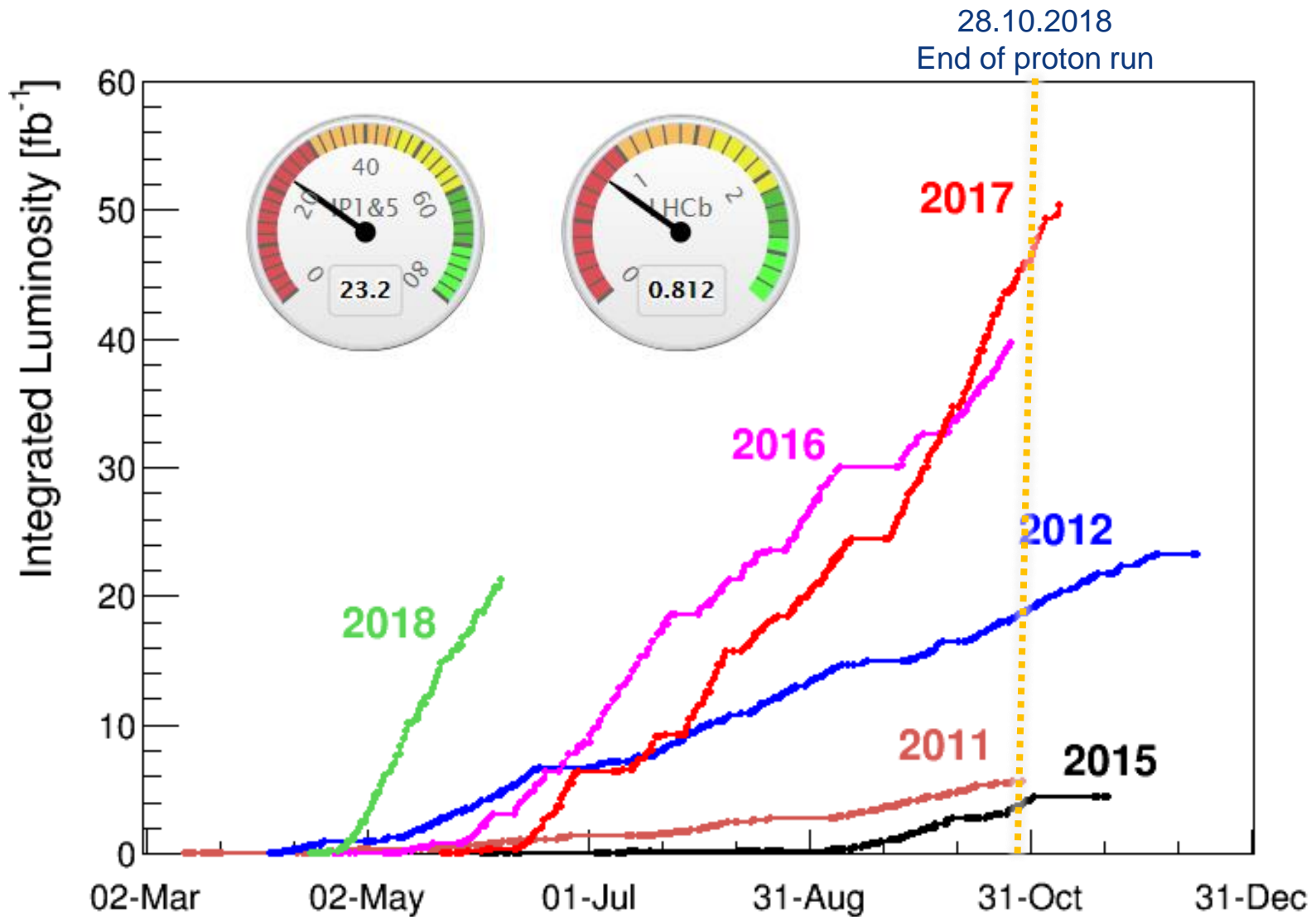


Status Report on Accelerators Council

Frédéric Bordry

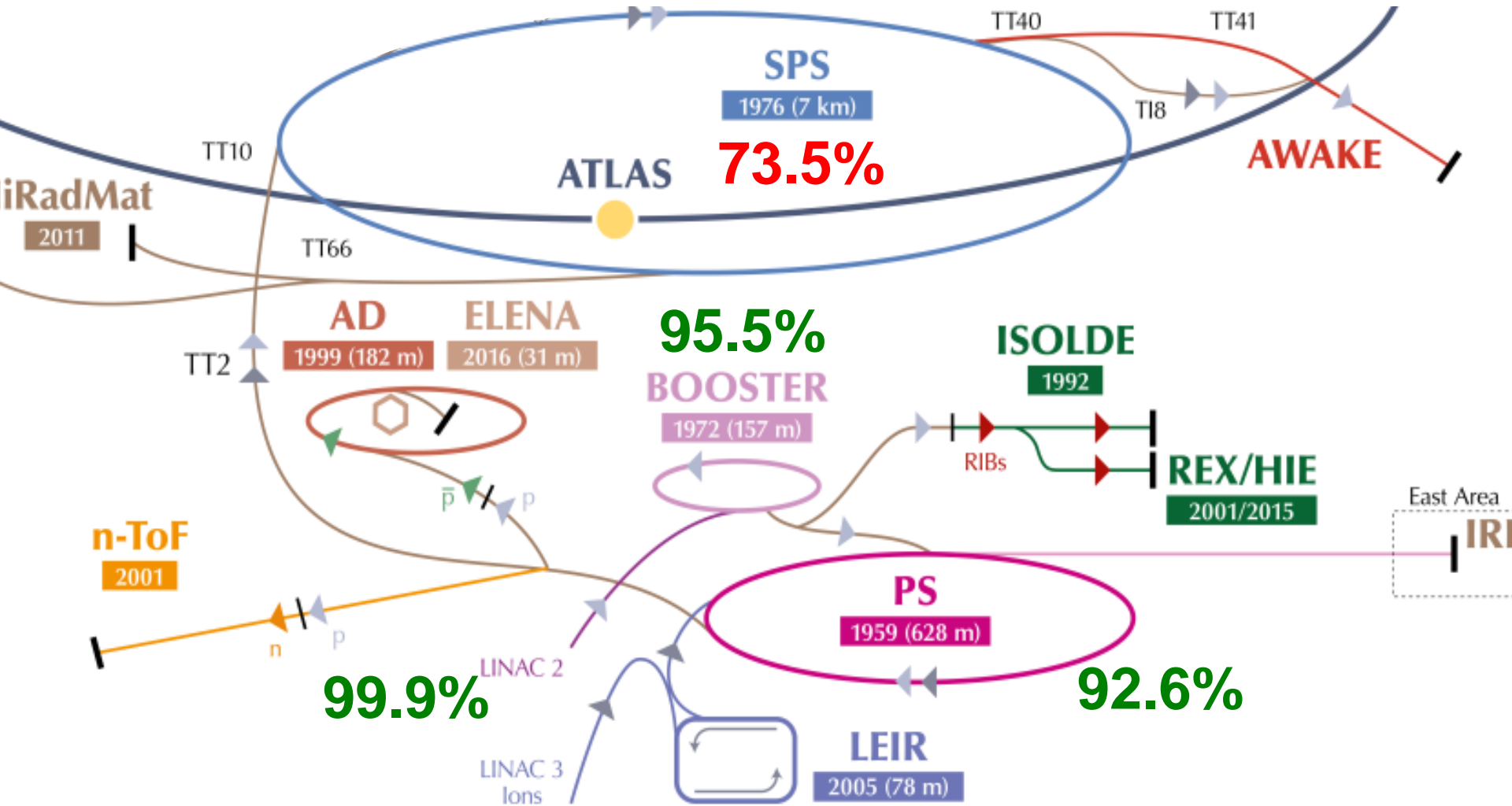
15th June 2018





LHC Injectors availabilities

AFT: Accelerator Fault Tracker



HIE-ISOLDE

- HIE ISOLDE project completed with the installation of the fourth HIE-ISOLDE Cryomodule
 - Recommissioning of the repaired Cryo Distribution System and Cooldown of the Cryomodules completed
 - Conditioning of superconducting structures completed
 - **Cavity 3 in CM4 has an issue with RF coupler and will be out of order for the 2018 run.**
 - Hardware Commissioning of the Cryomodules completed
 - REX Beam Commissioning completed
-
- **HIE ISOLDE Beam Commissioning started in time**
 - **HIE ISOLDE Physics will start as planned as of week 28**
 - **Installation of the ISOLDE Solenoidal Spectrometer ISS close to completion**



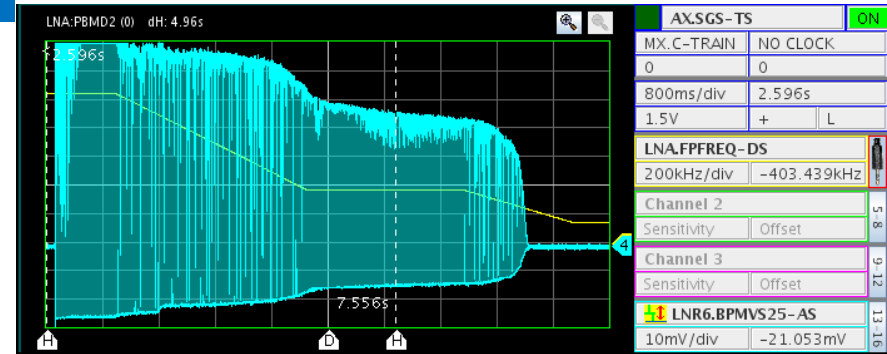
Cryomodule 4



ISOLDE Solenoidal Spectrometer ISS

ELENA: Commissioning

- Ion source H- has been reconfigured to 85kV (after a new 100kV transformer failure)
- ~50% of injected beam remains at last ramp. (No beam cooling yet)



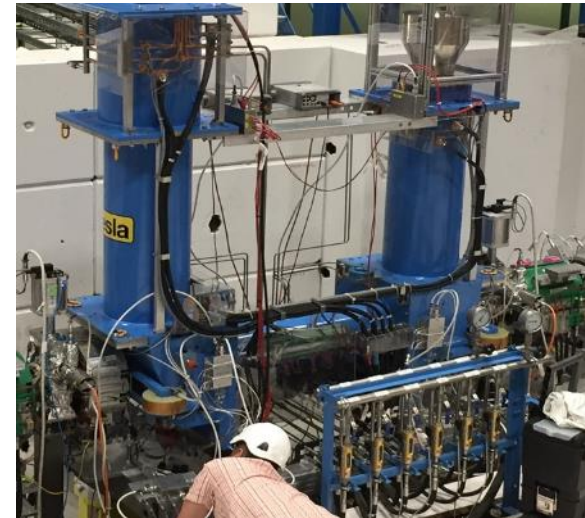
Anti-protons decelerated in ELENA, no e-cooler

e-Cooler Commissioning

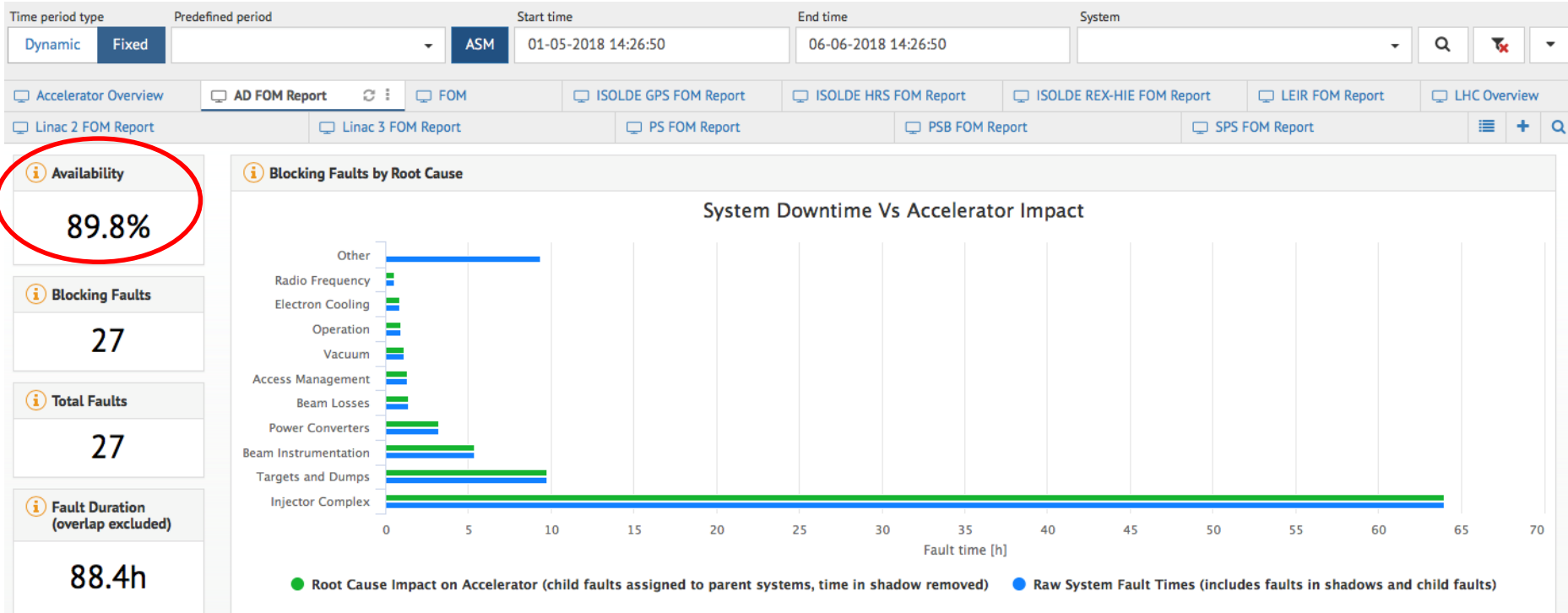
- **Installation finalised**
- First electron beams generated in the e-cooler at low energy levels, beam can be steered on to the collector and outgassing reduced.

Commissioning – Next Steps

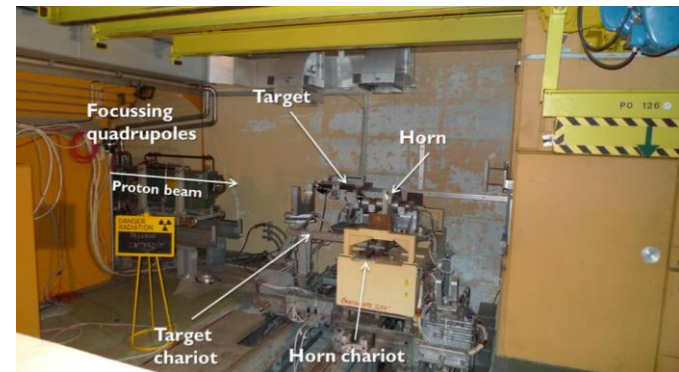
- **Transfer Pbars to Gbar as of 30/7/2018**
- De-bug profile monitor detectors
- ...



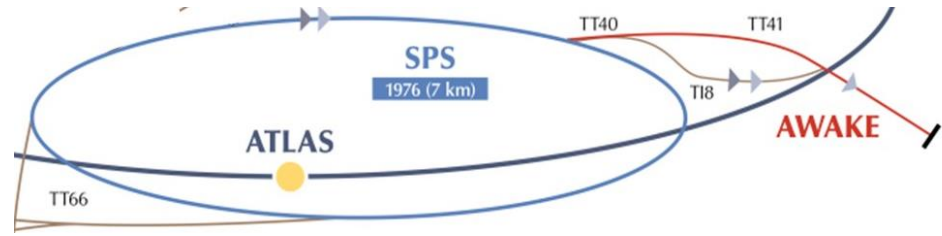
AD: Availability & Fault Statistics



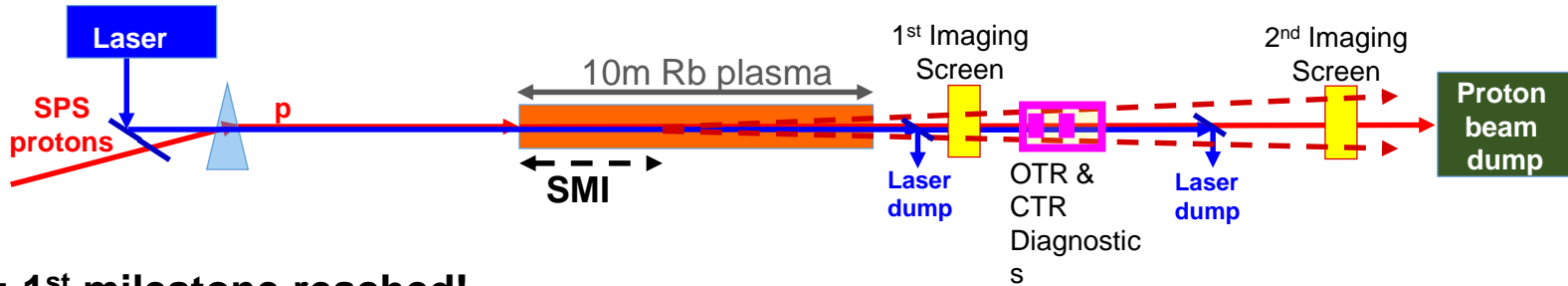
- After delays and modifications to the start-up schedule, very little beam time was available for the 2-week AD start-up due to a water leak problem in the Target Area.
- Physics could nevertheless start as planned on 30 April.
- The leak, which is closely monitored, has diminished to almost zero. Threshold effect with beam intensities.



AWAKE : Seeded Self-Modulation



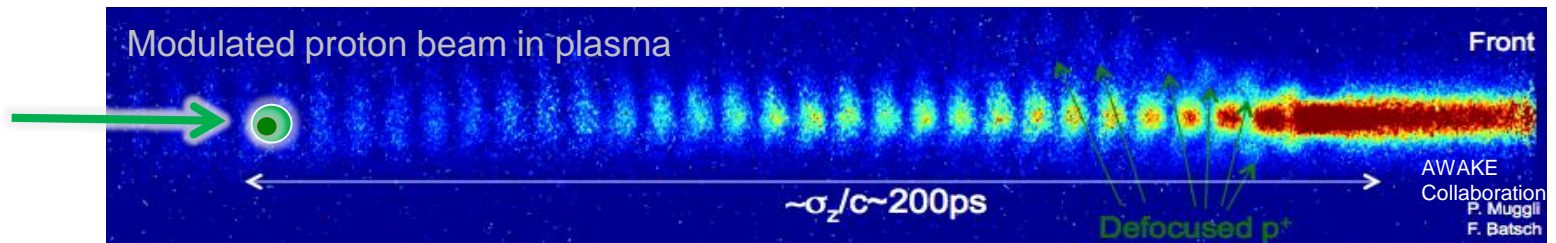
Phase 1: 2016/17: Understand **the physics of self-modulation instability** processes in plasma.



2017: 1st milestone reached!

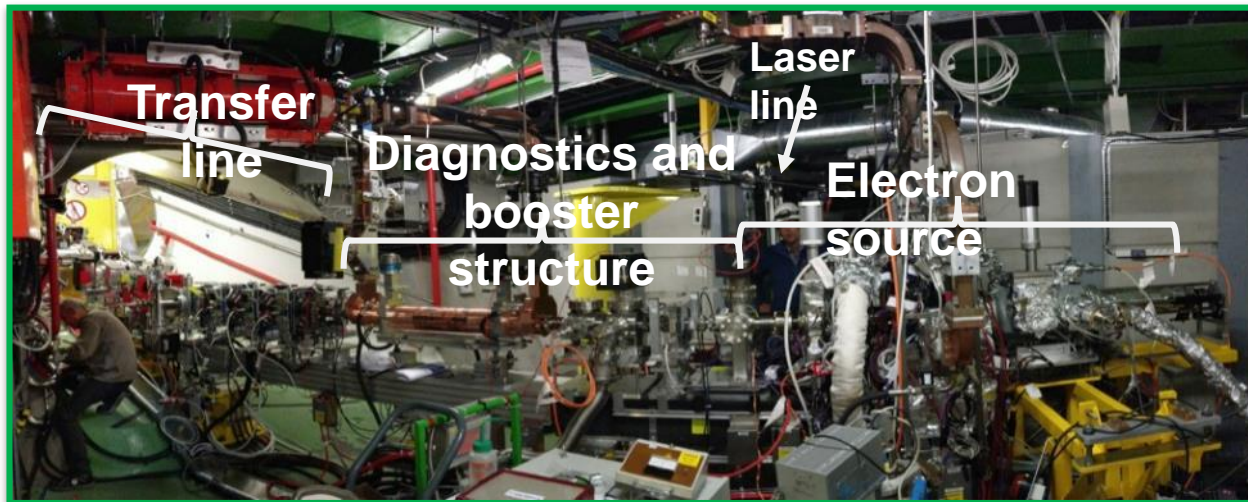
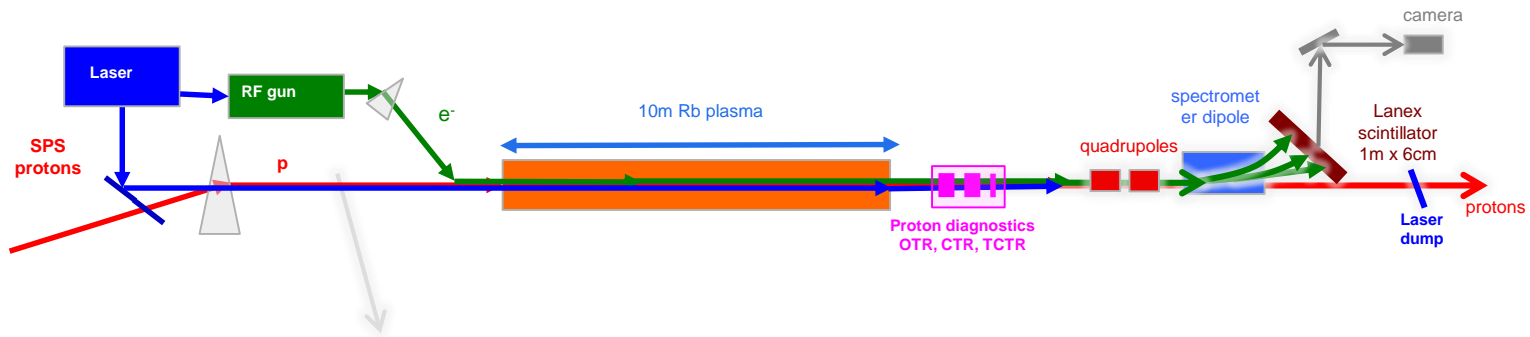
First demonstration of seeded self-modulation of a high energy proton bunch in plasma (phase-stable and reproducible) → resonantly drive the wakefields in the plasma → essential for electron injection and acceleration!

In 2018: inject electrons here



AWAKE: Electron Acceleration

Phase 2: 2018: 2nd Milestone: Inject electrons externally and accelerate to GeV level



Electron beam system and electron diagnostics installed in 2017, commissioning started end 2017, first run May 2018, further run periods in July, August and October 2018.

AWAKE Accelerates Electrons!

Electrons have been **injected externally at 2m inside the plasma and accelerated.**

These are **initial results** with non-optimized electron beam and injection parameters.

Further analysis, calibration and measurements need to be done. →
2018 AWAKE runs


Analysis is ongoing and a **publication under preparation** in the next couple of weeks.

The **policy** of the AWAKE collaboration is to **not make ‘official public results’, ie nothing on indico, webpages, social network, etc...** until the publication

2018 LHC schedule : Q1 and Q2

	Jan				Feb				Mar			Apr		
Wk	1	2	3	4	5	6	7	8	9	10	11	12	13	
Mo	1	8	15	22	29	5	12	19	26	↓	5	12	19	26
Tu		Controls Maintenance												
We														
Th						Technical stop (YETS)								
Fr														
Sa									DSO test					
Su														

Start powering tests (Mar 9), LHC to OP (Mar 10), LHC, T12, T18 closed (Mar 11), T12 & T18 Beam tests (Apr 12), Experiments valves open (Apr 13).



	Apr			May				June					
Wk	14	15	16	17	18	19	20	21	22	23	24	25	26
Mo	Easter 2	9	16	Scrubbing 23	30	7	14	Whitsun 21	28	4	11	18	25
Tu					1st May							TS1	
We				600	2100								
Th	Recommissioning with beam		75	Interleaved commissioning & intensity ramp up			Ascension						
Fr											MD 1		$\beta^* = 90$ m run
Sa			300		2556							VdM program	
Su				1200									

First Stable beams (Apr 16), Collisions with 1200 bunches (May 18).

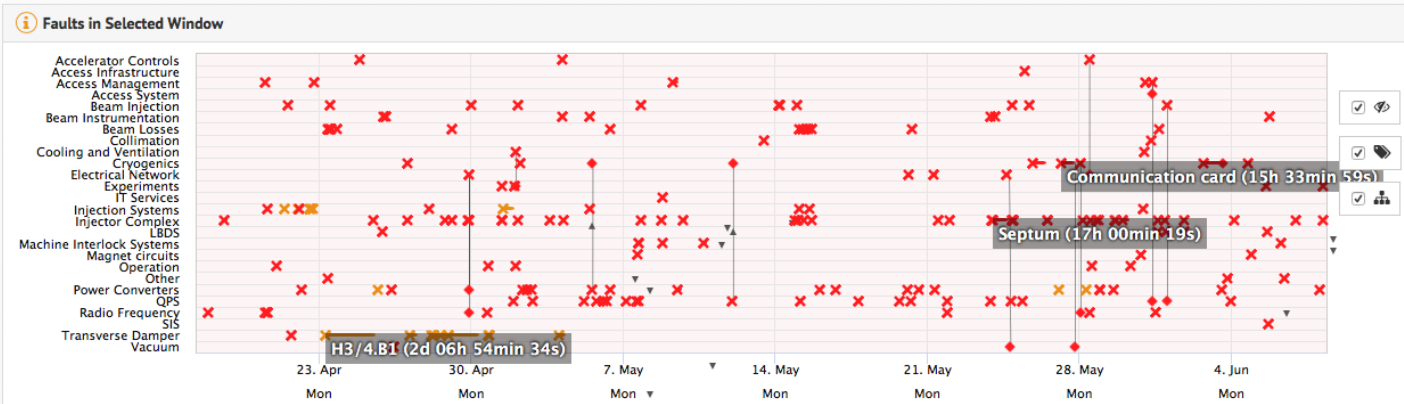
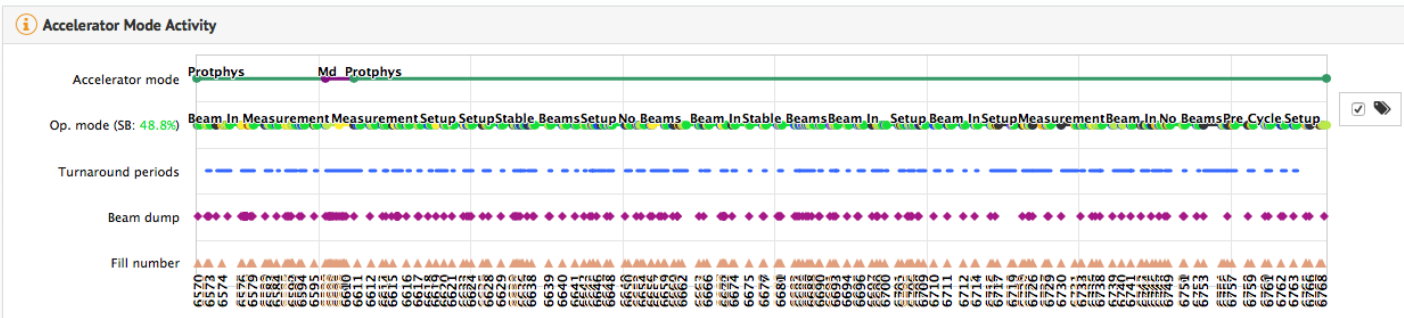
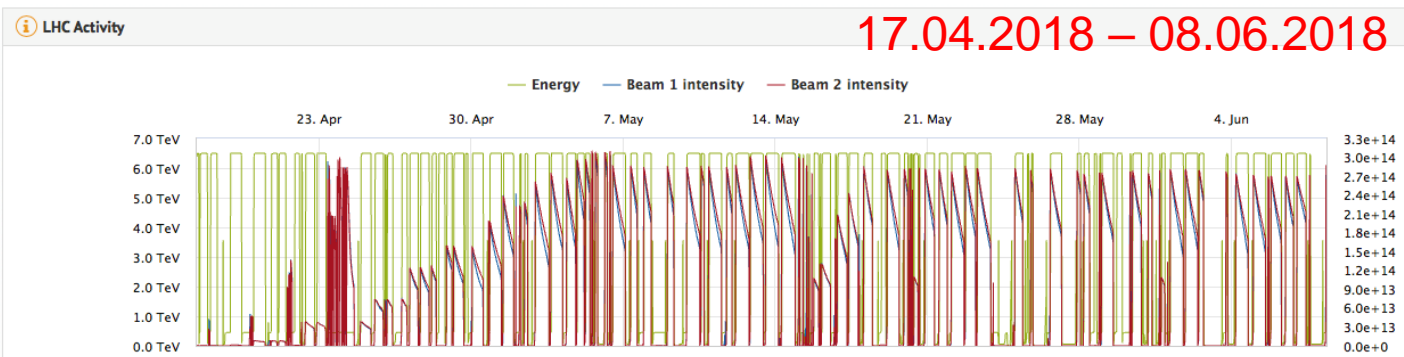
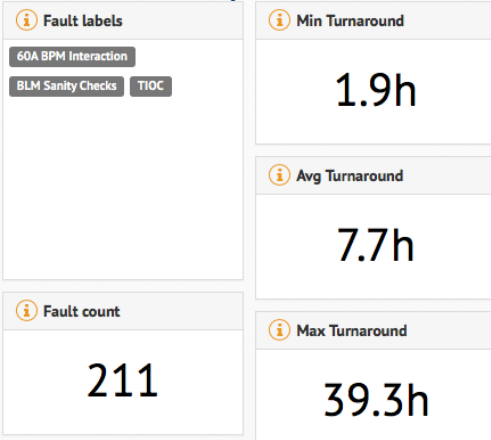
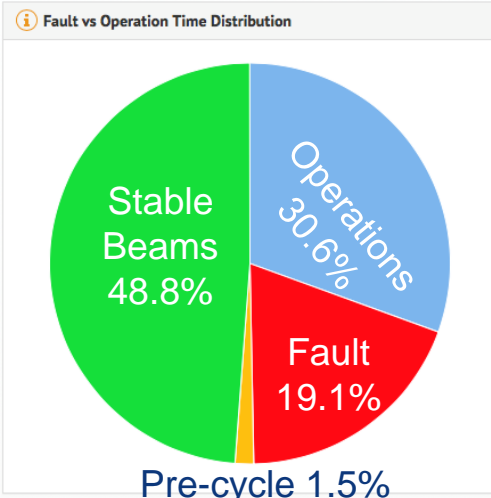
2556 bunches reached after 17 days
In 2017 it took 24 days.

LHC 2018: Smooth & Fast Intensity Ramp-up

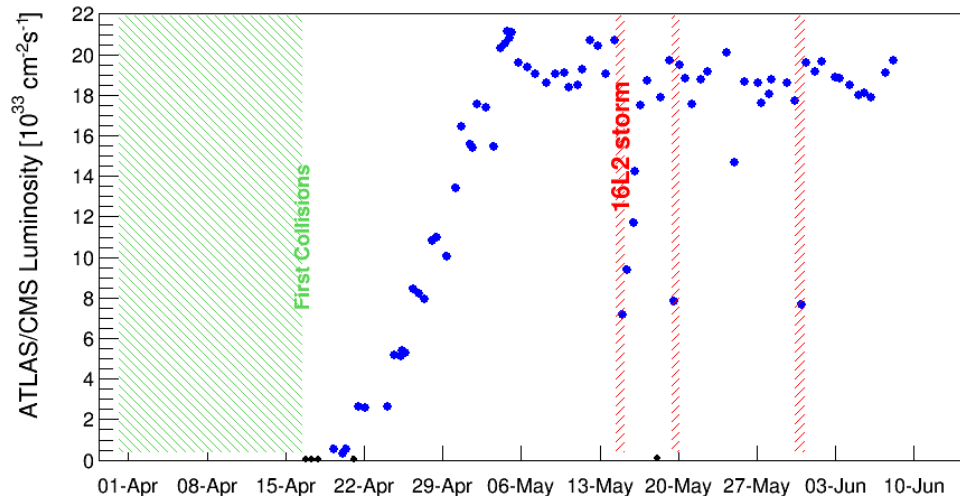
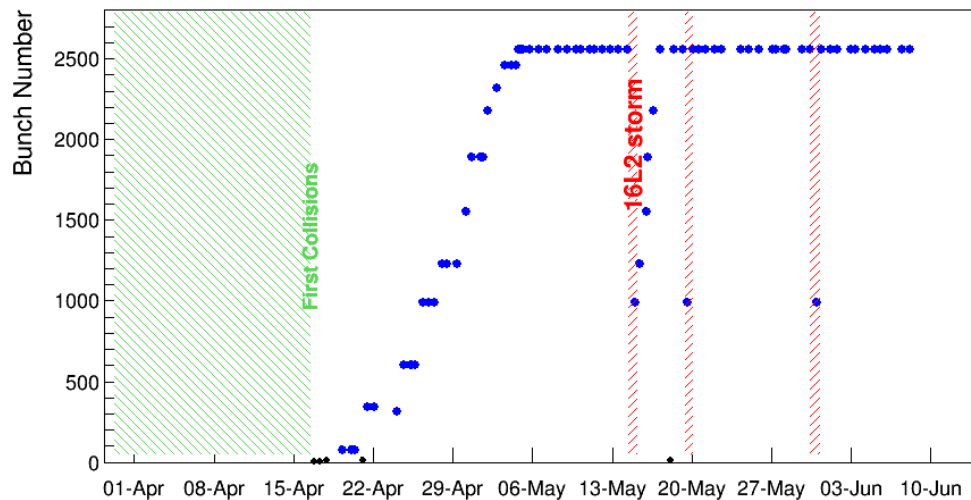


- With interleaved beam commissioning and intensity ramp up **1227 bunches in only 10 days** (excl. scrubbing)
 - In 2017 it took 15 days
- **2556 bunches** reached after **17 days**
 - In 2017 it took 24 days.
- **This is thanks to excellent machine availability and dedicated teams, signing off checklists for every step at any moment**

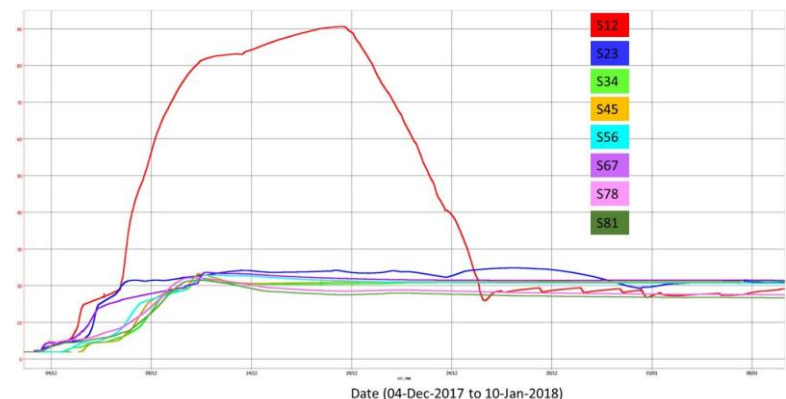
LHC 2018: LHC Statistics Since First Collisions



LHC 2018: Performance up to now



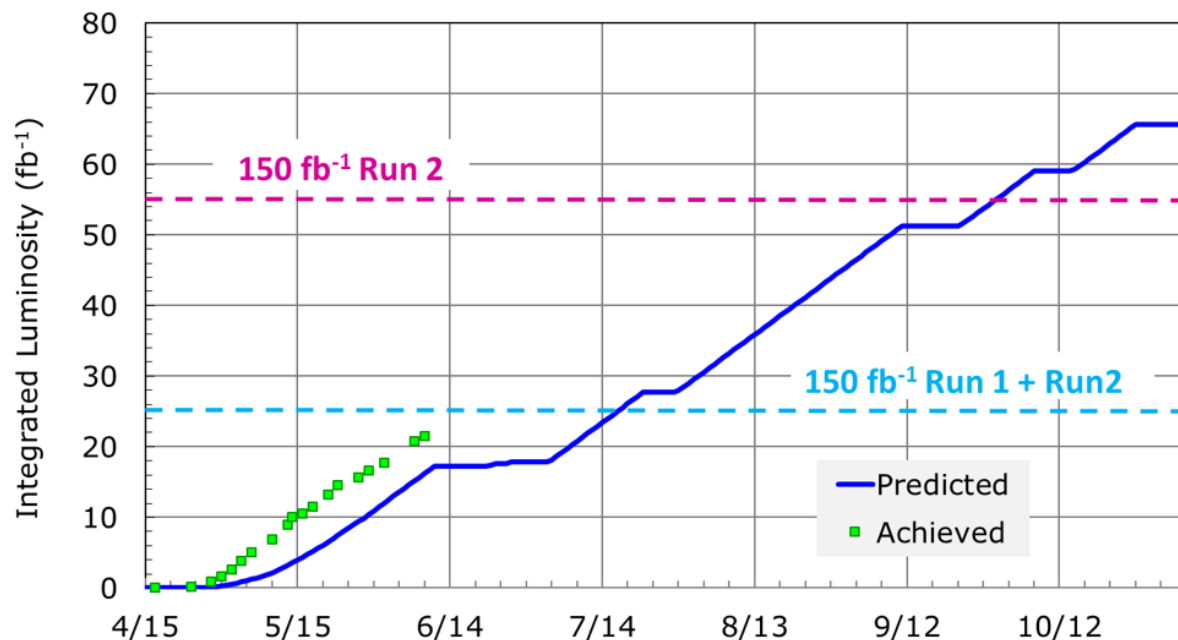
- Full machine (2556 bunches) reached on May 5th
- Peak luminosity in stable beams of $2.1 \times 10^{34} \text{ cm}^{-2}\text{s}^{-1}$ reached during intensity ramp up
- After that small step back in bunch intensity ($\sim 1.9 \times 10^{34} \text{ cm}^{-2}\text{s}^{-1}$)
- **Three “16L2 storms” encountered with successful recovery**



Date (04-Dec-2017 to 10-Jan-2018)



LHC Performance 2018



**2018:
a production
year
to complete
Run 2**

today Run1 + Run2 = 146.5 fb⁻¹

- 2018 also a crucial year to assure efficient re-start and successful post LS2 and LS3 operation (e-cloud and heat-load, LIU beam parameters, instabilities + UFOs, magnet training, ATS optics, crab-cavities @ SPS,...)
- Preparation for LS2 activities in full swing to start in 6 months



HALO at Art Basel

Thanks for your attention