

AD machine status

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ADUC



Outline



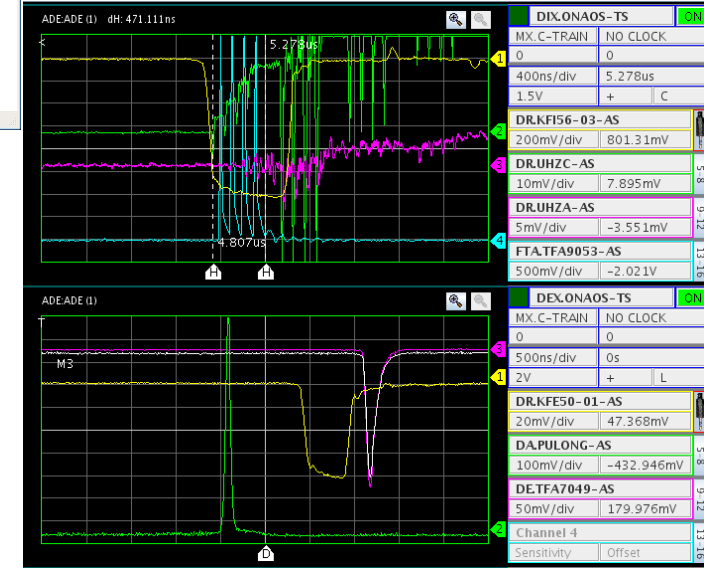
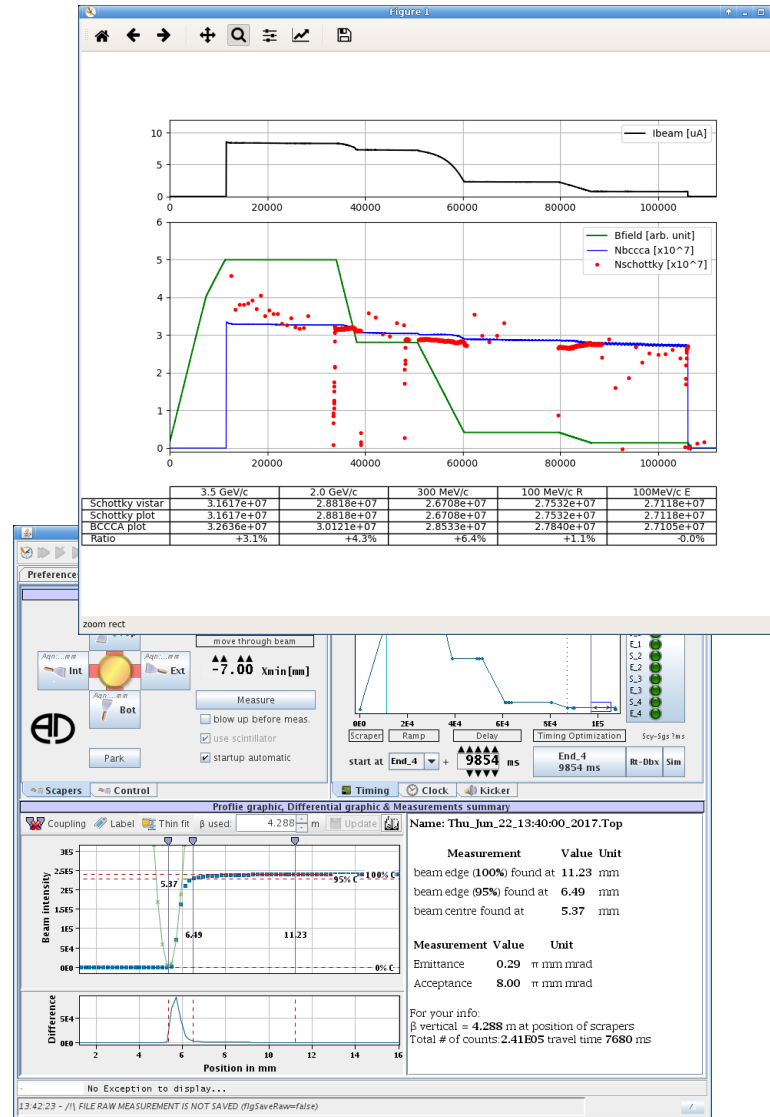
- 2017 AD start-up and performance
- Machine issues
- AD machine developement
- Run statistics
- Outlook for 2018 & LS2



2017 AD performance



- Very short start-up:
 - Setting-up with beam in only 8 days – only minimal optimisation done
 - Issues with kicker controls, synchro/phase PS-AD, RP alarms, destination switching etc. etc.
 - Physics start as planned 1/5
- Good deceleration efficiency and excellent beam quality at 100Mev/c: $E_h/E_v < 0.3 \mu\text{m}$, absence of “halo”, $l_{\text{bunch}}=110\text{ns}$ => stable throughout the year





Machine issues (physics run)



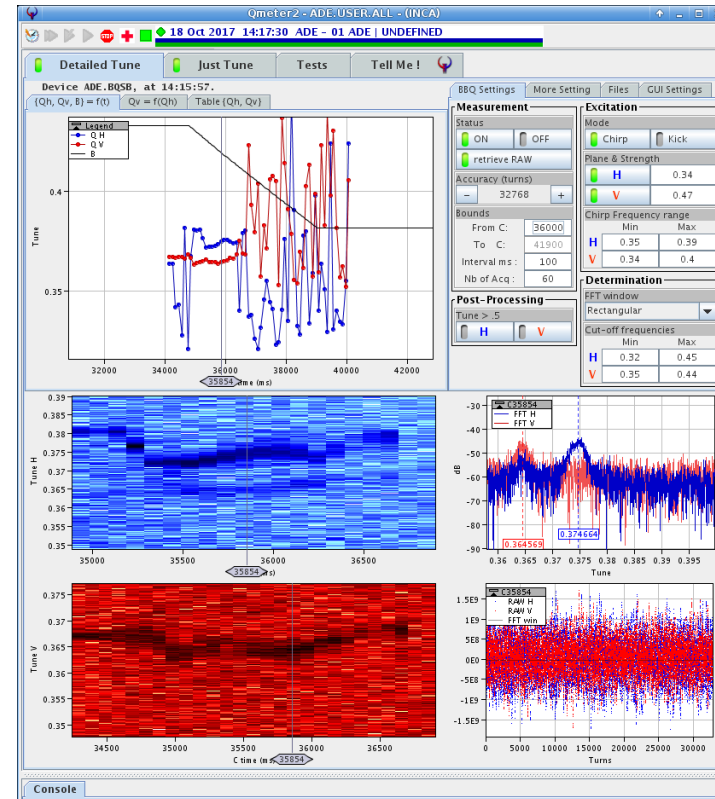
- Periods with Hor. position fluctuations of ejected beam @ ALPHA, ASACUSA, ATRAP:
 - Situation improved towards end of run
 - Intermittent fault found on power converter DE0.DHZ45
 - Ej. kicker timing drift: unstable during periods, problem found
 - Ej. septum pulse shape modified in 2016: additional kick prior to ejection no longer visible
 - To be continued...
- New kicker electronics/controls: still hiccups & teething problems
- RP alarms due to: PS supercycle issues, Inj. kicker malfunctioning, TT2 beam transfer elements etc.
- Re-tuning of injection line before & after target done in Sept. to recover reduced intensity
- Intensity reduced again the last few weeks, no action. To be addressed during 2018 start-up:
 - Capture losses at 3.5 GeV/c due to increased long. emittances ?
 - Acceptances reduced ?
 - Injection line tuning ?



Machine studies



- New Q-meter set-up: tune measurements possible on ramps! =>
- New orbit measurement system: set-up including ramp measurements & correction using YASP => =>
 - => Further optimisation can now be done throughout the cycle to obtain more margins
- Stochastic cooling optical notch filter (successful) tests. Will be tested further in 2018 for stability issues.
- Tests of Pbar yield dependency of field of 2 final focusing Quadrupoles before target in view of LS2 replacement with permanent magnets – to be continued in 2018





AD statistics



- Running for physics since 2000, > 55000 physics hours realized, (no machine runs in 2005 & 2013):

run time (h)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total	3600	3050	2800	2800	3400	0	2925	3800	3340	4600	4610	4680	5480	0	2185	3300	5440	5400
Physics	1550	2250	2100	2300	3090	0	2765	3760	3140	4460	4550	4530	5360	0	2135	3250	5375	5190
ELENA																		174
md	2050	800	700	500	310	0	160	40	200	140	60	150	120	0	50	50	63	32
Beam available for physics (%)	86	89	90	90	71		65	76	81	78	87	84	90		85	89	86	95.4
Uptime AD machine (%)					89		74	81	93	92	91	90	95		90	92	93	97.6

Beam time distribution:

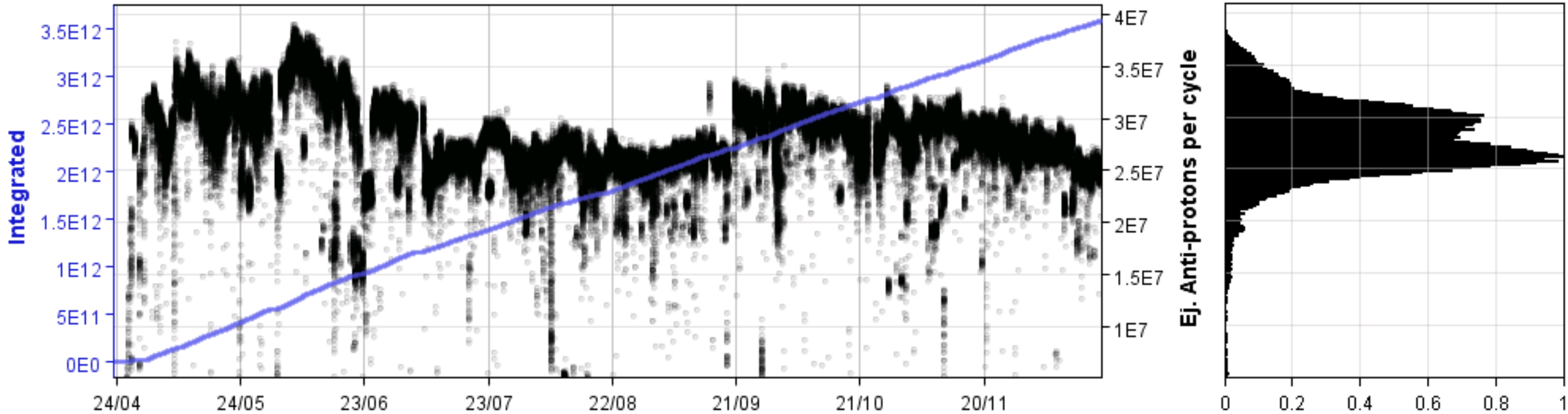
ASACUSA	1232h
ATRAP	914h
ALPHA	1622h
AEGIS	1229h
BASE	194h
ELENA	174h
AD md	32h



Ejected beam intensity 2017



Extracted anti-protons - DE.BCT7049 - 2017
3.58E12 in total over 163765 cycles.





Faults



- ~ 50/50 AD vs. Injector (L2, PSB, PS) faults
- AD downtime spread over the systems, some examples:
 - Power converters; many units in ring & transfer lines
 - Infrastructure (cooling water, el. glitches etc.)
 - C02/C10 RF systems: various faults
 - Target area: water infiltration, interlocks (cooling & chariot positions)
 - Electron cooling
 - Vacuum
 - Injection/ejection kickers



Outlook for 2018 and beyond



- 2017/18 YETS activities (see F.Butin:s talk for planning):
- Ongoing consolidation program:
 - Ring magnets renovation, replace degraded shimming. 1 BH (no.6 of 24), 2 Quads (only a few done so far, 56 in total).
 - Ring corrector dipole power converters renewal
 - Profile measurement system, replace obsolete scrapers/motor drive
 - Ccc (high sensitivity BCT); maintenance, cryostat improvement
 - C10 RF system; tests of refurbished TH116 triodes => determine consolidation needs
- LS2 - heavy activities in ADT & ADR:
 - Major ADT refurbishment after 30 years w/o major interventions: new target design & new horns including trolleys, new ventilation building B196, new ventilation/cooling systems, magnet consolidation, infrastructure, decontamination etc.
 - Finalise most of ADR consolidation: magnets, RF C02 (PSB finemet prototype), RF C10, stochastic cooling upgrade, new electron cooler, power converters,



Key dates 2017



- https://beams.web.cern.ch/sites/beams.web.cern.ch/files/schedules/Injector_Schedule_2018.pdf
- Close AD ring & Target Area 12:th March
- 12 – 25 March: Safety tests, HW tests, cold check-out
- 26 March: PS beam available
- 26 March – 8 April: setting-up with beam
- 9 April: start physics + ELENA pbar commissioning
- Pbar beam for AD physics 9/4 – 12/11 (31 weeks)