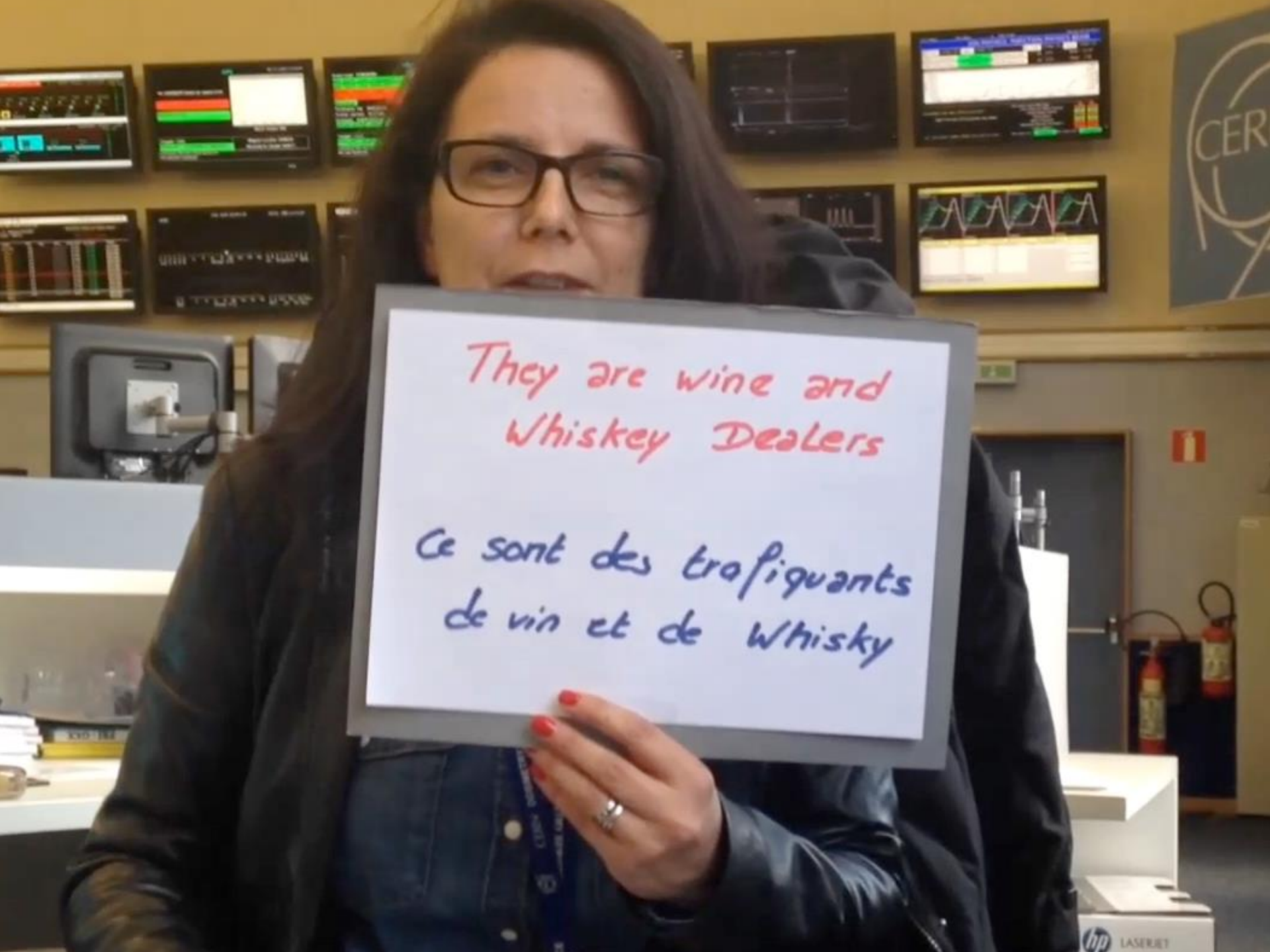
- We are, of course, critically dependent on the injector as regards
  - Availability
  - Beam quality – across many different varieties ranging through production to MD
- We have recently conducted a survey to find out what the community thinks
- We started with the SPS…*

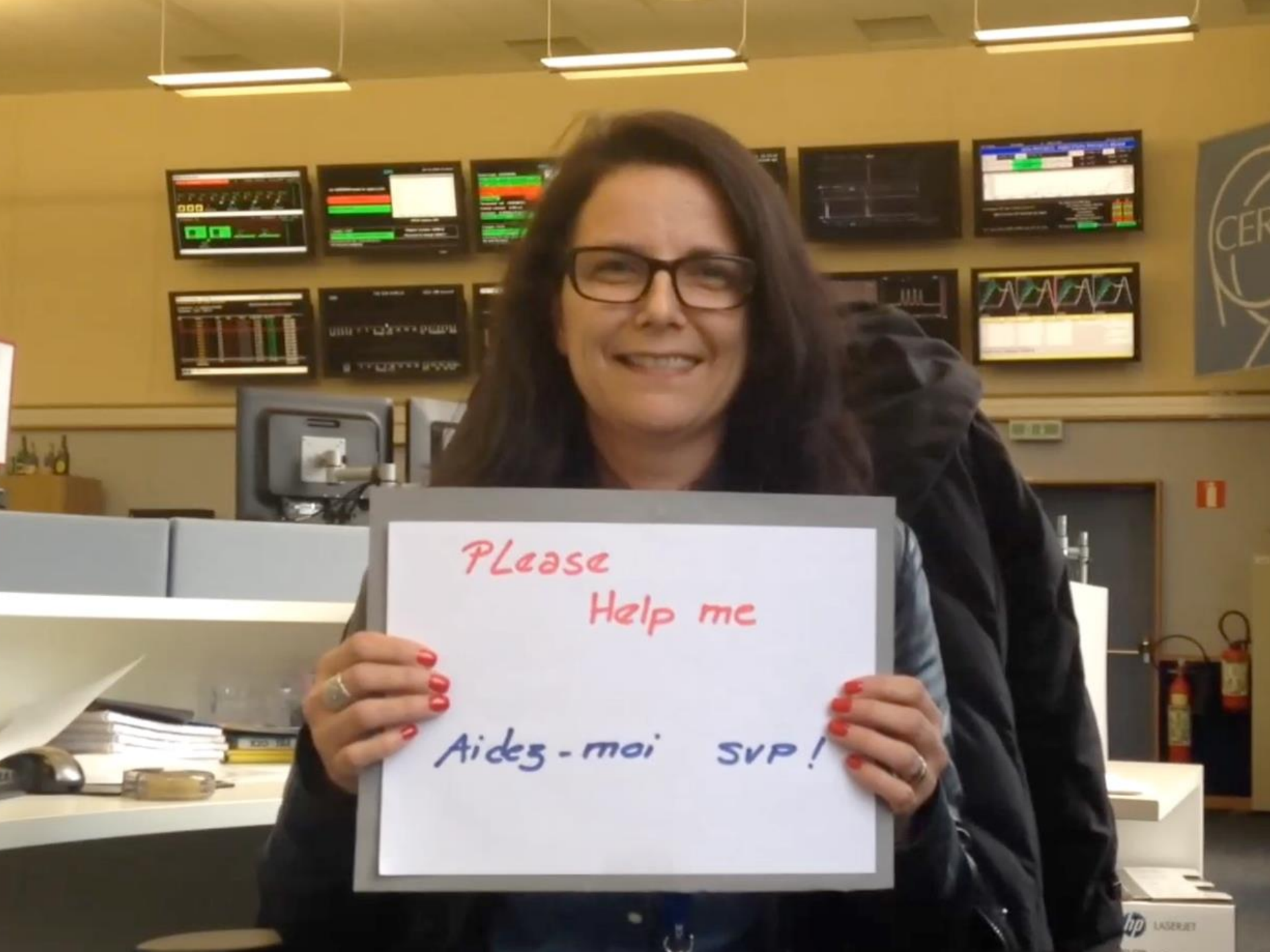
*Thanks to Johan Dalla-Costa



Sylvia the devoted secretary


I´m daily
threatened
Je suis menacée
quotidiennement
CERN


They are wine and
Whiskey Dealers
Ce sont des trafiquants
de vin et de Whisky


PLease
Help me
Aidez-moi SVP !


LHCb pentaquark!
Curvée
Straight Brut
Curvée


HAVE
FUN!