

# AD machine status

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ADUC



# Outline



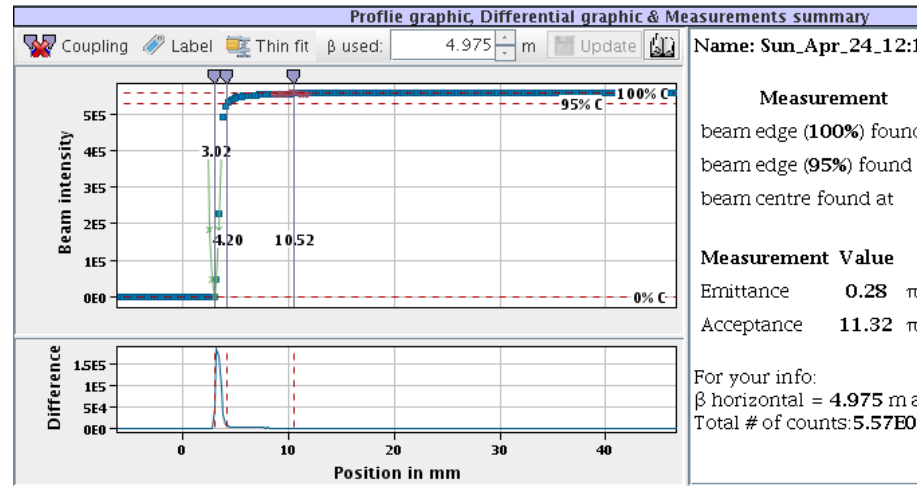
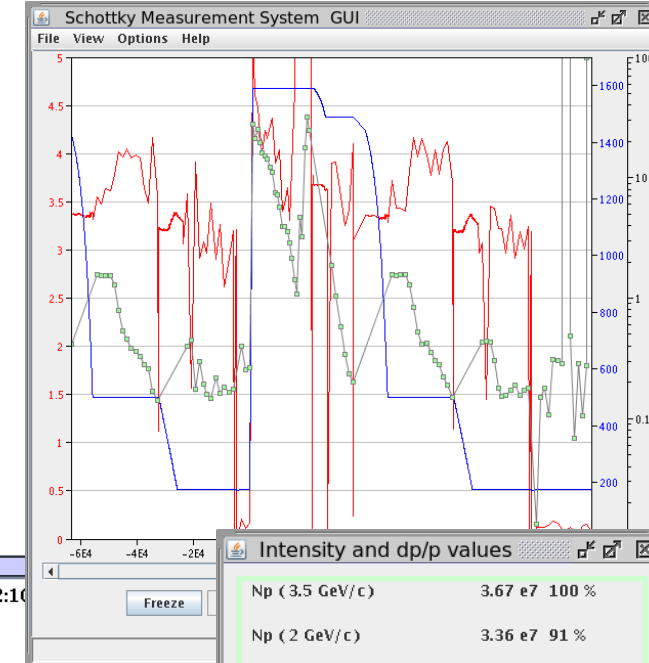
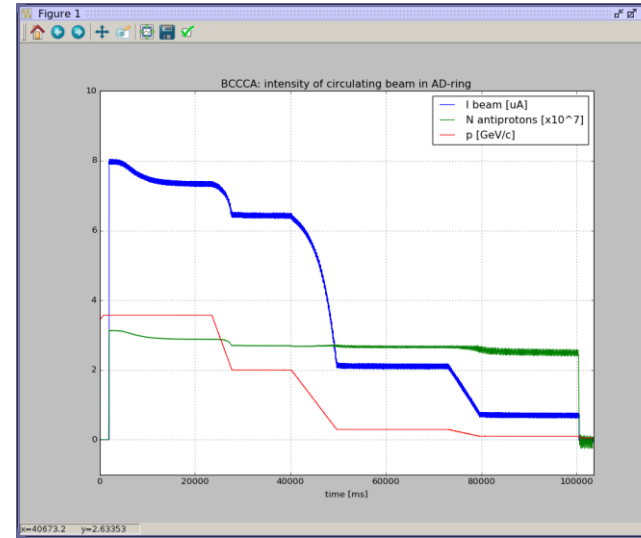
- 2016 AD performance
- Machine issues
- Run statistics
- EYETS activities 2016/17
- Outlook for 2017



# 2016 AD performance



- Very short start-up due to late ring bake-out (BCCC installation):
  - Setting-up with beam in only 11 days
  - Start-up as planned 25/4
- Good deceleration efficiency and excellent beam quality at 100MeV/c:  $E_h/E_v < 0.3 \mu\text{m}$ , absence of “halo”,  $l_{\text{bunch}}=130\text{ns} \Rightarrow$  stable throughout the year
- Complete overlap e-cooling/bunch rotation at ejection, no stability issues
- Some fluctuation of beam intensity over the year (PS beam quality, intensity & trajectory, AD deceleration efficiency)



Name: Sun\_Apr\_24\_12:10

**Measurement**

beam edge (100%) found at 10.52 mm  
 beam edge (95%) found at 4.20 mm  
 beam centre found at 3.02 mm

Measurement	Value	Unit
Emittance	0.28	$\pi$ mm mrad
Acceptance	11.32	$\pi$ mm mrad

For your info:  
 $\beta$  horizontal = 4.975 m at position of scrapers  
 Total # of counts: 5.57E05 travel time 7699 ms

**Intensity and dp/p values**

Np (3.5 GeV/c)	3.67 e7	100 %
Np (2 GeV/c)	3.36 e7	91 %
Np (300 MeV/c)	3.21 e7	87 %
Np (100 MeV/c ramp)	3.34 e7	91 %
Np (100 MeV/c end)	3.21 e7	87 %
DEBCT7049	3.56 e7	97 %
dp/p (3.5 GeV/c)	27.668	24.652
dp/p (2GeV/c)	1.859	0.203
dp/p (300MeV/c)	1.554	0.149
dp/p (100 MeV/c)	0.429	0.306



# Machine issues



- ~ 50/50 downtime AD vs. PS
- Downtime spread over the AD systems, some examples:
  - CO2 RF system: resettable trips, self-recovering trips, controls problems, intermittent longitudinal blow-up
  - Orbit jumps
  - Injection/ejection kickers: trips sometimes needing specialist resets
  - Power converter & controls problems
  - Electron cooler trips needing long re-starts
  - Recovery from power glitches
- RP limits on beam intensity – alarms in hall at some locations. Threshold is very close to nominal ( $\sim 4E7$ ) AD intensity. => Primary beam intensity reduced on some occasions (but less than last year)
- Hor. position fluctuations of ejected beam, suspected to be linked to pulse shape of ejection septum power converter. Varies over time...tentative plan to replace septum next time that vacuum sector is vented.



# AD statistics



- Running for physics since 2000, some 50000 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
<b>Total</b>	3600	3050	2800	2800	3400	0	2925	3800	3340	4600	4610	4680	5480	0	2185	3300	<b>5440</b>
<b>Physics</b>	1550	2250	2100	2300	3090	0	2765	3760	3140	4460	4550	4530	5360	0	2135	3250	<b>5375</b>
<b>md</b>	2050	800	700	500	310	0	160	40	200	140	60	150	120	0	50	50	<b>63</b>
<b>Beam available for physics (%)</b>	86	89	90	90	71		65	76	81	78	87	84	90		85	89	<b>86</b>
<b>Uptime AD machine (%)</b>					89		74	81	93	92	91	90	95		90	92	<b>93</b>

## Beam distribution:

<b>ASACUSA</b>	<b>1530h</b>
<b>ATRAP</b>	<b>908h</b>
<b>ALPHA</b>	<b>1528h</b>
<b>AEGIS</b>	<b>912h</b>
<b>ACE beamline</b>	<b>499h</b>
<b>BASE</b>	<b>0h</b>
<b>AD md</b>	<b>63h</b>

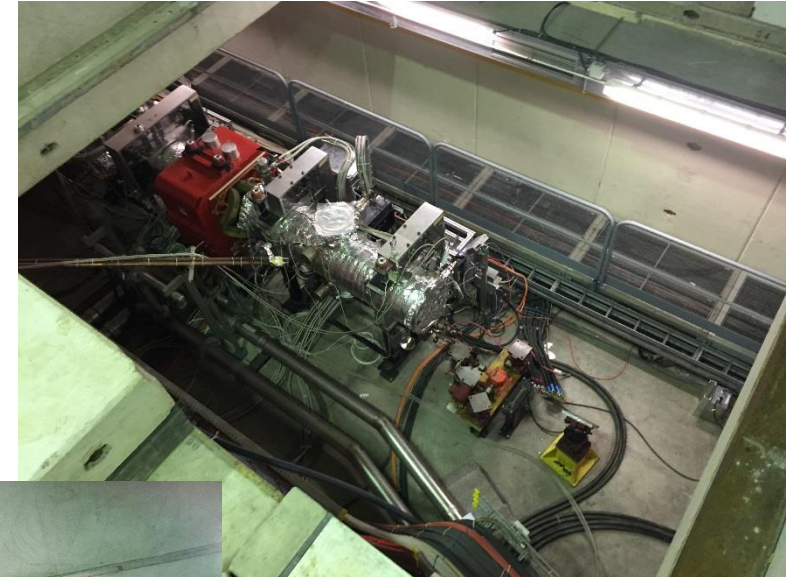




# Major EYETS activities



- Magnet coil shimming:
- Long-term BHN/BHW renovation program, 1-2 per year. No.5 of 24, BHN33 this year
- 57 main quads need attention, especially QN:s
- We profit from BHN33 removal to do also QDN33 this year



**DR.QDS01 repair in-situ**



**DR.BHN33 removed for renovation**

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**DR.QDN33 removed for renovation**

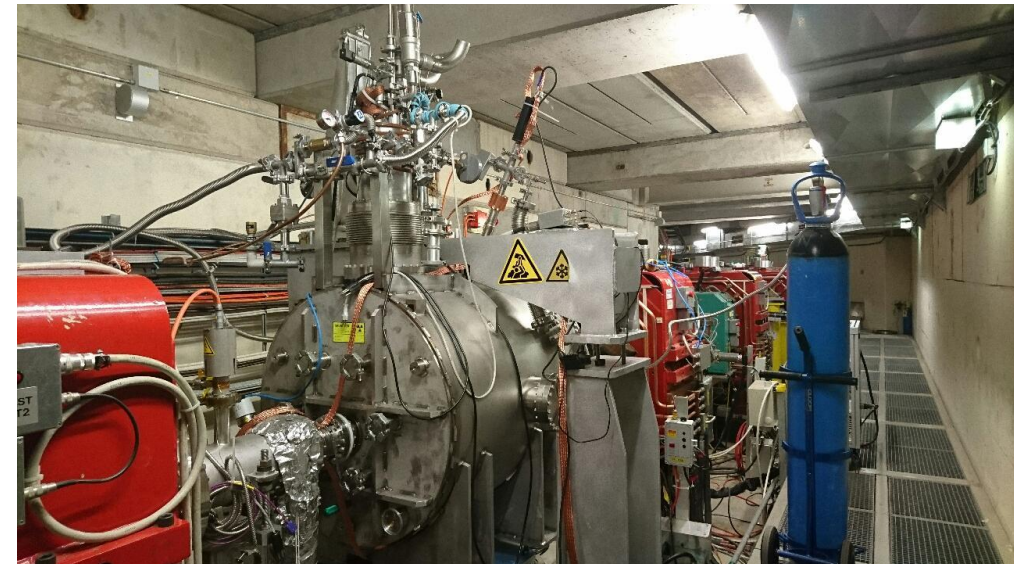


# Major EYETS activities



- C10 RF (new interlock system & racks)
- General survey of all AD ring elements
- 3 vacuum sectors to be opened: 1B(sector valve leak), 2A(leak), 4(BHN33, QDN33)
- Continued consolidation of many systems during and beyond EYETS: Vacuum system, Stochastic cooling system, new electron cooler, Magnets, Power converters, Kickers, Horn pulser, CO2 cavity & low-level, etc.
- Target area consolidation: preparing for major renovation in LS2 including new Targets, Horns, Target/Horn chariots, new ventilation system & building, Horn test bench, magnets, support systems etc.

- BCCCT:
  - modification of vacuum pumping connections & He equipment.
  - Accidental disconnection of He line => purge & recover from air/humidity pollution







And also.....



- Re-vamp the AD control room !







# Key dates 2017



- [https://espace.cern.ch/be-dep/BEDepartmentalDocuments/BE/Injector\\_Schedule\\_2017.pdf](https://espace.cern.ch/be-dep/BEDepartmentalDocuments/BE/Injector_Schedule_2017.pdf)
- Demineralised water system: maintenance 6/2 – 13/2
- He liquefying plant: maintenance period early April
- 3-14 April: HW tests & cold checkout
- >17 April PS beam available
- 1 May: start physics
- Pbar beam for AD physics 1/5 – 18/12 (33 weeks), including ELENA Pbar shifts