AD machine status

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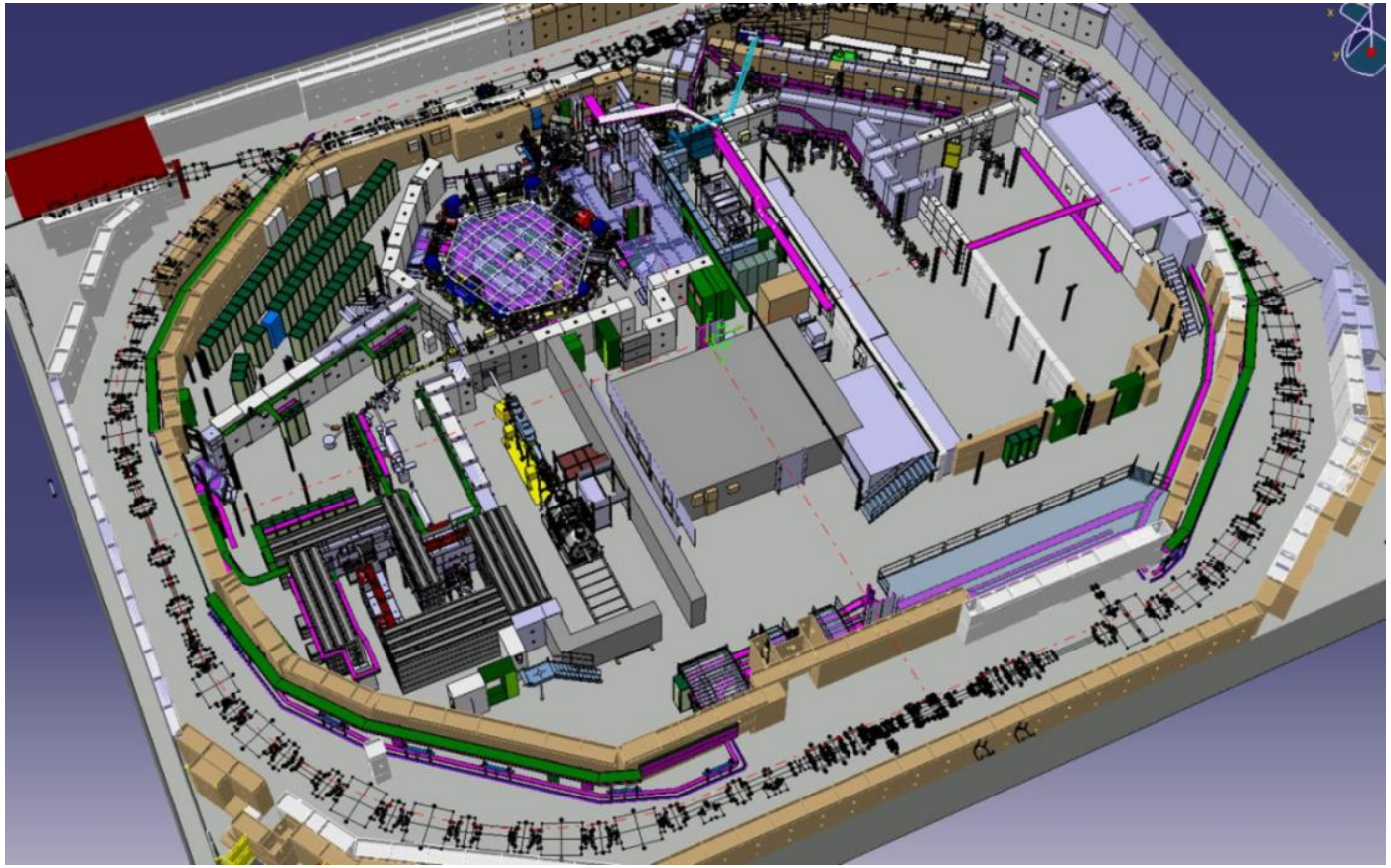
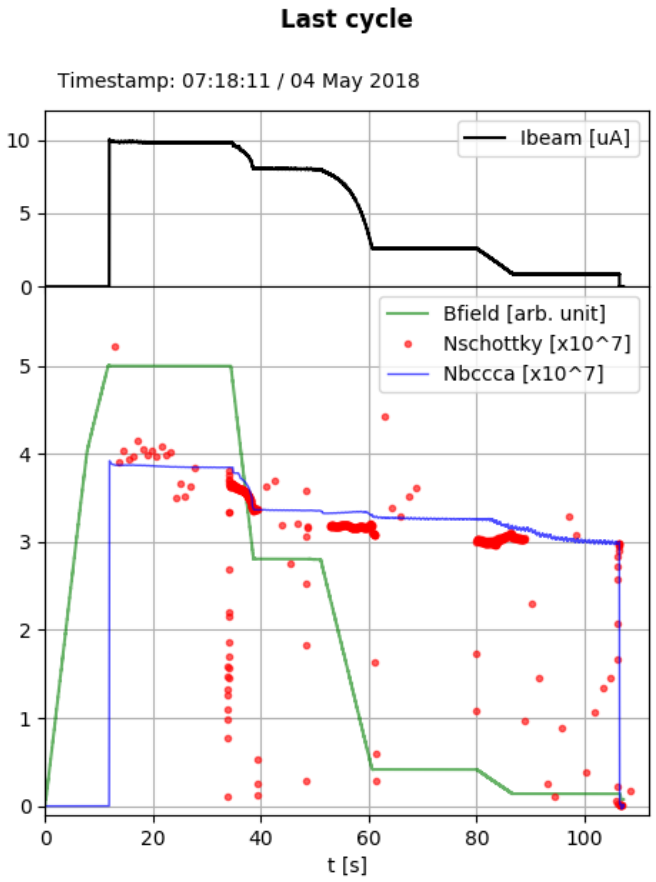
Outline

- 2018 AD start-up and performance
- Machine issues
- Run statistics
- Plans for LS2



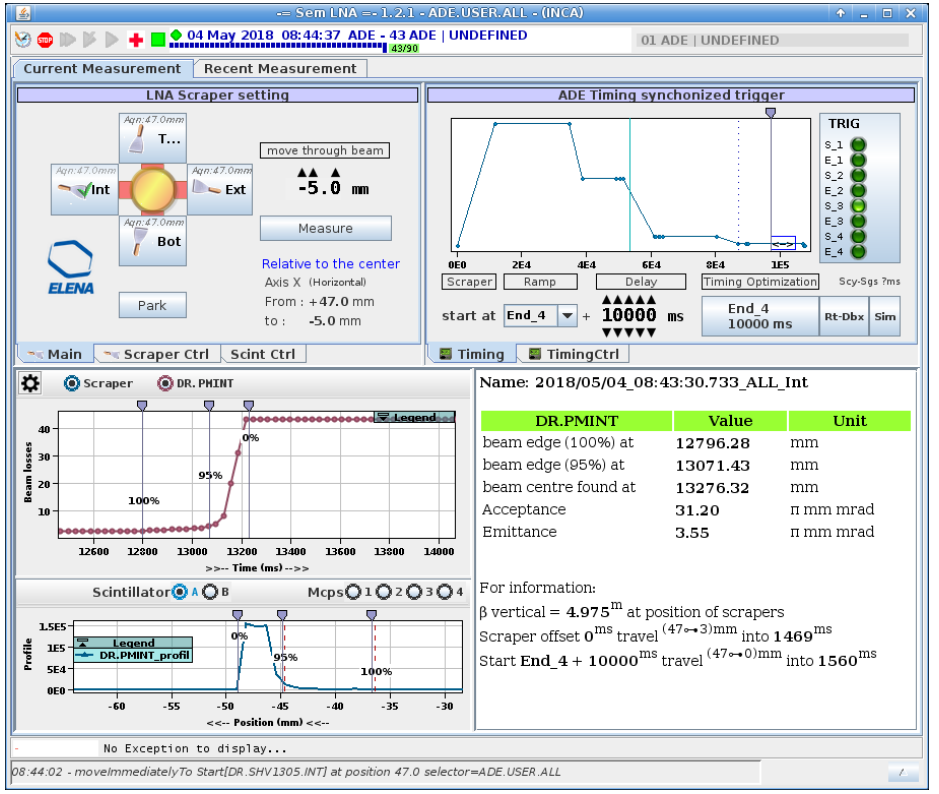
2018 AD start-up

- Physics start delayed from 9/4 to 30/4 due to fire in the Horn power supply…
- Very short AD start-up:
  - **First Pbars produced 19/4**
  - **Issues with Power converter controls upgrade (FGC3) and other minor problems**
  - **First signs of target cooling water leak**



2018 AD start-up

- Good deceleration efficiency and beam quality at 100Mev/c: absence of “halo”, lbunch<200ns
- Physics start on 30/4 as (re-) planned



Major machine issues (physics run)

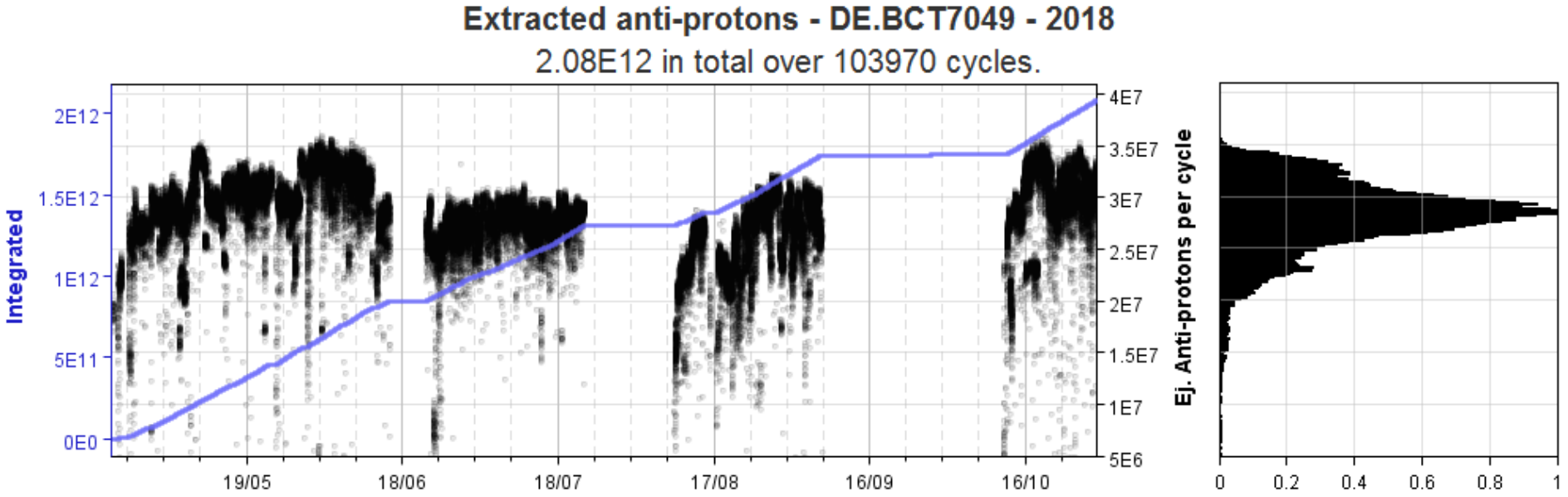
- 15/6 – 22/6: HV flashover in Horn junction box/stripline (in Target Area). Replaced with spare unit.
- 23/7 – 17/8: Electron cooler cooling water leak inside collector vacuum chamber. Replaced with spare collector.
- 6/9 – 12/10: Spare collector also develops (smaller) leak….this time no spare is available:
  - **A: Isolate and vacuum pump leaking circuit. HV tests ok but HV breakdowns when starting electron beam**
  - **B: Repair leak with liquid epoxy. HV tests ok and some cooling observed at 300 MeV/c but vacuum pressure builds up…**
  - **C: Install (recently) repaired original collector. Some HV issues at restart.**
  - **(D: Design and build new collector to fit both existing and future e-cooler)**
- Until 12/10: Target cooling water leak:
  - Varying leak rate at first believed to be linked to proton beam intensity
  - System modified to air-cooled, works well with full beam intensity

AD statistics

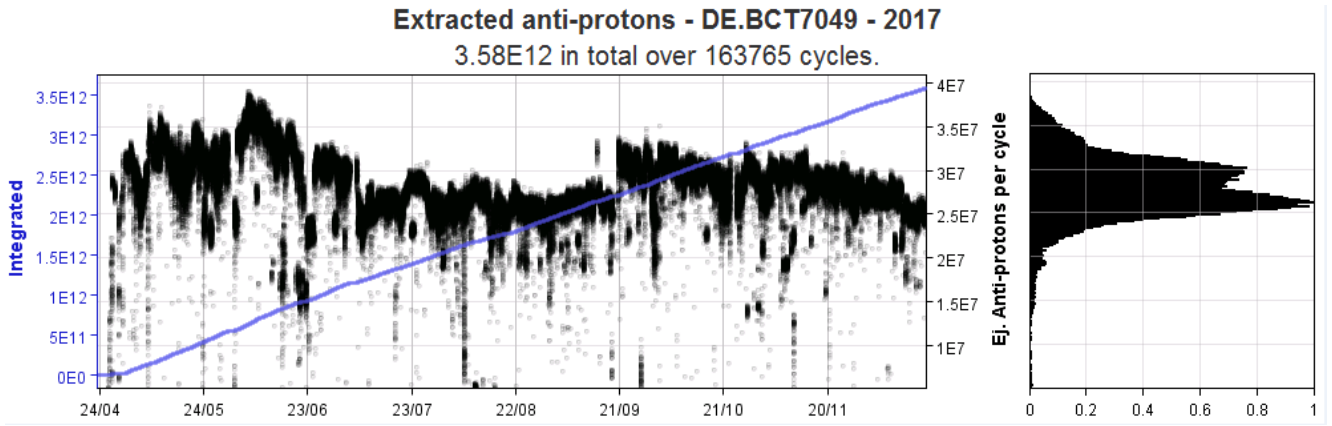
- Running for physics since 2000, > 60000 physics hours realized, (no machine runs in 2005 & 2013):

run time (h)	2000	2001	2002	2003	2004	2006	2007	2008	2009	2010	2011	2012	2014	2015	2016	2017	2018 <30/10
Total	3600	3050	2800	2800	3400	2925	3800	3340	4600	4610	4680	5480	2185	3300	5440	5400	4400
Beam available for physics (%)	86	89	90	90	71	65	76	81	78	87	84	90	85	89	86	95	62
Uptime AD machine (%)					89	74	81	93	92	91	90	95	90	92	93	98	65

Ejected beam intensity 2018



For comparison – 2017:



Fault statistics

Availability

62.1%

Blocking Faults

136

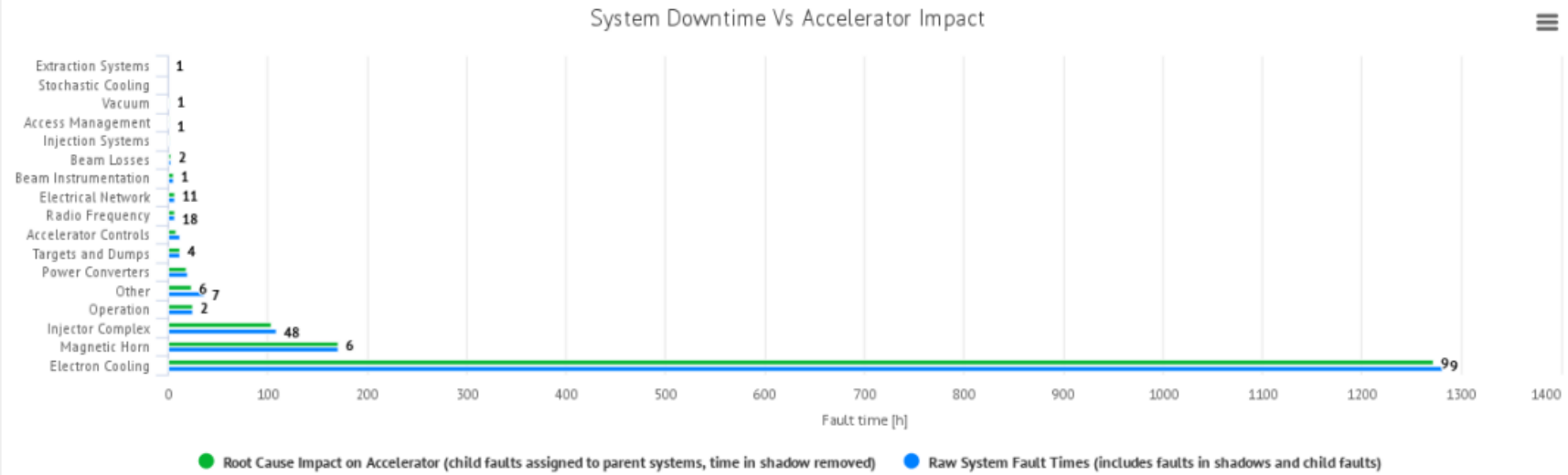
Total Faults

137

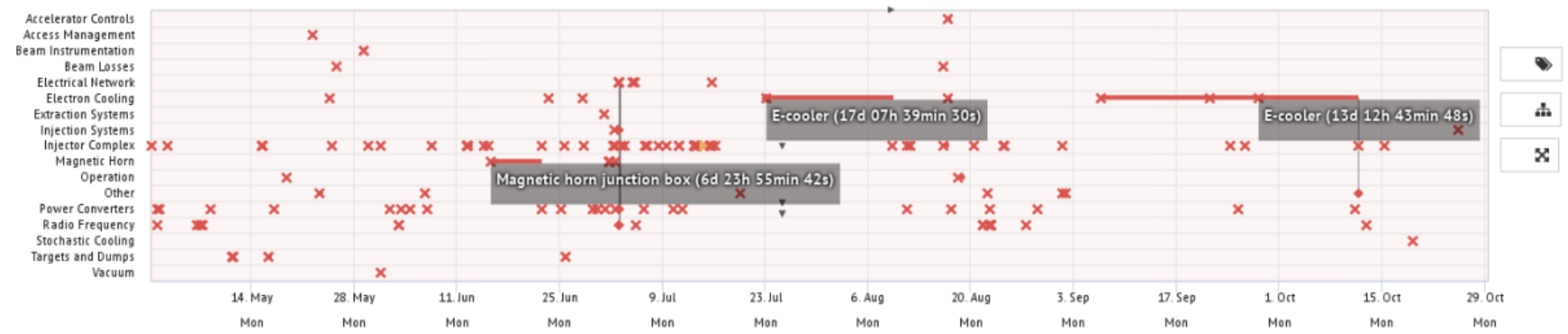
Fault Duration (overlap excluded)

1660.3h

Blocking Faults by Root Cause



Faults Timeline



Outlook for LS2

- LS2 - heavy activities in AD machine & target area:
  - Major Target Area refurbishment after 30 years w/o major interventions: new target design & new horns including new re-designed trolleys, new ventilation building B196, new ventilation/cooling systems, magnet consolidation, infrastructure, decontamination etc.
  - Finalise most of AD machine consolidation:
    - Magnets: 70/50% of Ring Bendings/Quads will be completed in LS2
    - Power converters: Capacitor discharge elements to be gradually renewed
    - RF C10: Fabrication of new final stage triodes, “small” Low-level upgrade
    - RF C02: new cavity (PSB finemet prototype), new Low-level DSP system
    - Stochastic cooling: Transmission lines/amplifiers etc. needs removal and re-installation to access magnets below shirlding
    - Electron cooling: Design/build new collector
    - BI: Consolidation of BCCCA Cryo system
  - And let’s not forget the experimental area...ELENA transfer lines (see F.Butins talk)