Mechanical Integration of the Forward and Backward EMC Endcaps

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Perugia SuperB Workshop

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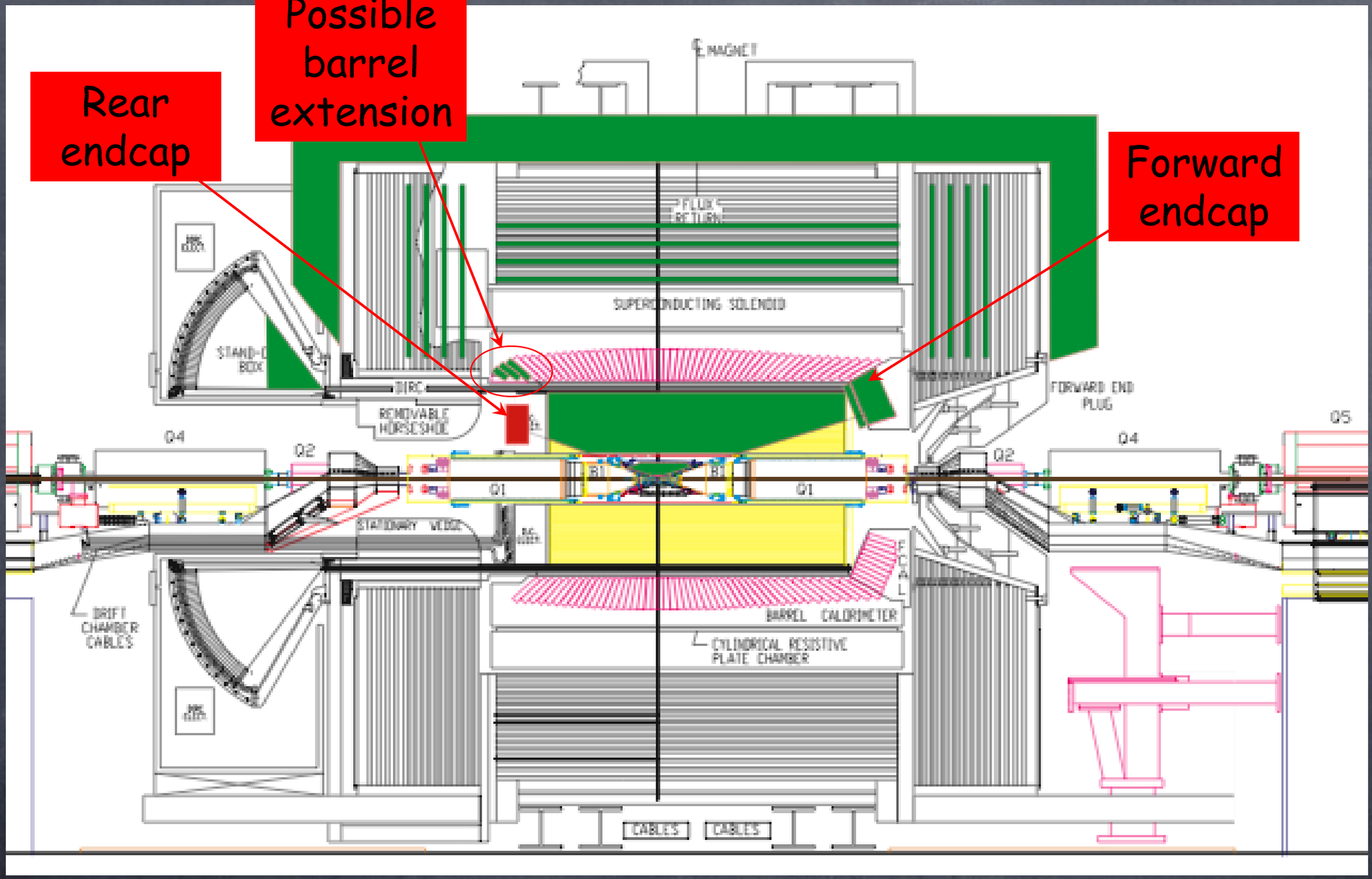

Rear endcap
Possible barrel extension
Forward endcap
MAGNET
FLUX RETURN
SUPERCONDUCTING SOLENOID
DIRC
REMOVABLE HORSESHOE
FORWARD END PLUG
Q4
Q2
Q1
B1
Q5
STATIONARY WEDGE
DRIFT CHAMBER CABLES
BARREL CALORIMETER
CYLINDRICAL RESISTIVE PLATE CHAMBER
CABLES
CABLES

Possible forward endcap configurations

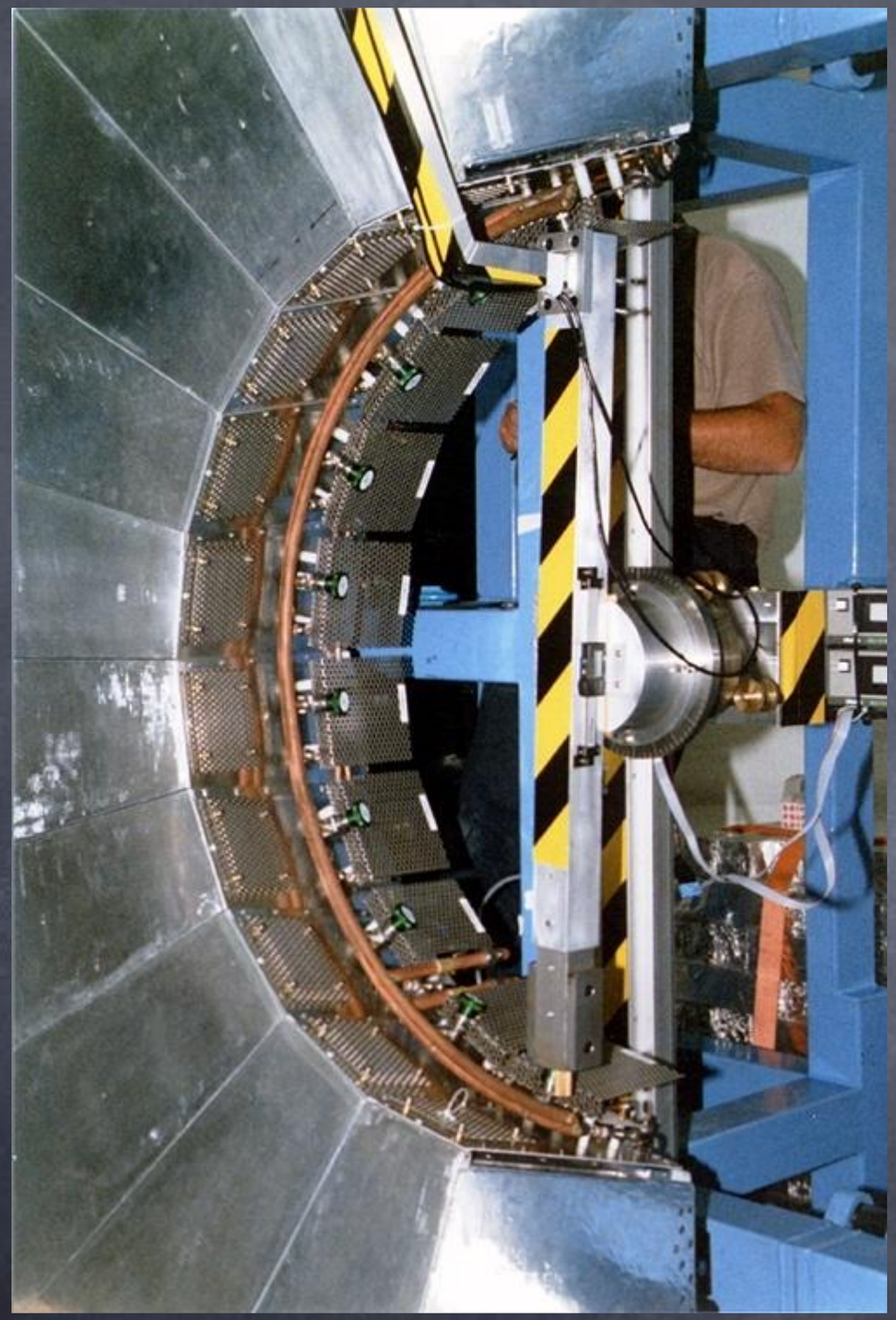
LYSO no PID

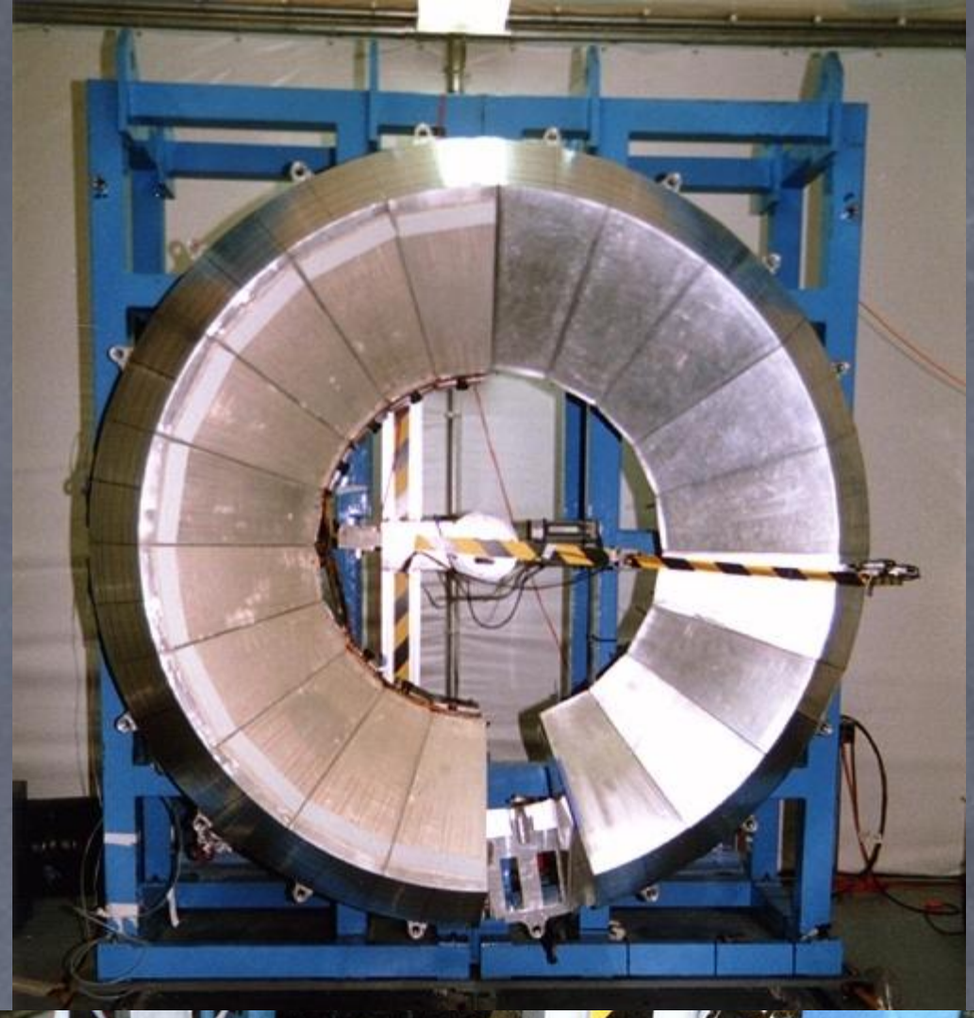
LYSO 10cm PID

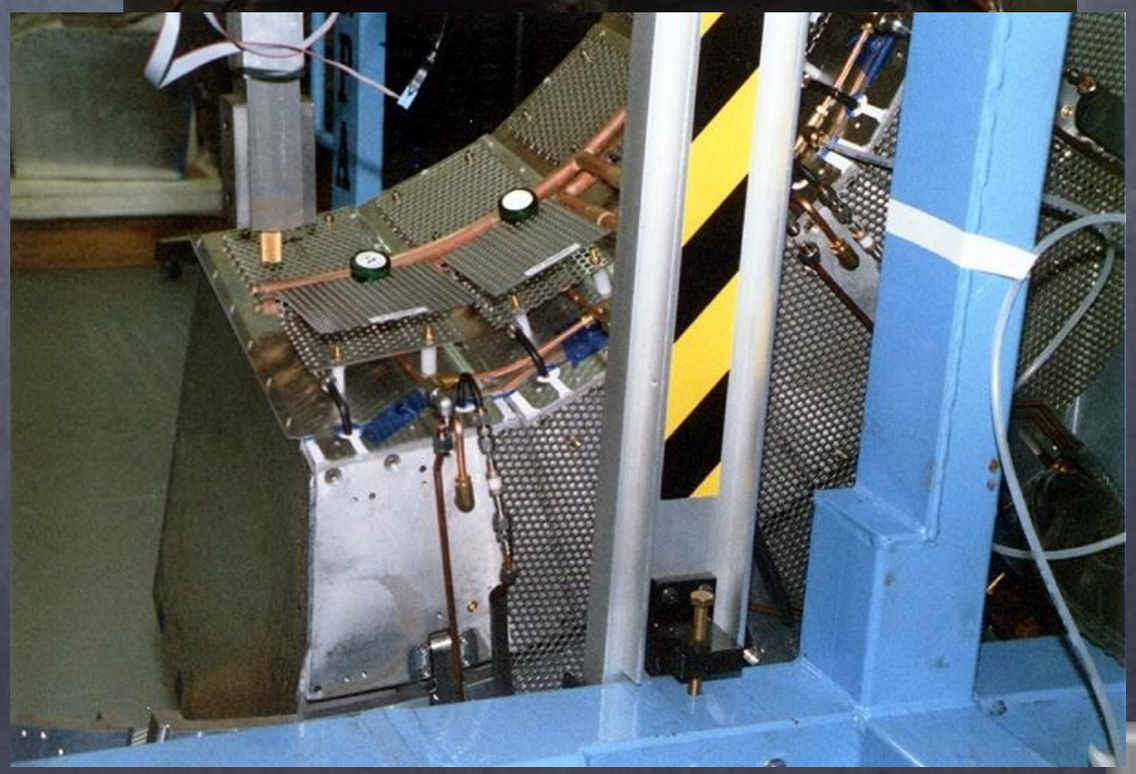
LYSO moved back, 10cm PID

Integration concerns are similar to those in *BABAR*, with some exceptions

The existing endcap



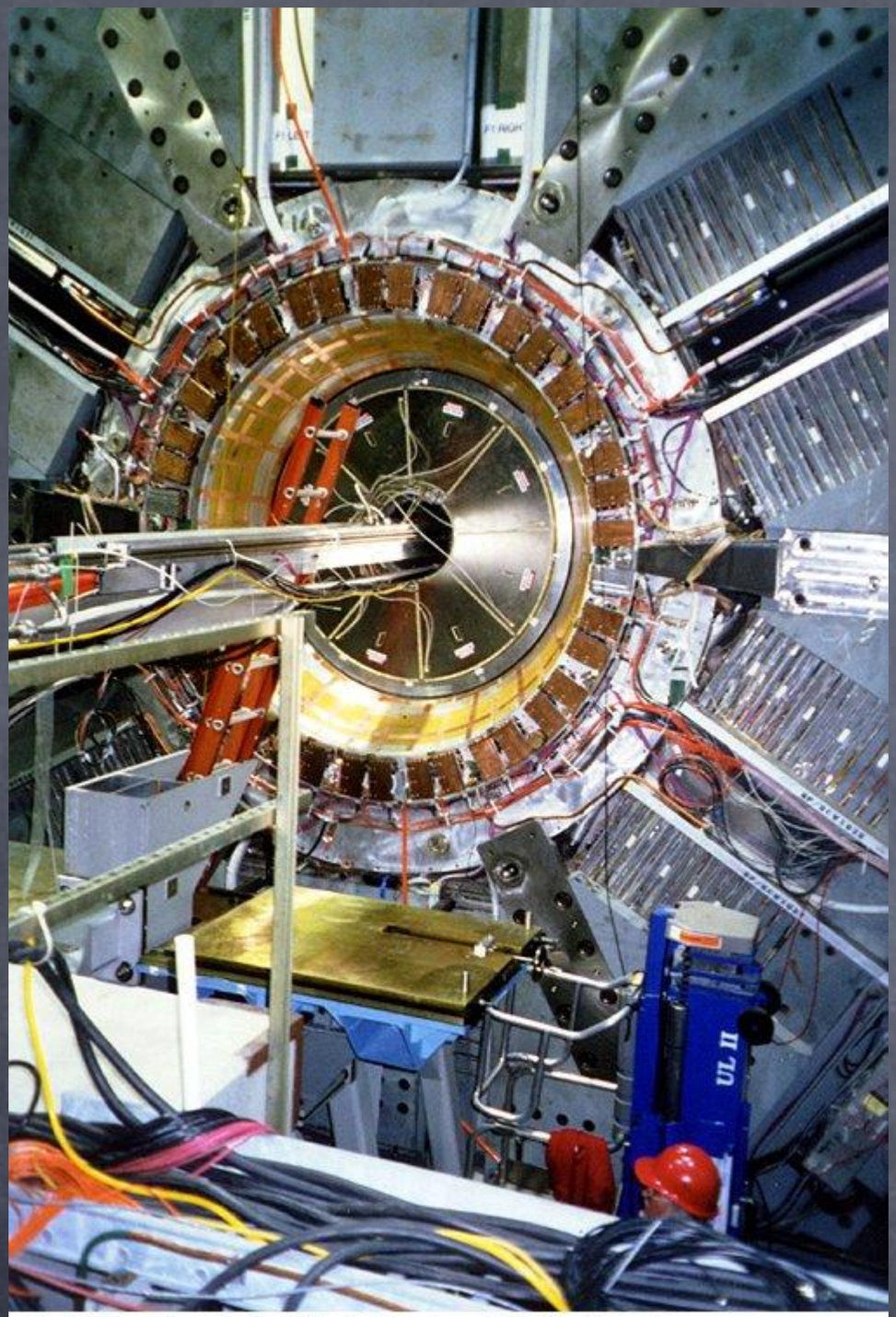




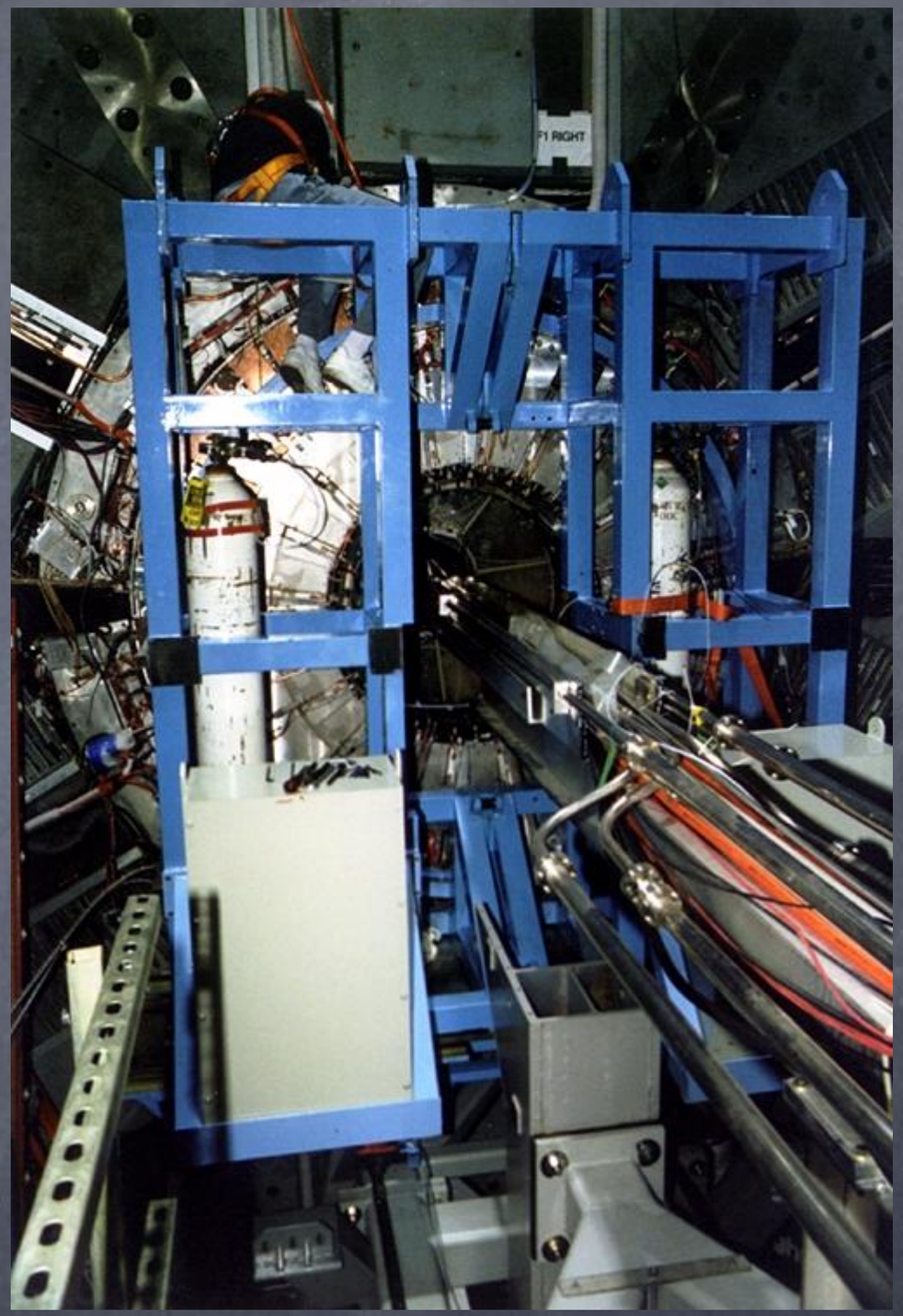
Forward endcap: *BABAR* vs Super*B* Integration similarities and differences

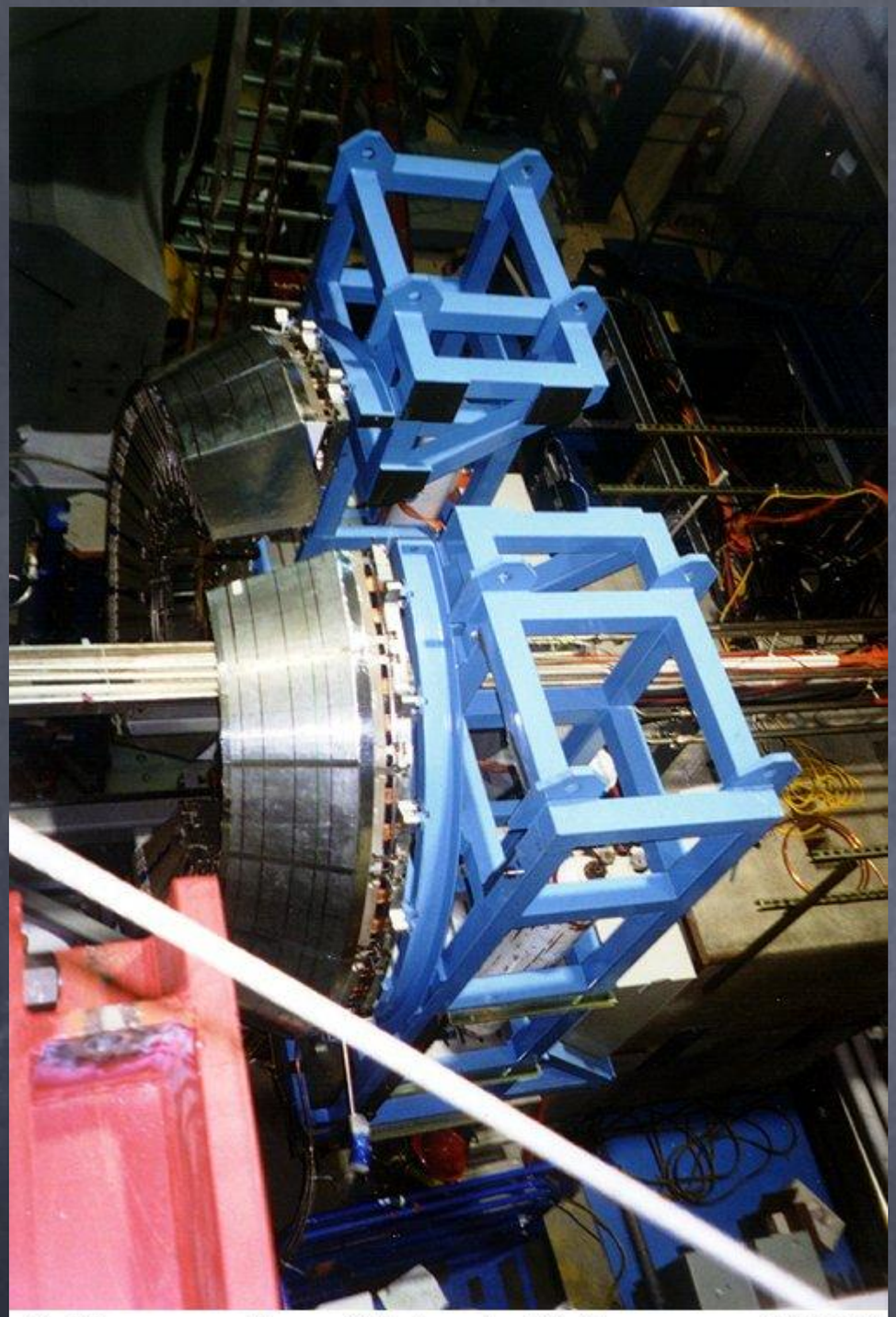
- Similarities
  - Endcap mounts to barrel, not to doors, as in some other detectors
  - Services
    - Signal cables
    - Power cables
    - Calibration
      - Fluorinert calibration piping – integrated into front face of EC
      - Light pulser distribution
    - Temperature monitoring and control
    - Radiation monitoring

- Differences
  - More channels ~4500 crystals (Molière radius)
  - Annular construction instead of two D's
    - Captures beampipe – difference in installation fixture (modification)
    - Must study operational impact – naively appears to be OK
  - Possible presence of forward PID
    - Mount to calorimeter or drift chamber ?
      What is the mass of the actual mounting structure?

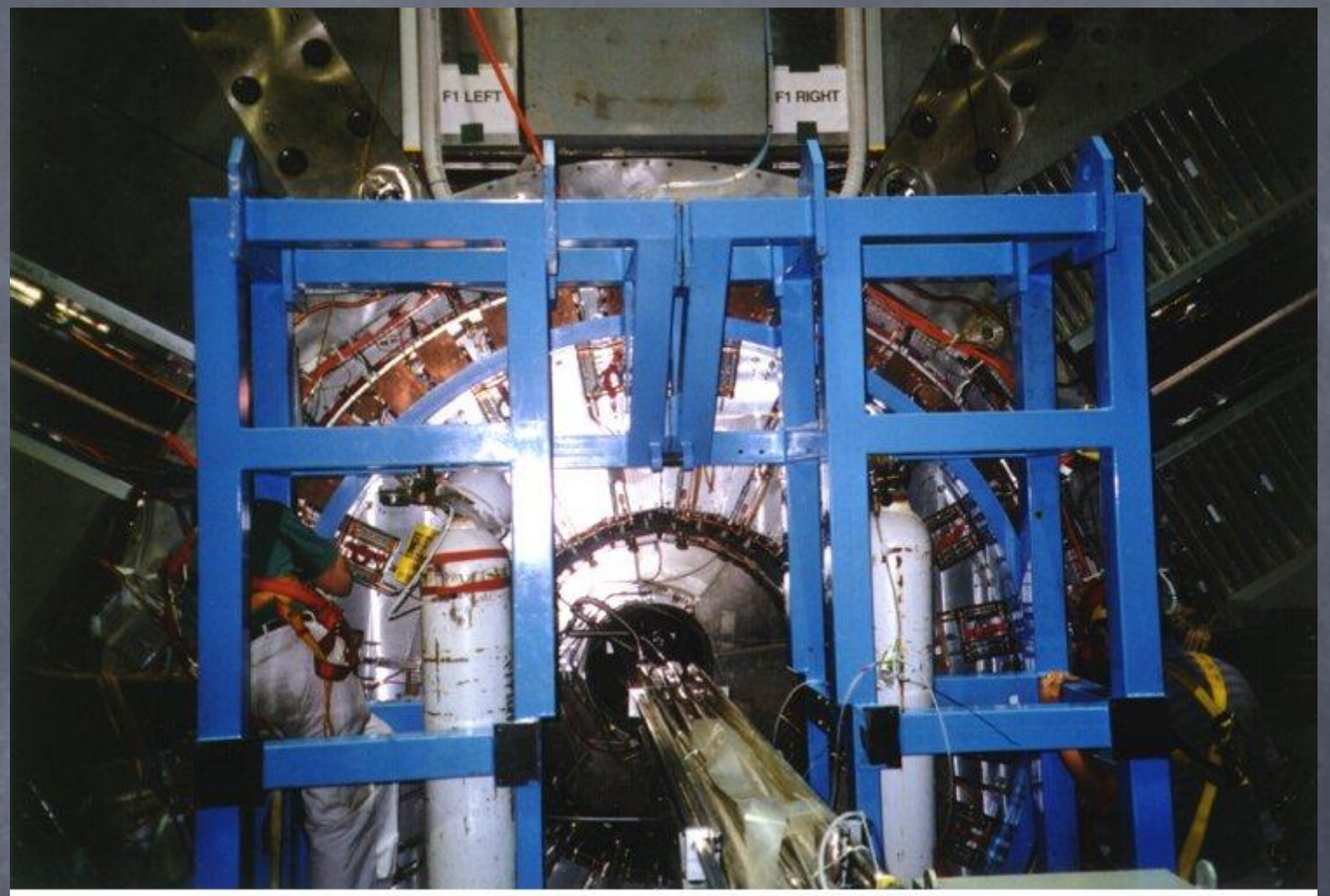


JF_002 Front End Calorimeter + Drift Chamber End Cap Installation Platform 10/22/98

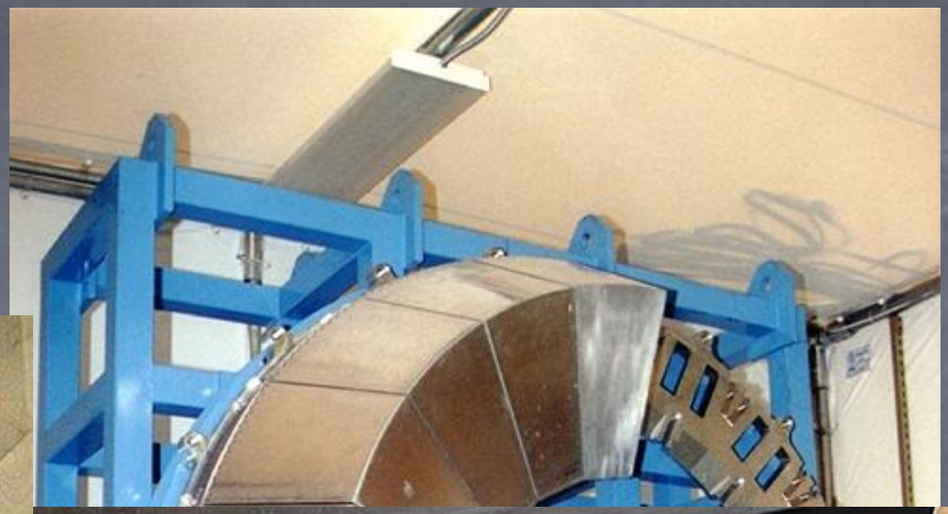


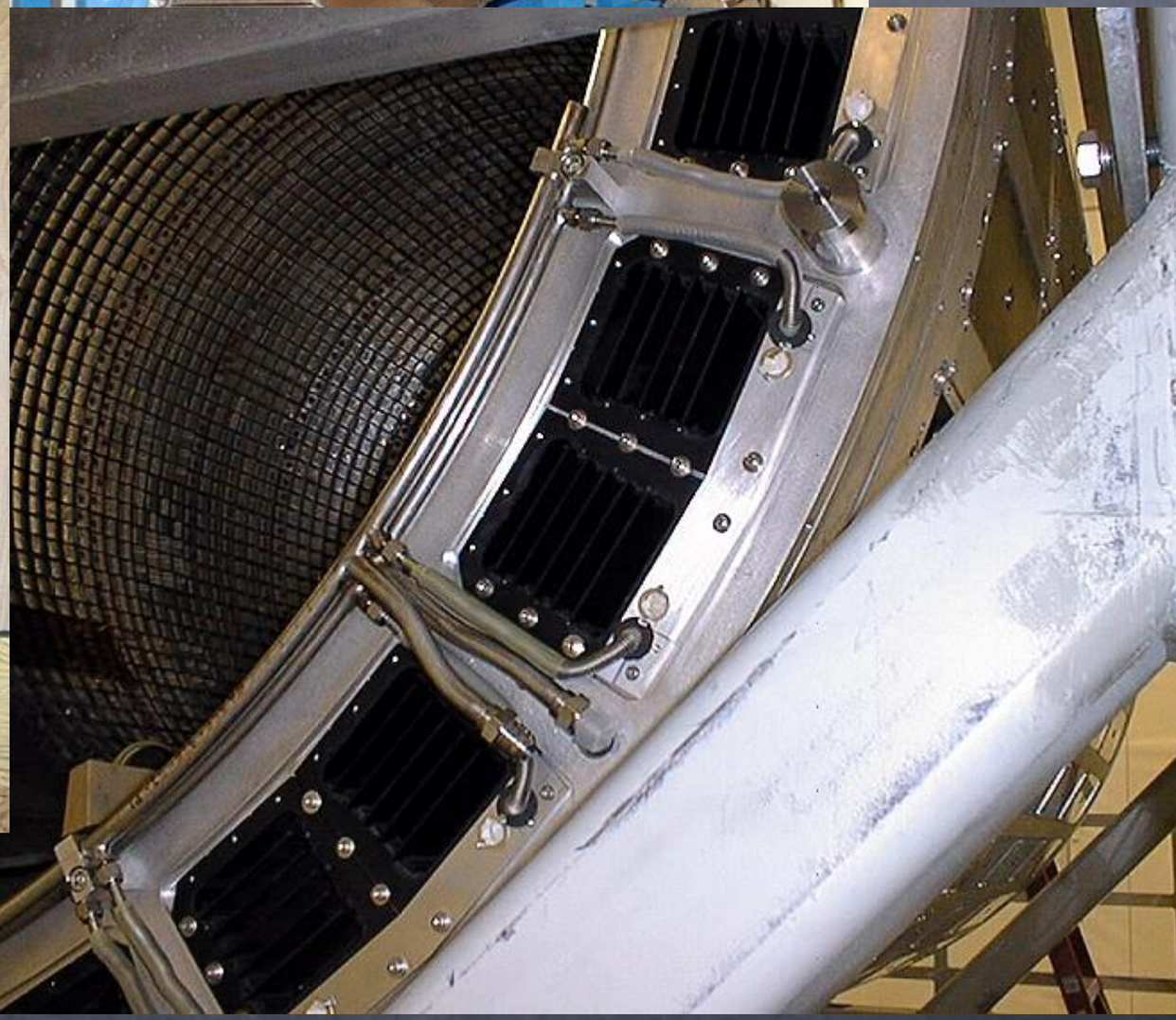


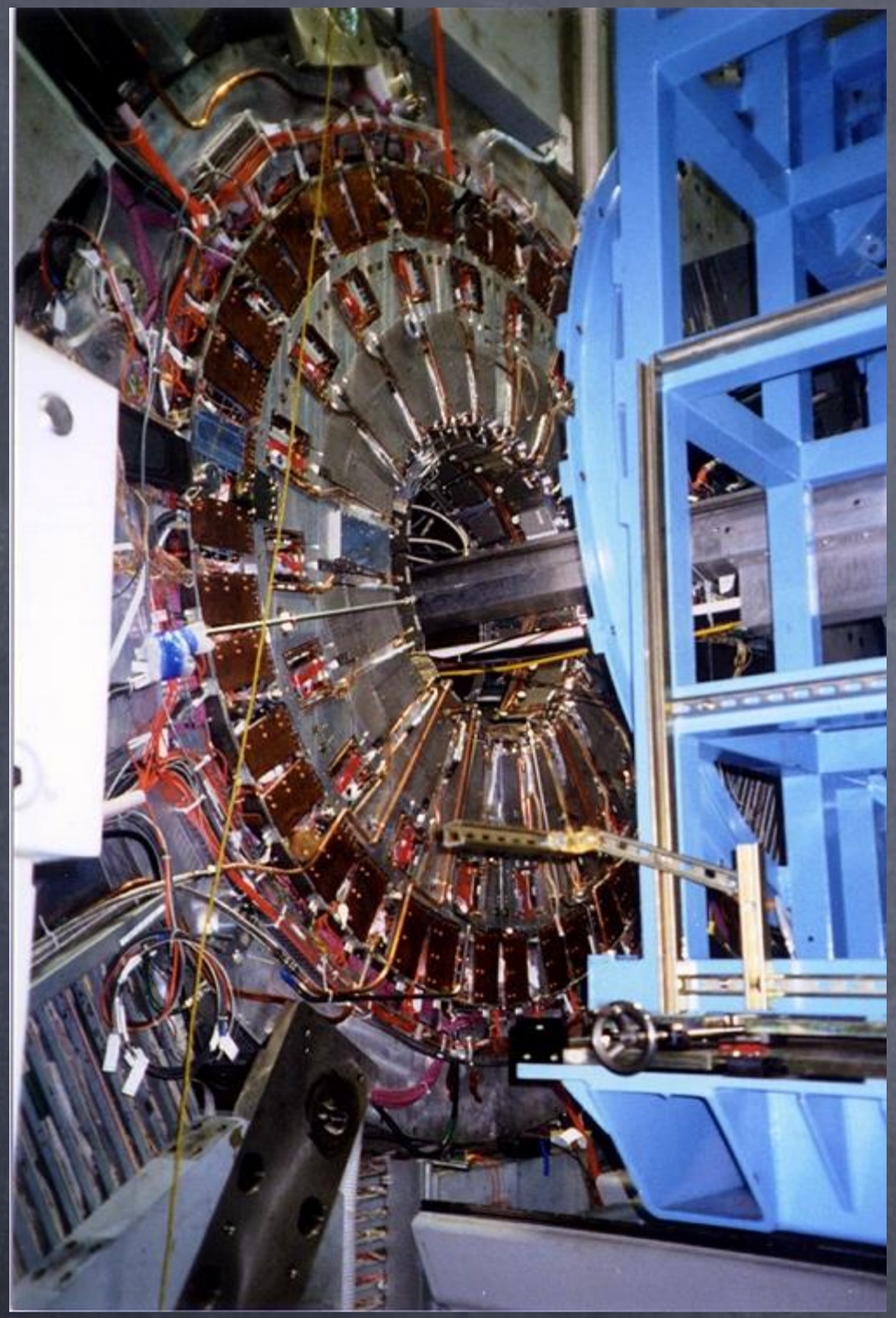
JF_010 Forward Endcap Installation viewed from above 10/22/98

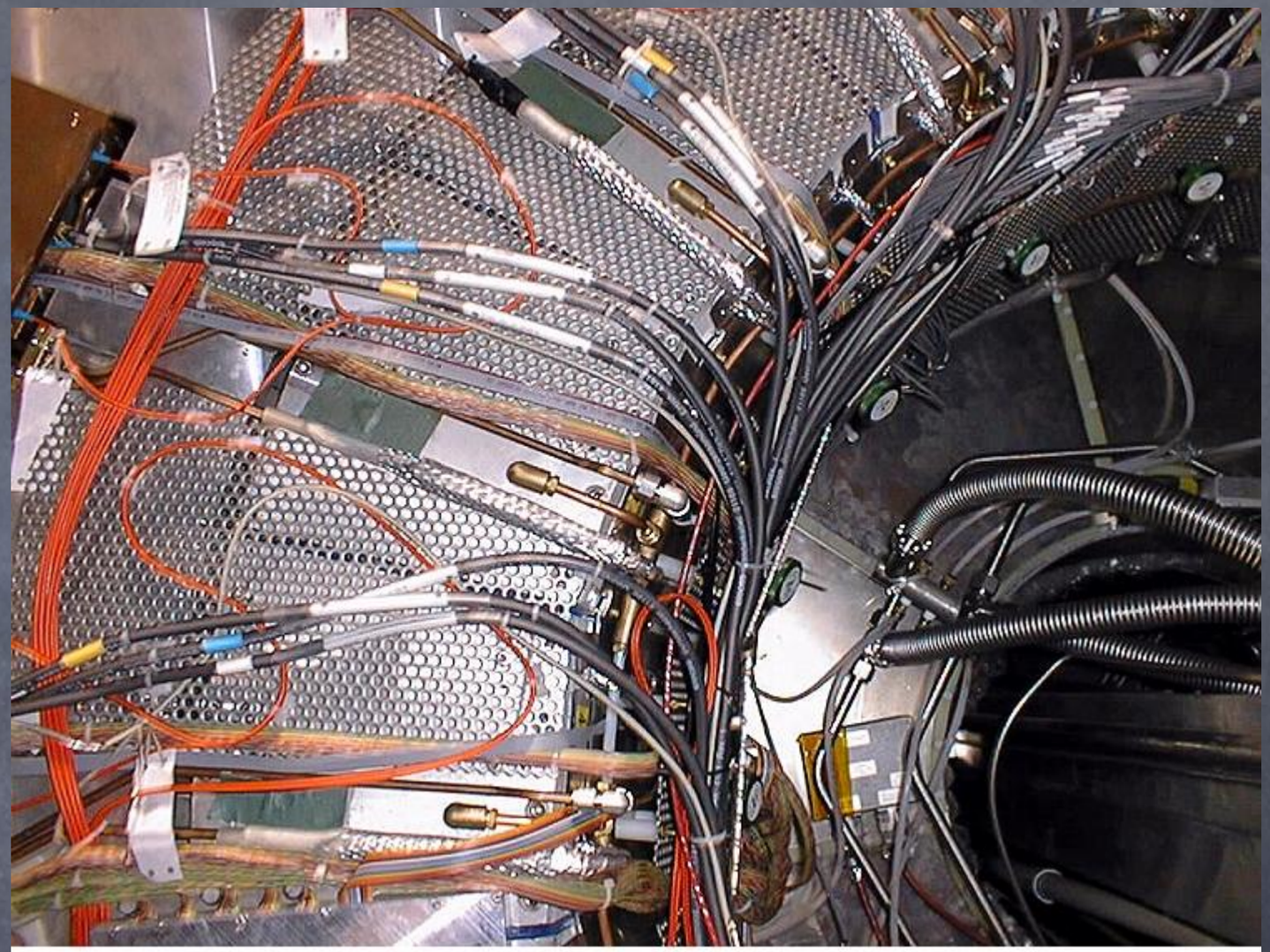


JF_011 Forward Endcap closed and inserted into the Barrel 10/22/98





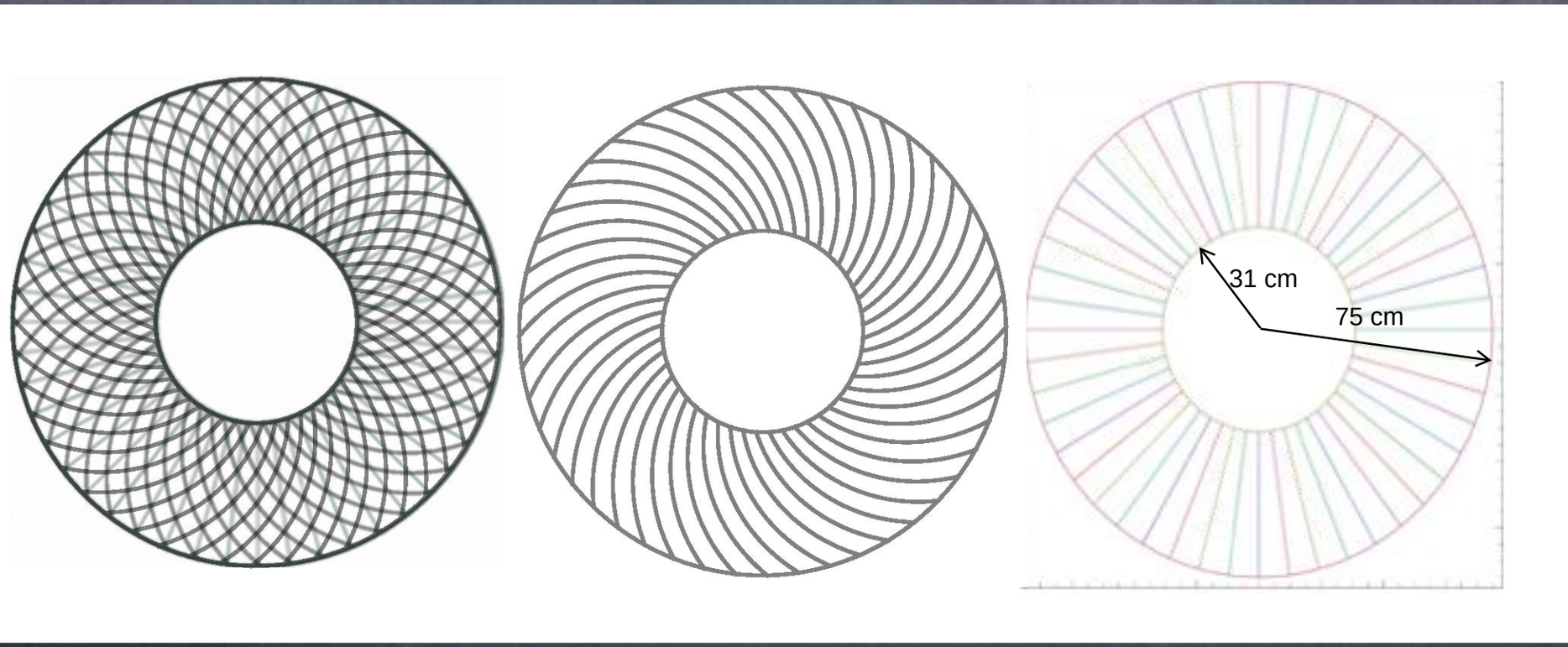




PB2_001 Endcap-as-built 01/19/98

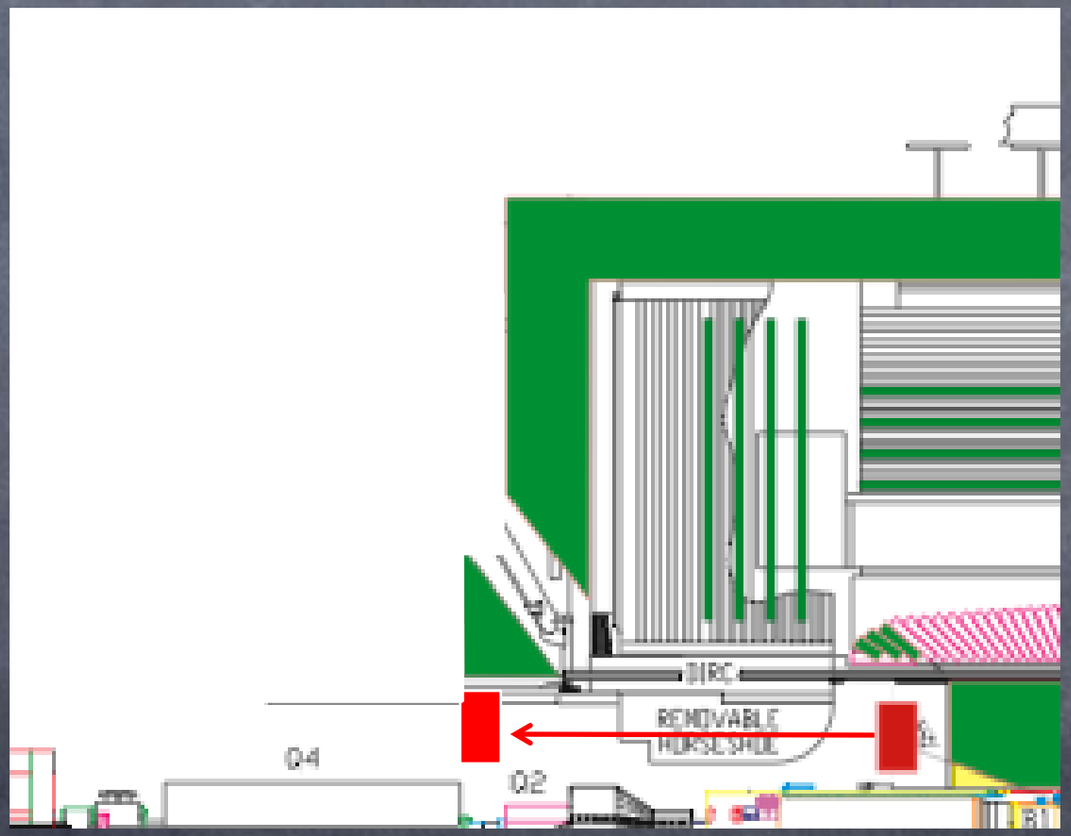
Rear endcap

- Alternate 3 different strip shapes 8 times ➔24 layers in total
  - Depth 15cm + digitizers at rear
- There are 48 strips per layer, yielding 1152 strips/channels
- All fibers/SiPM's come to outer circumference
- Due to the logarithmic spiral strip shapes, it is best to construct as an annulus
- The sectors overlap 7 left-handed and 7 right-handed spirals
  - Radial strips provide ambiguity resolution
- Mount to DIRC tunnel - ~1/2 tonne
- Services
  - Fibers, preamp/digitizer power, "HV", light pulser, temperature control



Rear endcap - II

- Rear EC must move back in DIRC tunnel far enough to allow access to drift chamber electronics
  - This is facilitated by shortening of the support tube connected with removal of the SOB



Conclusions

- Forward endcap
  - Mechanical – similar to *BABAR* EC, except for full annulus
  - Electrical – Services similar – temperature measurement and control, HV, LV calibration
    Fourfold increase in channels (fibers)
- Rear barrel
  - It may be possible to add three rings of crystals to the rear of the barrel
    - Resolution would be compromised due to material in front, but would close a hole to further improve missing energy studies
    - Requires an engineering study – has not yet been done
- Rear endcap
  - A simple tile/fiber/SiPM design
  - Mechanical – in the DIRC tunnel, must be retractable for DCH access
    best built as a full annulus
  - Electrical – Fibers for 1100 digitized signals, HV, LV, temp meas and control