D&D Phase Overview

- D&D Task Force:
  - PEPII team: S.DeBarger, S.Ecklund, A.Hill, D.Kharakh, M.Zurawel
  - BaBar team: H.J.Krebs, S.Pierson, W.Wisniewski
  - Civil demolition team: O.Ligeti, L.Plummer, S. Pierson, M.Zurawel, H.Dao, S.Rokni, K.Chan

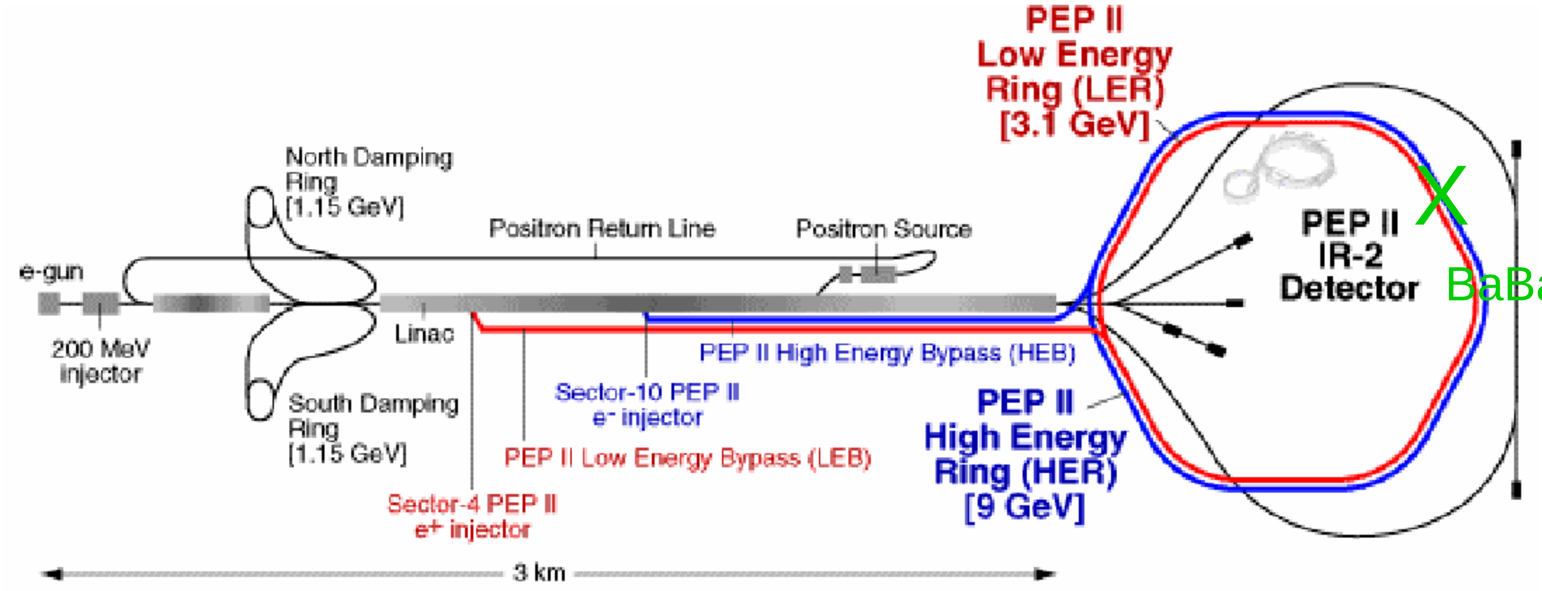
Task Force

- Task force assembled in early May and charged to:
  - Review the rampdown plan.
  - Develop plans, manpower requirements, costs, schedules for the eventual disassembly and disposal of the PEP-II accelerator and the BaBar detector, as well as the ‘conventional’ facilities: accelerator housings, tunnels, support buildings on the surface, service infrastructure (water lines, compressed air…)

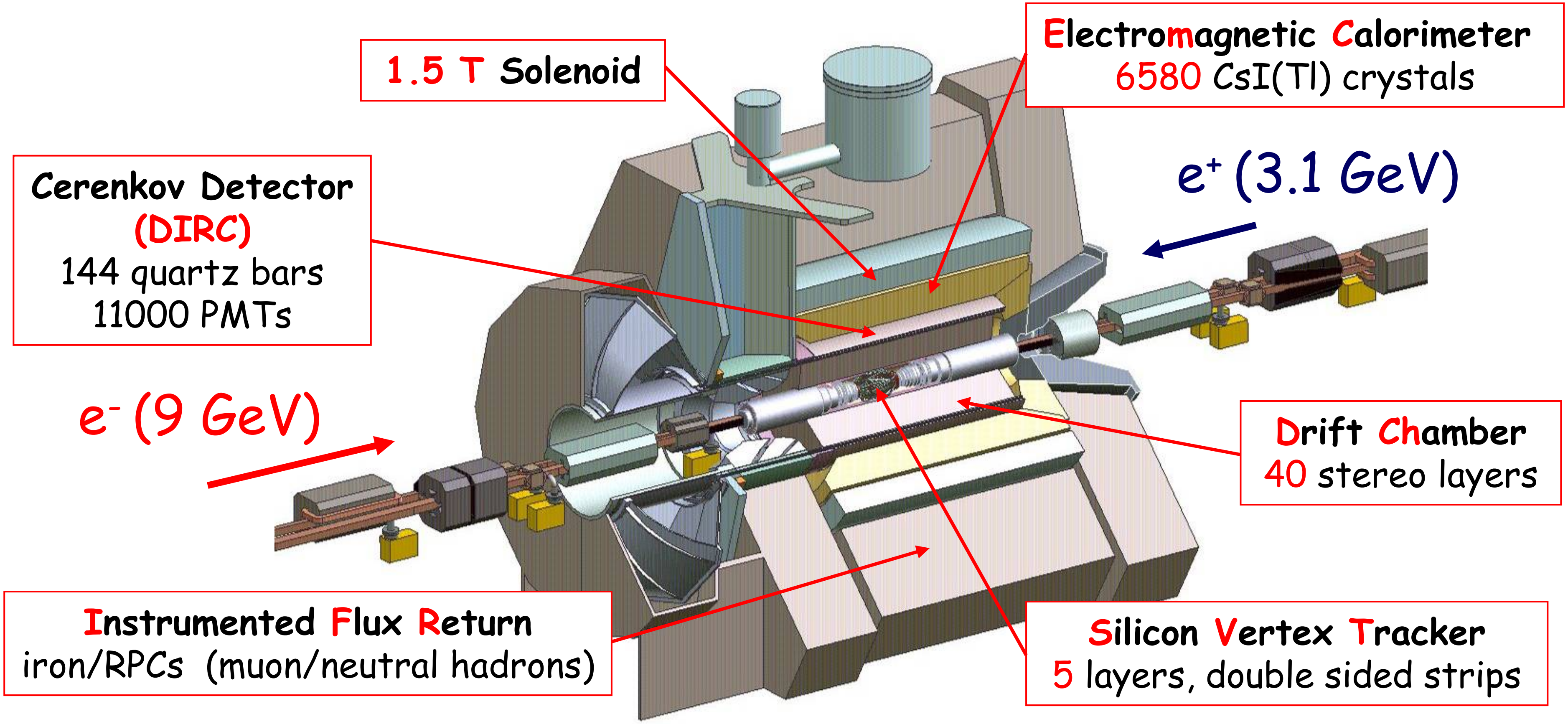
- Scope of work splits naturally into three areas:
  - BaBar disassembly and storage of components of long term value
  - PEP-II technical systems removal and preservation of components with reuse value
  - Demolition of the conventional facilities with dispersal of materials

- Presentations are a snapshot of work-in-progress

The B-Factory



BaBar Detector



SVT:	97% efficiency, 15 μm z hit resolution (inner layers, perp. tracks)
SVT+DCH:	$\sigma(p_T)/p_T = 0.13\ \% \times p_T + 0.45\ \%$
DIRC:	K-π separation 4.2σ @ 3.0 GeV/c $\rightarrow$ >3.0σ @ 4.0 GeV/c
EMC:	$\sigma_E/E = 2.3\ \% \cdot E^{-1/4} \oplus 1.9\ \%$

BaBar Detector

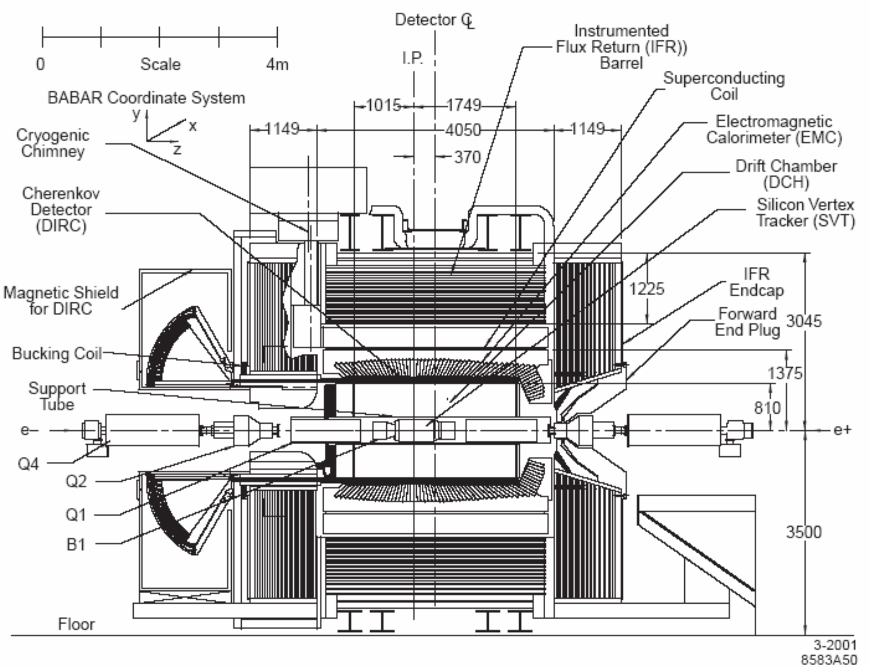


Figure 1. *BABAR* detector longitudinal section.

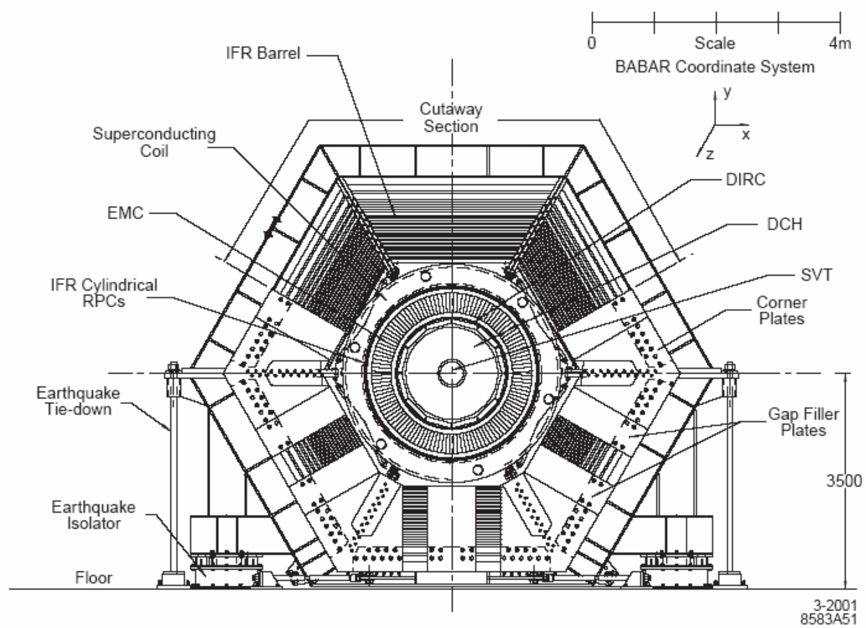
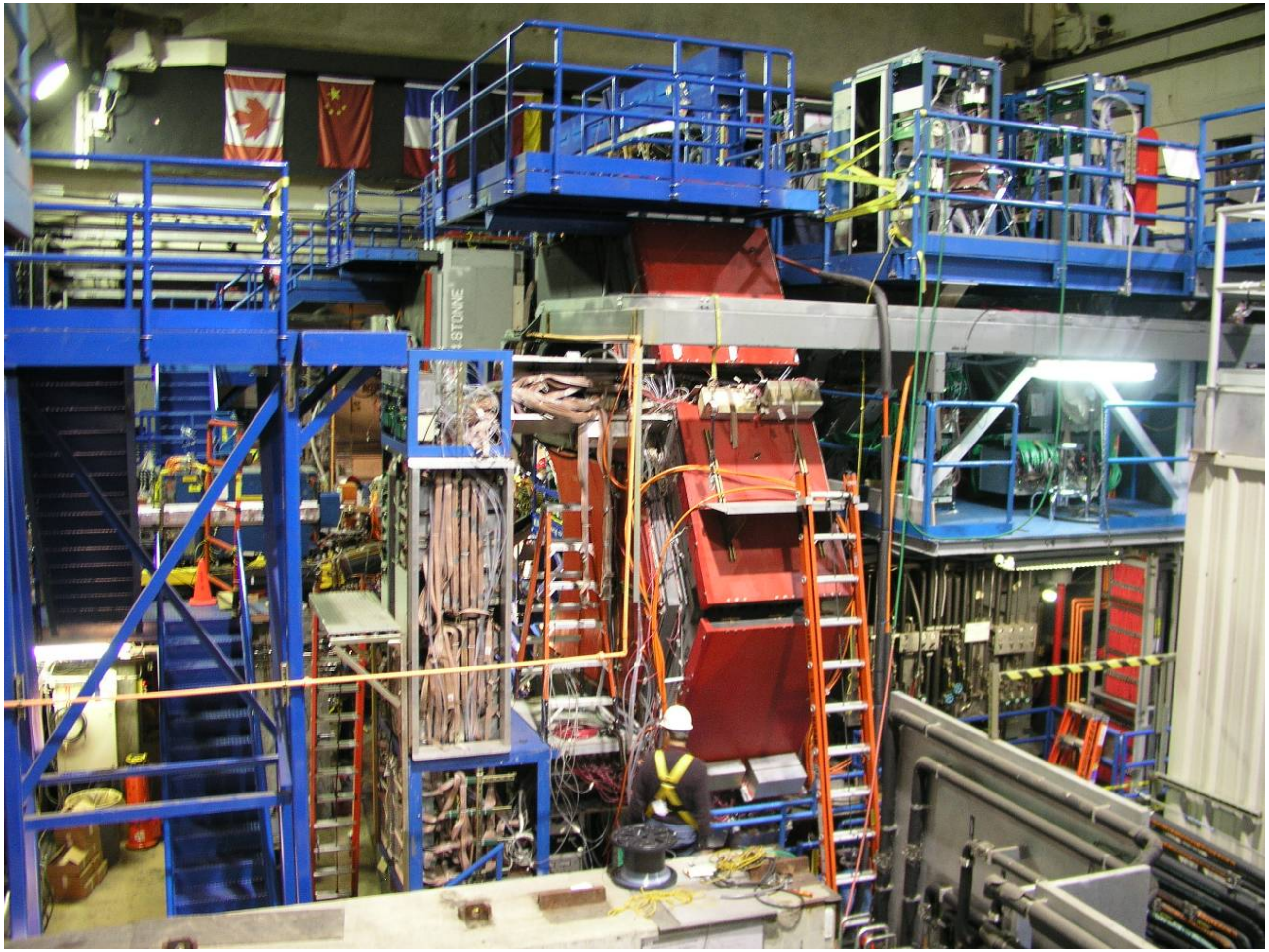


Figure 2. *BABAR* detector end view.

'Ideal'

BaBar Detector



'Actual'

Shield wall removed

BaBar Detector Disassembly

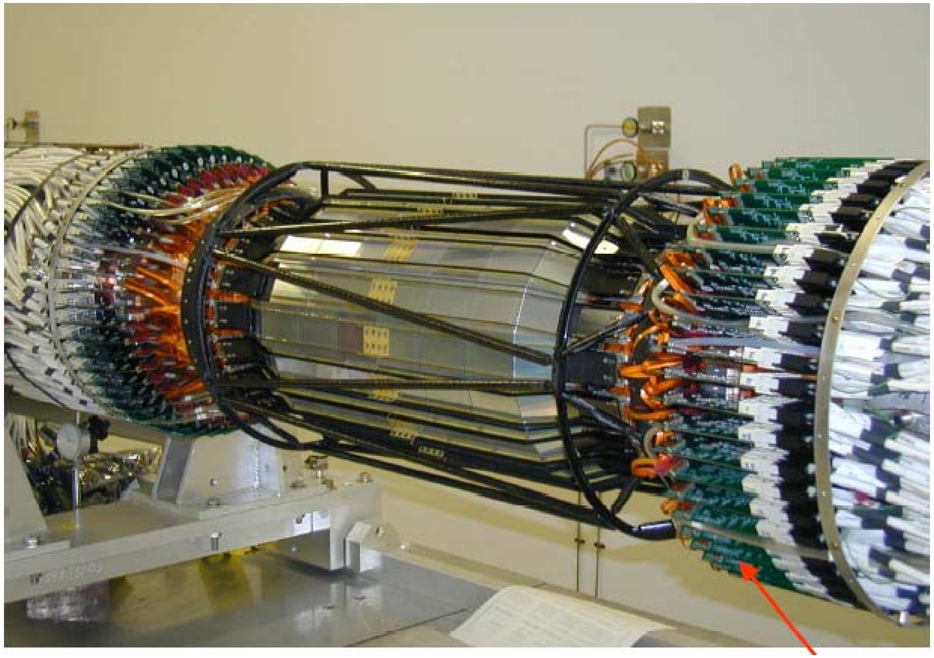
- BaBar completed the IFR upgrade in Fall 2006. This upgrade took place over three campaigns: IFR Forward Endcap Resistive Plate Chambers in 2002, 1st third of IFR Barrel Limited Streamer Tubes in 2004, balance of IFR Barrel sextants with LSTs in 2006.
  - Barrel upgrade required uncabling of forward end of SVT, forward end of EMC, load transfer of EMC, removal of most of the corner blocks fore and aft, removal of flux bars, releasing some of the cryostat restraints, pulling forward doors to walls.
  - Experience gained in these campaigns provides excellent input for planning the detector disassembly process, estimating the required manpower (both labor and engineering), as well as M&S.

BaBar Detector Disassembly

- Identification of assets:
  - Subsystem managers were involved in identifying detector components with long term value.
  - Assets with high value to preserve in the disassembly process, if they have not already been spoken for:
    - Quartz bars from the DIRC.
    - CsI (Tl) crystals from the EMC.
    - Superconducting magnet coil, cryostat and current leads.
- Look at detector disassembly by system from the IP.

BaBar Detector Disassembly: SVT

- SVT located in the support tube that carries the beam line elements closest to IP. Have detailed project plan from removal during the 2002 upgrade campaign. Improved tooling exists.
  - Expected disposition: display.



BaBar Detector Disassembly: DCH

- DCH is supported by the DIRC: remove while the detector is on the beamline. Tooling exists.
  - Expected disposition: display.

BaBar Detector Disassembly: DIRC

- Radiator is synthetic fused silica in the form of long, thin bars with rectangular cross-section. The material was chosen for its resistance to radiation, long attenuation length, large index of refraction, excellent optical finishing properties. The 144 bars are collected together in groups of 12 in hermetically sealed bar boxes. The bars are a unique resource. Likely store in bar boxes.
- The Cherenkov photons emerge from the bars into a water filled expansion region, the Stand-Off Box. The SOB is instrumented with ~11000 phototubes whose faces are exposed to water.

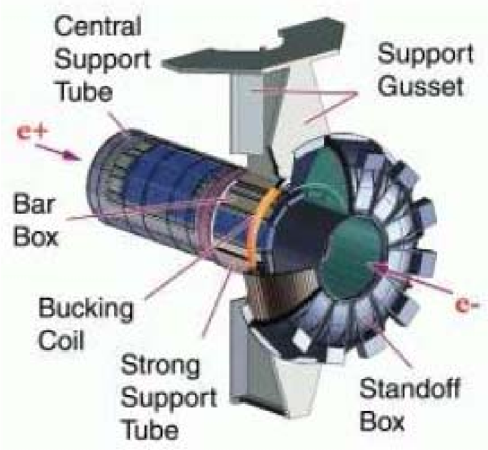
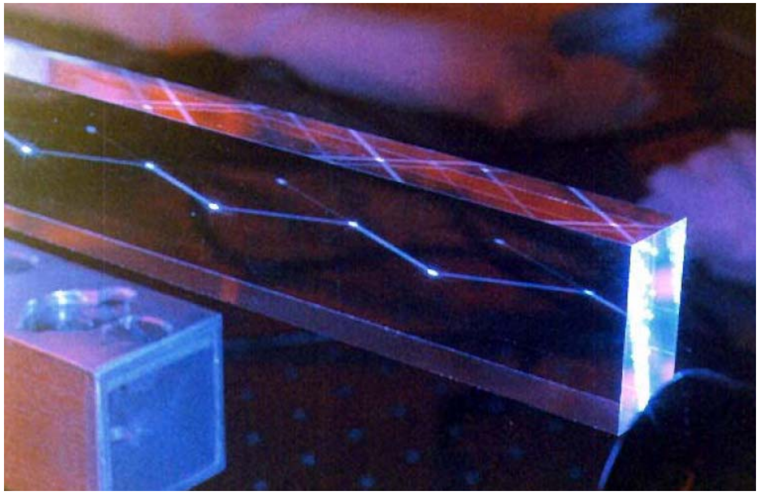
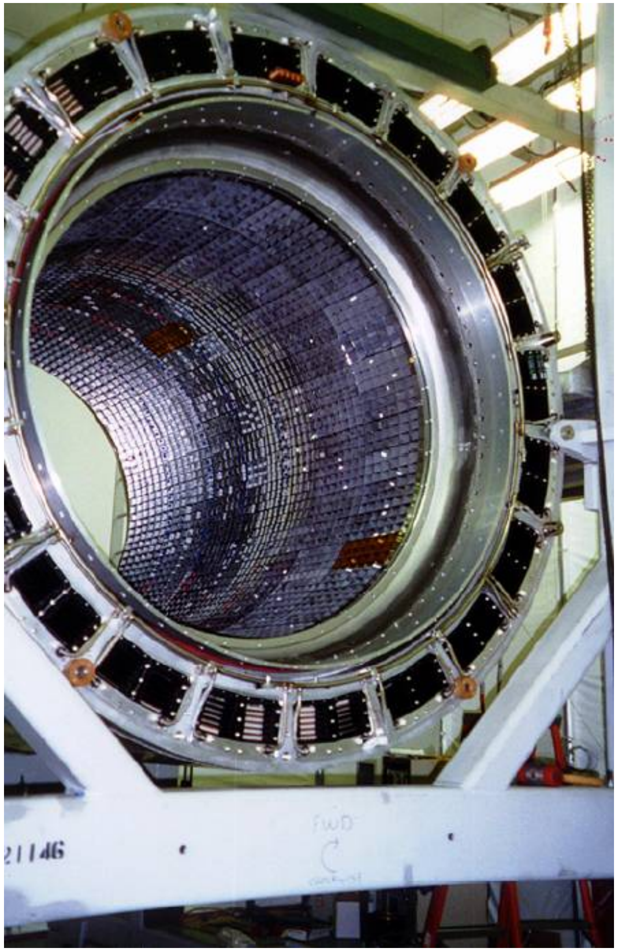


Figure 49. Exploded view of the DIRC mechanical support structure. The steel magnetic shield is not shown.



BaBar Detector Disassembly: EMC

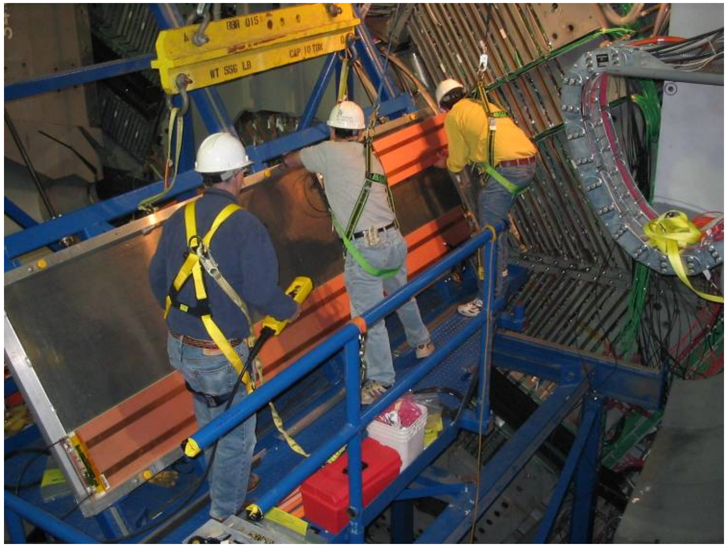
- Consists of 6580 ~4kg CsI(Tl) crystals read out with two photodiodes each. CsI(Tl) is mildly hygroscopic. Crystals are suspended in carbon-fiber support structures mounted in the calorimeter support structures. ~$20M asset. Will require dry room construction to store crystals
- Calorimeter is in two parts: barrel portion (most of crystals) and forward endcap. Barrel supports endcap, and is supported off magnet return steel.

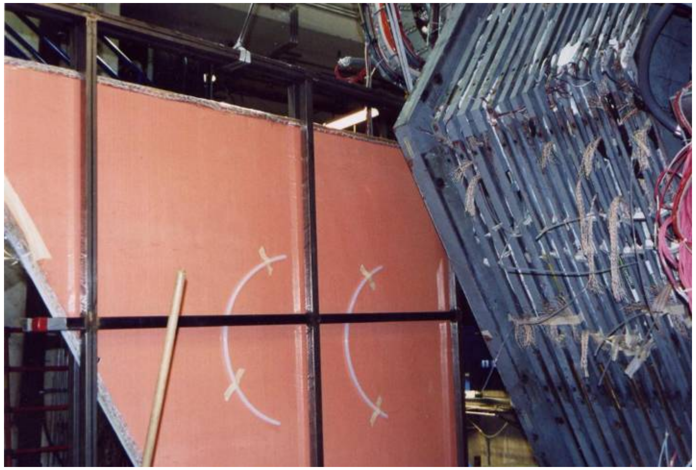


BaBar Detector Disassembly: IFR

- LSTs: twelve layers of modules in 6 sextants. Six layers of brass installed in gaps formerly occupied by PRCs (increase interaction lengths). These detectors are expected to have minimal aging at the time of cessation of B-Factory operations.

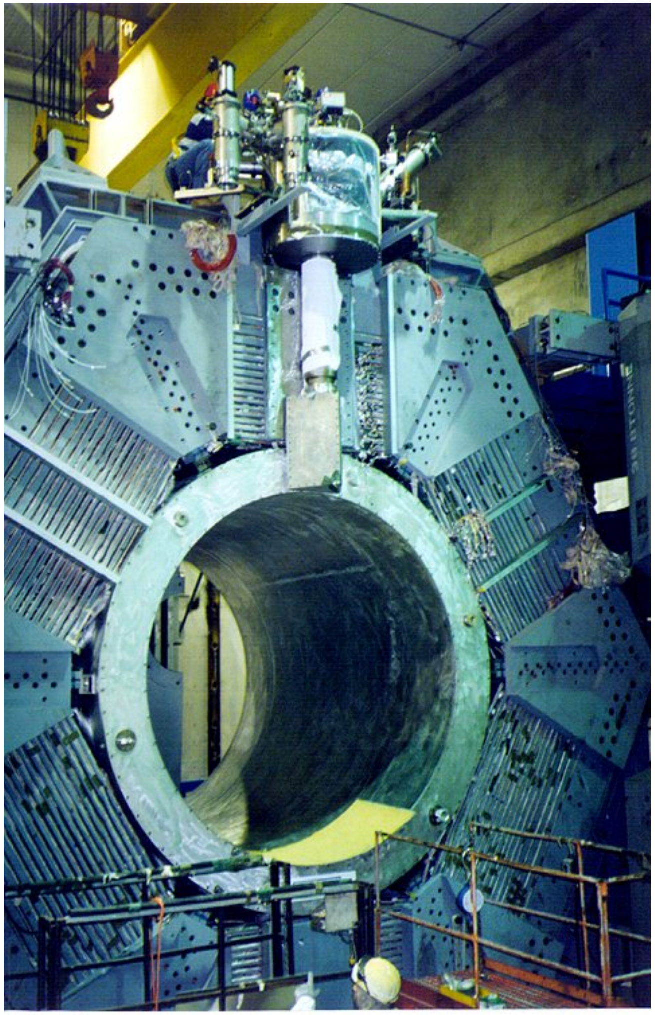
- RPCs: Forward endcap: 16 layers of chambers (192 gaps), 4 in double modules, with 5 layers of brass; these chambers are being aged by backgrounds. Backward endcap: 18 layers of modules (216 gaps) from the initial construction of the detector; the majority of these chambers are in bad shape.





BaBar Superconducting Coil & Steel

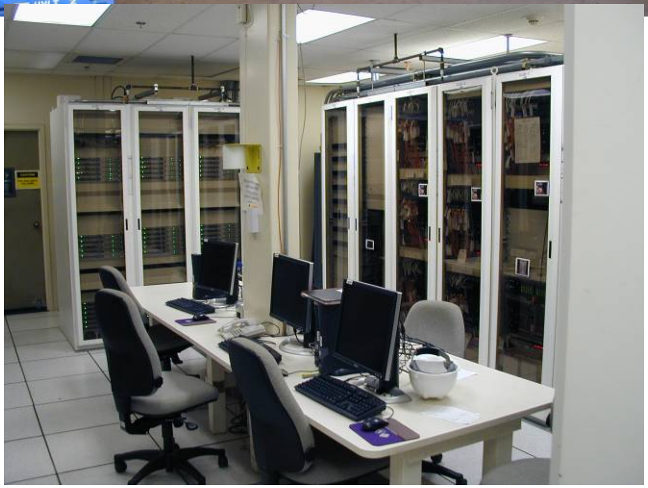
- The magnet system is composed of:
  - Superconducting coil in its cryostat, with current leads. This is an asset with long term value.
  - Power supply for the magnet.
  - Cryogen system: pumps, liquifier, dewars and controls. Has long term value, though will be almost two decades old.
  - Flux return steel (IFR). Has scrap value (pending metals suspension resolution)



TO_300 Valve Box Assembly 12/12/97

BaBar Detector Disassembly: Electronics Hut

- Compute farm will be removed early while it still has value.
- Electronics will be outdated.



BaBar Disassembly Schedule and Cost

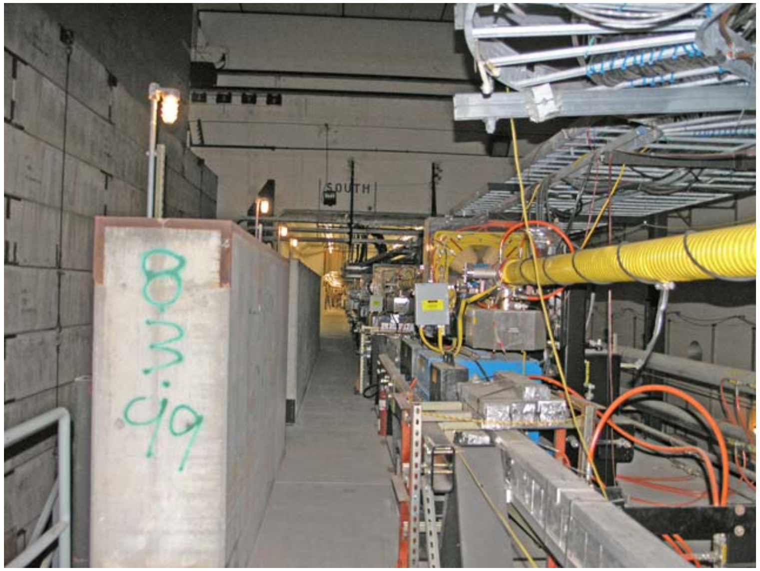
- Schedule: 45 months, assuming fully sequential disassembly. Requires use of at least one additional IR hall for subsystem disassembly.
- Total cost: $9.4M (FY07). This breaks down to $3.2M for ED&I, $1.7M for M&S, $4.5M for SLAC labor. Contingency included is 30%; indirects included.
- Next steps: refine cost estimate. Preserve and document disassembly tooling.

PEP-II Disassembly: Technical Systems

- Disassembly estimate includes:
  - Shielding
  - Vacuum/Mechanical
  - Cable Trays and Cables
  - RF systems
  - Power supplies
  - Controls
- General schedule has not been assembled.
- Costs estimated in 2007 $ with indirects included.
- Effort has focused on component lists: need to be fleshed out with more detailed documentation.

PEP-II Disassembly: Technical Systems

- Shielding:
  - Shield walls in 5 IRs.
  - Bridge shield walls in IR8,12.
  - Cable Trays and Cables
  - IR2 tunnel shielding



PEP-II Disassembly: Technical Systems

- LER Magnet Removal:
  - Remove rafts with captured beampipes. Transport for disassembly.
  - Estimate $1.7M.
- HER magnet removal:
  - After LER out of the way.
  - Vacuum chamber removal more complex than LER.
  - Estimate $1.6M.

PEP-II Disassembly: Technical Systems

- Vacuum Pumps, valves, gauges, TSPs. Controls including ion pump power supplies, vacuum gauge controllers, valve controllers, etc.
- Beam Position Monitors
- Cable Trays
  - Base estimate on FFTB removal experience: ~$.8K/ft.
  - Level of difficulty higher: ceiling mounted, 4 trays in 2x2 pattern.
- RF Systems:
  - Many items identical to SPEAR RF
  - Recover: Klystrons, circulators, waveguides, low level RF
  - 15 stations to dismantle and store
- RF High Voltage Power Supplies:
  - One oil-filled for each klystron

PEP-II Disassembly: Technical Systems

- Power Supplies:
  - Many identical to SPEAR power supplies (rack mounted).
  - Many can be used as LCLS spares (free standing)
- Feedback systems:
  - Power amplifiers are significant assets.

PEP-II Disassembly: Technical Systems

- PEP Injection Lines:
  - Possible alternate use for transport lines
  - Long distance transport followed by ~730 ft N & S injection lines
  - Can only be removed when Linac not in operation.
  - Radiation issues for BSY and tun-up dumps.

PEP-II Disassembly: Technical Systems

- Storage Space:
  - Tunnel fill fraction is high
  - Support buildings house power supplies, etc.
  - Need interim space for component disassembly and long term space for recovered component storage

PEP-II Disassembly: Technical Systems

- Disassembly cost:
  - Rings: $20.6M
  - Injection lines: $4M
  - Proj Mgmt: $9M
  - Contingency(50%): $16.7M
  - Project total: $50.2M
- Next steps:
  - Confirm reuse potential of components
  - Cables represent ~1/3 of cost: check
  - Explore storage schemes.

Conventional Facilities

- Scope of work:
  - D&D of the PEP-II tunnel and associated support buildings.
  - PEP-II tunnel ~7250 ft + NIT + SIT
  - Total area of 26 main buildings and 4 mechanical pads ~115K sq ft. There are an additional 35 minor structures (sheds, trailers).
  - Missing: what level of restoration does the landowner require?

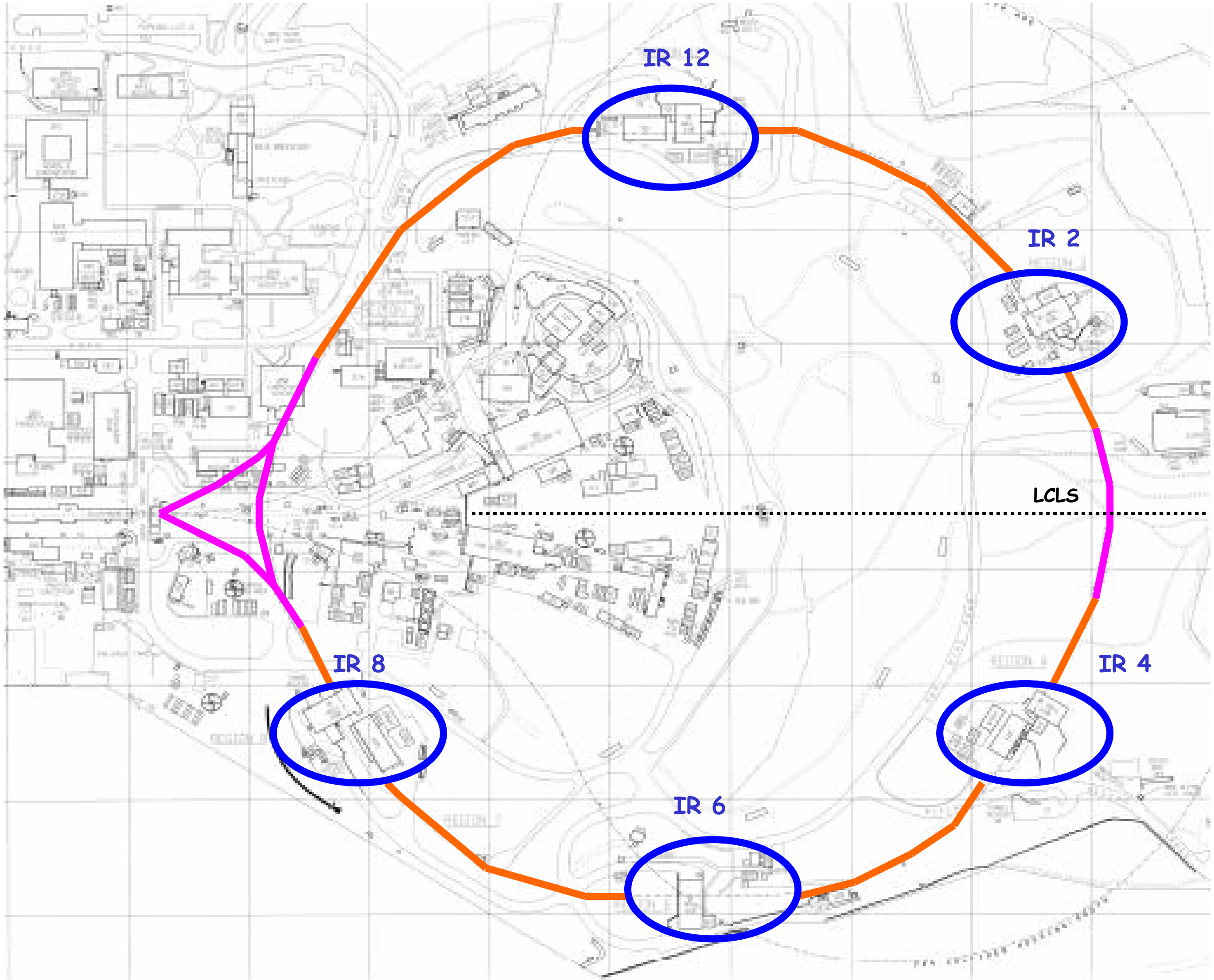
Conventional Facilities

- Phases of effort:
  - Some of the structures have significant reuse value:
    - IR halls provide large open space with good crane coverage, typically 50T, in one case 100T. These halls provide excellent sites for construction and staging of detectors. Service structures that support these halls should also be retained.
    - Power and cooling at IR halls have the potential to support major computing installations.
    - Counting houses can be adapted for office space.

Conventional Facilities

- Phases of effort:
  - Civil D&D estimated to take 3 years of contractor time with and additional year of SLAC planning.
  - Work in 3 phases:
    - Most of the ring tunnel
    - IR halls when no longer needed
    - Portions of the tunnel that pass under other structures that remain in use

Conventional Facilities D&D Phases



Conventional Facilities

- Tunnel demolition:
  - Sections of tunnel are bored
  - Sections of tunnel are cut & cover
  - Interferences: NIT and SIT run under the Computing Center (SCCS) and the vacuum assembly building, and next to the SSRL building.
    - PEP tunnel passes less than 20ft beneath the LCLS tunnel near the back end of the Near Experimental Hall.

Conventional Facilities

- Cost estimate:
  - Estimate from FERMA Corp (Stanford Stadium demolition)
  - Estimate based on prior experience taking into account nature of structures to be demolished
  - Material & Equipment costs dominate estimate (80%)
  - Fractional cost by phase: 35%, 30%, 35%.
  - Estimated cost 15% adjustment for SLAC site & DavisBacon, 15% overhead & profit, 50% contingency
  - Cost: $176.3M
  - Further study: landowner requirements; hazardous materials testing issues. See Lori's talk.

Conventional Facilities: Radioactive Waste Disposal

- Pre-decommissioning:
  - PEP-II site sampling analysis plan
  - Complete site and component sampling and characterization
- Assume D&D follows DOE, EPA, Stanford requirements, and that Contractor will support waste packaging and loading ops
- Decommissioning:
  - Characterization; waste shipment within regulatory time limits; personnel qualifications

Conventional Facilities: Radioactive Waste Disposal

- Basis of Estimate:
  - FFTB experience applied to PEP-II:
    - Equipment density
    - Cables
  - Low Level Waste: ~104k cu ft; mixed waste ~9k cu ft.
  - Metals suspension and moratorium affect volume of materials handled as waste; affect storage decisions.
  - Personnel needs: 54k hours of coordinators/professionals; double hours for technicians.
  - Container and transportation costs using current quotes
  - Disposal costs calculated using current pricing at EnergySolutions.
- Cost estimate: $36.2M
- Caveat: depends on fraction of mixed waste; estimate of activation area.
- Next steps given in Olga's talk.

Cost estimate

- BaBar: $9.4M
- PEP-II: $50.2M
- Civil: $176.3M
- Rad mat: $36.2M
- Total: $272.1M

First round bottom line.