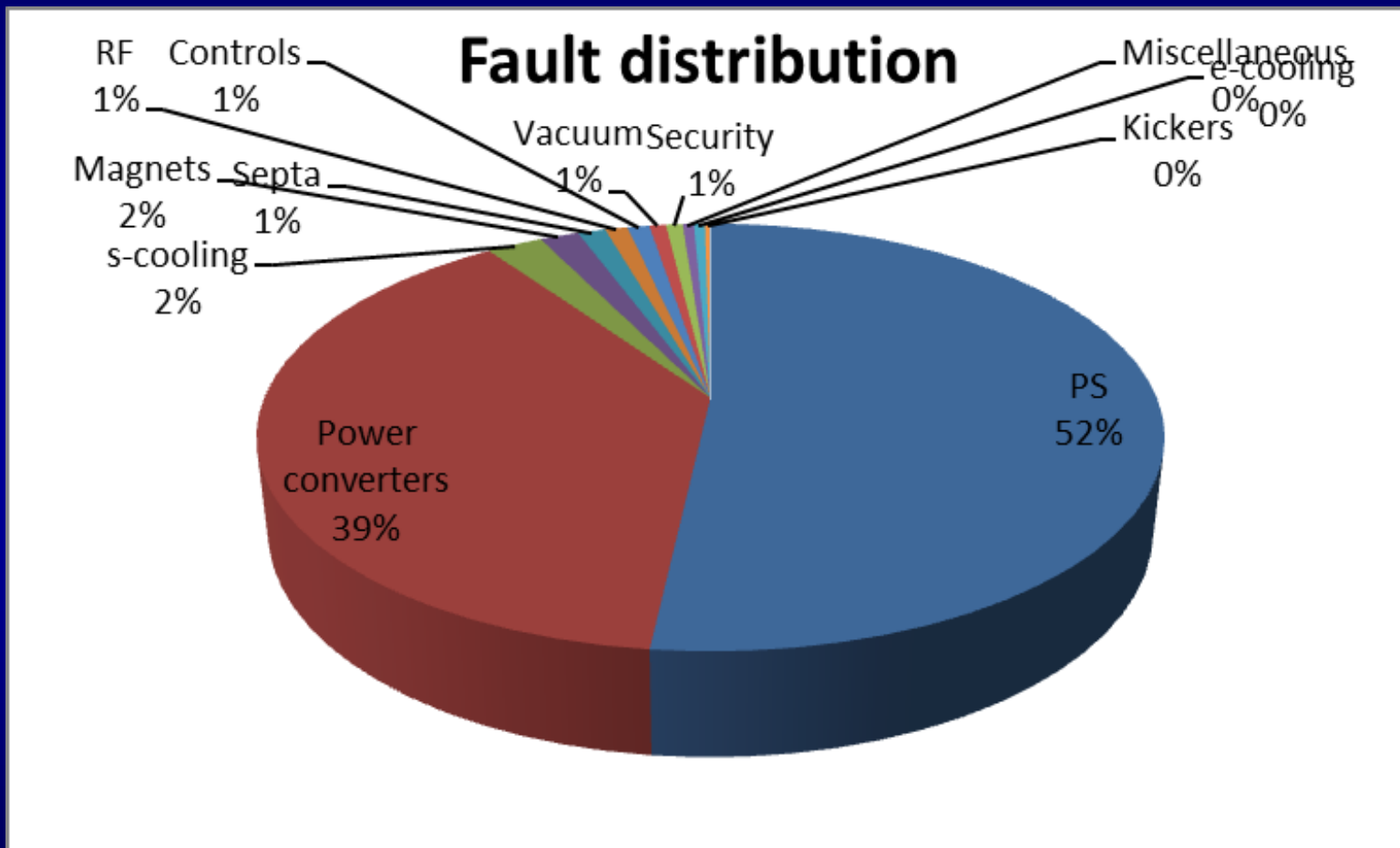




# AD status in 2012, foreseen consolidations at AD



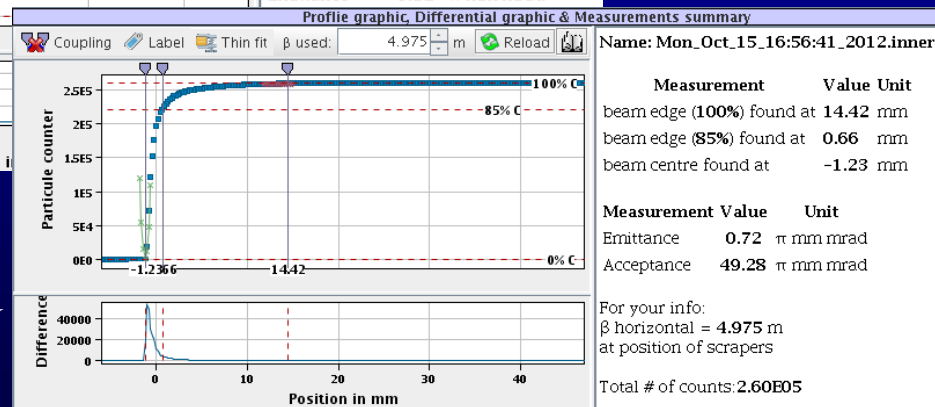
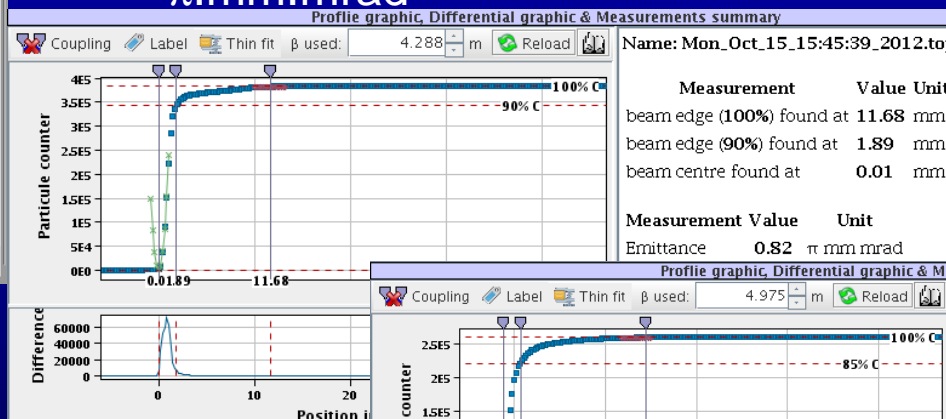
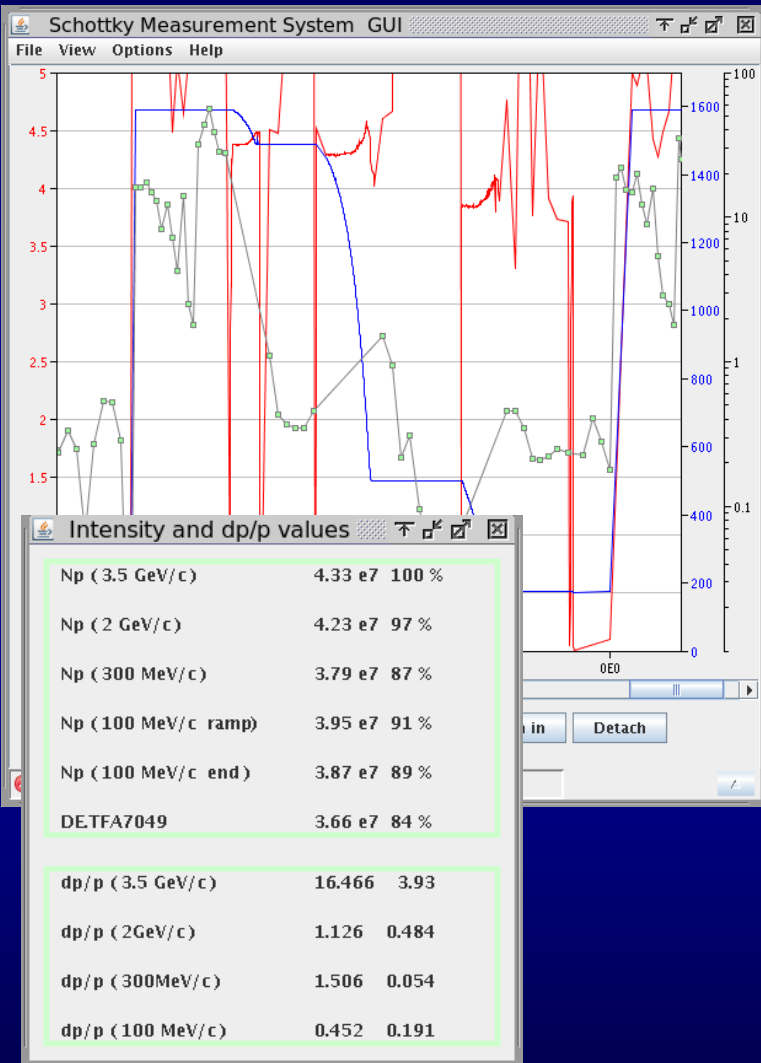
# First the good news....





# AD cycle/performance

- Good deceleration efficiency has been maintained during the run (~ 90%)
- Less tuning needed (no corrections at all at 300MeV/c f. ex.)
- Ejected beam:
  - ~No transverse tails H/V
  - Bunch length = 100 – 170 ns
  - H/V emittances: 85/90 % of beam within  $1 \pi$ .mm.mrad



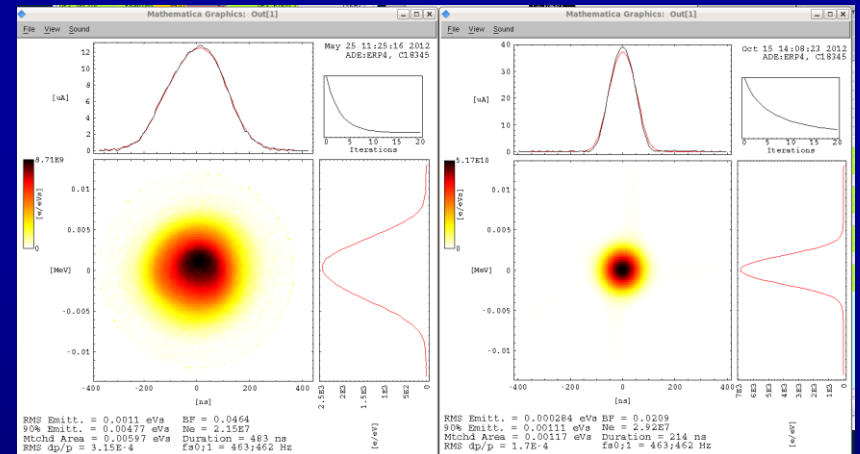


# md

- At startup: careful setup of trajectories through e-cooler. Use of Schottky diagnostics for scans instead of scrapers => contributes to better stability over the year(?)
- Losses 2 => 0.3 GeV/c: some gain by optimising tunes before/during /after ramp. Remaining losses due to large transverse emittances, more pronounced at higher intensities. Reduced by increasing cooling duration at 2 GeV/c.
- Pickup/orbit system (in view of ELENA design): reproducibility starts to degrade at  $2 \cdot 10^6$ .
- GEM tests at 500 MeV/c: ok !
- Measurements on ring BPM:s (in view of ELENA design)

# md

- Bunched beam cooling at 100 MeV/c (to further reduce dp/p in view of ELENA transfer line design).
  - Increase duration of bunching process from 0.5 s. => cooling rate faster than dp/p increase.
  - Slow set-up
  - 0.5s :  $dp/p = 4.1 \cdot 10^{-4}$
  - 2.0s :  $dp/p = 2.5 \cdot 10^{-4}$
  - 5.0s :  $dp/p = 1.3 \cdot 10^{-4}$
  - Stability can be an issue
  - Next: check bunch length with bunch rotation





# md

## Studies on ejection line optics mismatch (md):

- Kick response measurements show(ed) incoherencies
- Important for ASACUSA RFQD matching + ELENA transfer line design
- Common part is validated up to DE0.GEM42 after shielding of BHZ8000 and including DE0.BHZ fringe fields in calculations
- Dipole fringe fields included in MAD calculations for all the lines
- ASACUSA: new (promising) optics available; need setting up downstream of RFQD
- ATRAP1: new optics with Bh reduced from 1000 to 200m in use
- ATRAP2: new optics to be validated
- ALPHA: still discrepancies, probably due to solenoid fringe fields. How to include this in MAD?
- AEGIS: in operation



# AD consolidation

- “Old” consolidation program since 2009, mostly completed
- Program is now revised and requests from all groups being collected taking ELENA lifespan into account
- More items might be added.....
- Cost for requested items (2013 – 2019) > ELENA project cost
- Budget request will be made



# Preliminary consolidation items

- Magnets, ring and transfer lines

- Ongoing:

- Ring BHN spare coils: order placed, delivery 2013 (to complete spare parts inventory)
- Orbit correctors 2904/2917: Installation of new magnets in LS1

- ELENA-era consolidation:

- Overhaul of ring main bending and quad magnets: removal/disassembly of one bending unit for assessment during LS1 => re-shimming?, build complete spare unit?
- 7020/7030 quads: new magnets, installation in LS1
- ++

- Power converters

- Ongoing:

- DR.Q-TRIM2,4 and 5 upgrade in LS1
- Main B/Q + BTI247 magnetic component spares: delivery in 2012

- ELENA-era consolidation:

- Study soon to be published by TE/EPC (tech + budget requests)
- Planned for 2014 - 2017





- **Beam cooling, stochastic**

- Ongoing:

- Electronics for system parameter control: replacement of obsolete equipment/controls interface with PLC-based system. Ready for use in 2014
- u-wave amplifier power supplies: replace existing large units with 48 individual supplies + renewed PLC-based controls. Installation in LS1. N.B. support will change from TE/EPC to BE/RF
- Pickup/kicker movement: Update of obsolete system with modern digital servo motor controller. To be done during LS1

- ELENA-era consolidation:

- Renewal of u-wave amplifiers: needs evaluation, cost ~ 2 MCHF
- p/u & kicker vacuum tanks: returned from GSI in 2012 => To be used as test bench for new p/u & kicker movement system components and spares



- **Beam cooling, electron**

- ELENA-era consolidation:

- Build a completely new modern cooler ~ 2.5 MCHF
- Existing cooler:
  - Is >30 years old
  - We have no spare magnets; very long down time if failure, significant cost for new spares
  - Performance issues (?)
  - e- bpm:s not operational
  - Contains unused equipment
- Planned for 2014 - 2018



- RF

- Ongoing:

- C10: renewal of 1kW drivers. 2 units are delivered to CERN. 1 unit is operational and under evaluation/improvements due to initial problems

- ELENA-era consolidation:

- C02 tuning system and HT-supply renewal: to be started. Equipment needs to be displaced for ELENA – has to be done in LS1
    - C10 final stage tubes: We do not have enough spares to operate the 2 systems. Market survey in progress => might need completely new power system. Cost > 1 MCHF
    - C10 electronics/controls renewal
    - C10 low-level upgrade
    - C10 Beam control: migration to standard DSP-based system.
    - C10 system to be done ~ 2017
    - Schottky analysis (longitudinal): integrate ageing DSP equipment into new LL beam control system



- **Beam transfer**

- ELENA-era consolidation:

- Kicker Vacuum tanks 55/56: Structural improvements (leaks) : LS1
    - Kicker Electronics/controls renewal: included in the ELENA planning since the platform needs to be displaced: 2015/16
    - Septa electronics/controls renewal: 2015
    - Magnetic Horn:
      - HV power supply: LS1
      - Replace Mercury ignitrons with solid state switches: 2014 – 2016
      - New horn test bench (B174 dismantled): 2015 - 2016

- **Instrumentation**

- ELENA-era consolidation:

- Orbit system renewal: LS1
    - IPM system renovation: LS 1
    - BCT (TFA6006 and 5302) renewal, BCT (all) electronics/software update: 2015
    - Scraper spares: 2014 - 2015



- Vacuum

- ELENA-era consolidation:

- Cryopumps (C10 cavities, s-cooling pickup tanks) LS1
    - New bakeout equipment LS1
    - Ion pump feedthrough heaters (corrosion problems) LS1
    - Ion pump replacement 2013 - 2019
    - Gas injection system renovation 2016
    - Injection line equipment renovation 2016
    - Turbo pumps HW + controls LS1 & 2017 - 2018
    - Vacuum controls 2013 - 2016



- Target area

- ELENA-era consolidation:

- Target/Horn control system update LS1
    - Transport system consolidation LS1
    - Remote survey system update LS1
    - GSM network 2014
    - Radioactive air release monitoring (RAMSES) 2015
    - Cooling/ventilation controls update 2015 – 2016
    - Building consolidation (RP contamination risk) 2014 – 2018
    - Reassembly of spare horn/stripline 2017
    - New target&horn chariot system 2017 – 2018
    - Target area cooling system modification 2018 – 2019
    - Spare target redesign/construction 2018 - 2019



- **Infrastructure & other**

- ELENA-era consolidation:

- General safety & exterior (guardrails, crinoline, parking..) 2014
- Building; foundations inspection & consolidation 2015
- Roof consolidation 2020
- Renovation of 2 50t cranes in AD hall 2018
- Cooling & chiller plants 2017 – 2018
- Cryo distribution for experimental areas 2015 – 2016

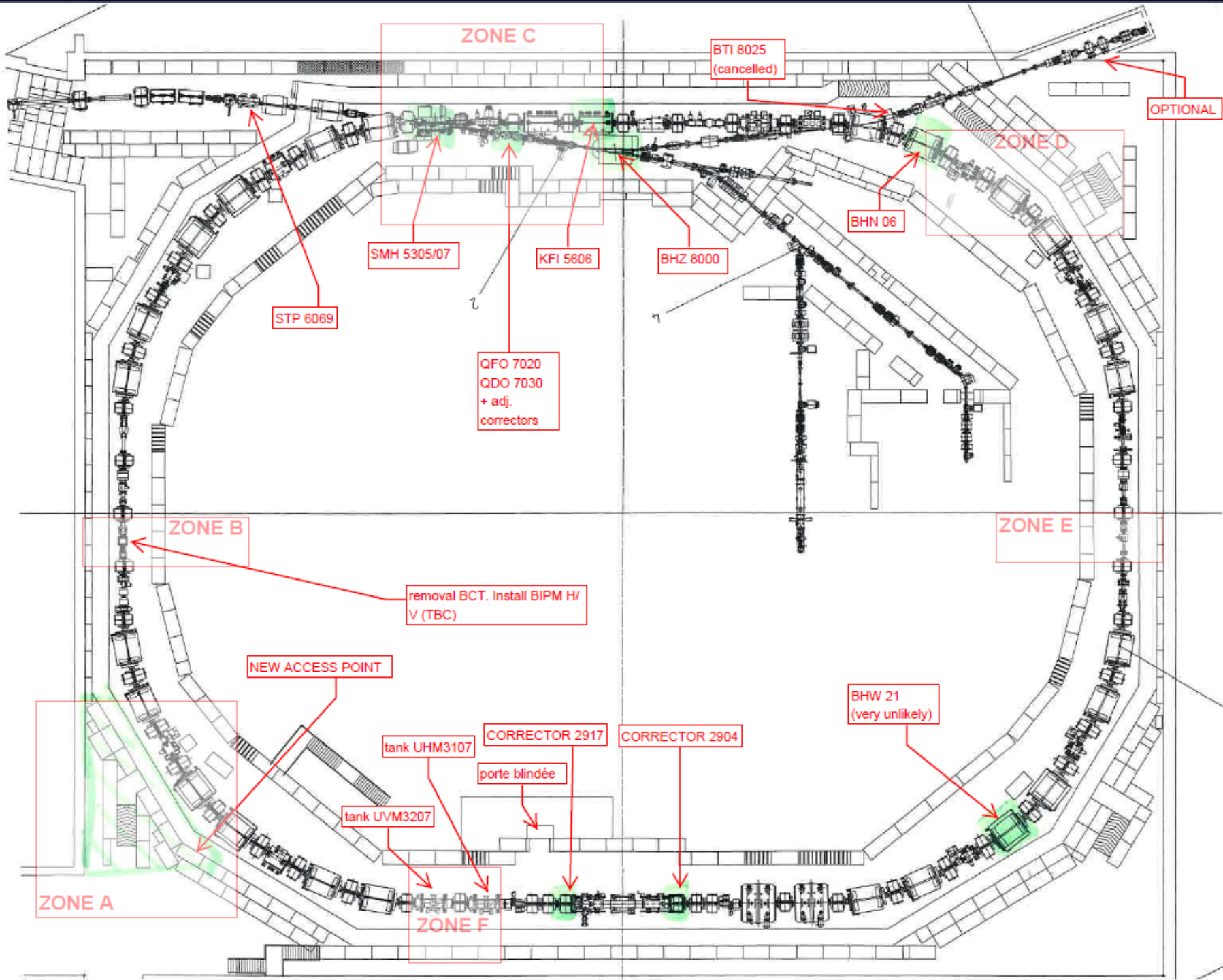


# LS1 and AD

Several interventions in the AD ring (ELENA preparation, maintenance, consolidation):

- DR.BHN06 to be removed for dismantling and inspection = > will give an idea of the condition of the 24 ring dipoles
- Several items in “zone C”:
  - Replace SME5307 with spare (water leak)
  - Replace QFO7020 and QDE7030 (new type) + re-arrange layout of 7000-line
  - Remove KFI 5506/5606 for renovation (vacuum/welds)
  - Remove BHZ8000 (ELENA transfer line space)
- Remove s-cooling pickup tanks 32/33 for Cryo-renovation
- Replace e-cooler correctors 2904/2917 with new type
- New access door(s) MAD/PAD,
- BIPM re-arrangement: both H and V systems to sector 42







# LS1 and AD cont:d

## – Complete controls upgrade:

- Front-end (DSC:s) replacement (ACCOR)
- FESA migration (some GM classes will remain for while)
- mtg/timing: de-couple AD from the PS complex, ELENA timing
- TG8 and GFA replacement
- MIL1553 replacement. New hardware and software (industrial PC).
- InCA will be deployed in AD (required by new central timing).
- DPRAM and MPV908 samplers replaced by new hardware and software (integrated in OASIS).

⇒ Limited access possibilities in certain areas

⇒ “interesting” startup in 2014.....