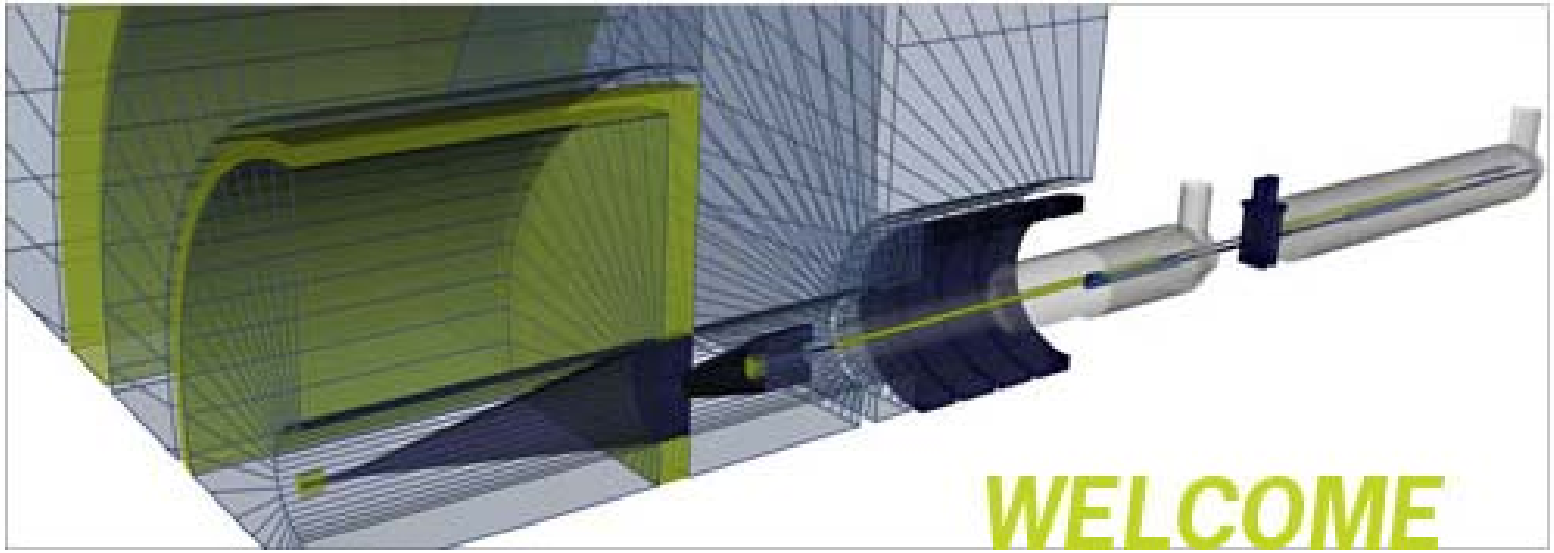


ILC Interaction Region Engineering Design Workshop

September 17-21, 2007

Stanford Linear Accelerator Center

Goals and Introduction

Andrei Seryi, SLAC, September 17, 2007

Global Design Effort

IR in RDR and goals of IRENG07

- ILC IR in Reference Design Report, major features:
  - **Single Interaction Region with 14mr crossing angle**
  - **Two detectors operating in push-pull mode**
  - **On surface assembly of the detectors**

- Goals of IRENG07
  - **To advance the design of the ILC Interaction Region, focusing in particular on integration, engineering design and arrangements for push-pull operation**

IRENG07 Working Groups

- **WG-A: Overall detector design, assembly, detector moving, shielding.**
  - **Including detector design for on-surface assembly and underground assembly procedures. Beamline pacman & detector shielding…**
    - **Conveners: Alain Herve (CERN), Tom Markiewicz (SLAC), Tomoyuki Sanuki (Tohoku Univ.), Yasuhiro Sugimoto (KEK)**
- **WG-B: IR magnets design and cryogenics system design.**
  - **Including cryo system, IR magnet engineering design, support, integration with IR, masks, Lumi & Beamcals, IR vacuum chamber...**
    - **Conveners: Brett Parker (BNL), John Weisend (SLAC/NSF), Kiyosumi Tsuchiya (KEK)**
- **WG-C: Conventional construction of IR hall and external systems.**
  - **Including lifting equipment, electronics hut, cabling plant, services, shafts, caverns, movable shielding; solutions to meet alignment tolerances...**
    - **Conveners: Vic Kuchler (FNAL), Atsushi Enomoto (KEK), John Osborne (CERN)**
- **WG-D: Accelerator and particle physics requirements.**
  - **Including collimation, shielding, RF, background, vibration and stability and other accelerator & detector physics requirements…**
    - **Conveners: Deepa Angal-Kalinin (STFC), Nikolai Mokhov (FNAL), Mike Sullivan (SLAC), Hitoshi Yamamoto (Tohoku Univ.)**

Work in preparation for IRENG07

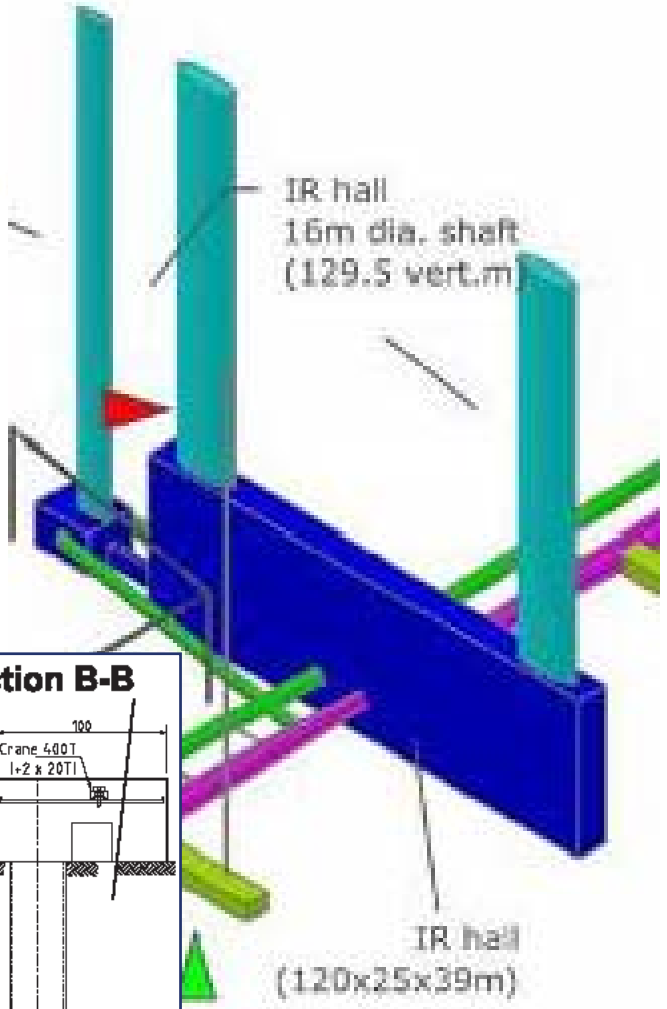
- In preparation for the workshop, the Working Groups had series of preparatory meetings
- In these meetings ~50 talks were presented, and about a week of discussion time was integrated
- These meetings allowed to iterate on design and formulate the questions and plans of study

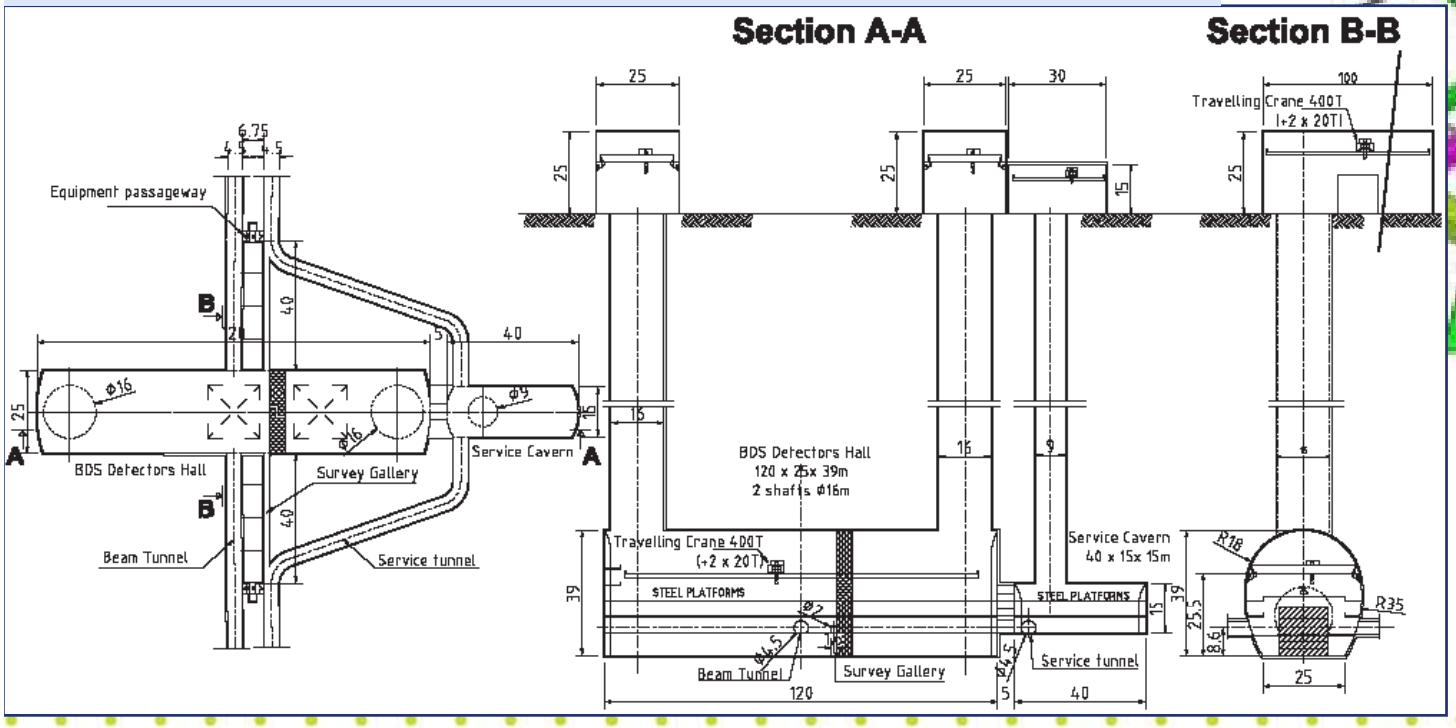
- **WG-A, conveners meeting, July 5**
- **WG-D, conveners meeting, July 11**
- **WG-A, group meeting, July 12**
- **WG-B, conveners meeting, July 13**
- **WG-C, group meeting, July 17**
- **WG-B, group meeting, July 23**
- **WG-C, group meeting, July 24**
- **WG-A, group meeting, July 30**
- **WG-C, group meeting, July 31**
- **WG-D, group meeting, August 1**
- **WG-B, group meeting, August 2**
- **WG-A, group meeting, August 6**
- **WG-C, group meeting, August 7**
- **WG-A, group meeting, August 13**
- **WG-D, group meeting, August 15**
- **WG-B, group meeting, August 16**
- **WG-A, group meeting, August 20**
- **WG-C, group meeting, August 21**
- **WG-A, group meeting, August 27**
- **WG-C, group meeting, August 28**
- **Conveners and IPAC meeting, August 29**
- **WG-B, group meeting, August 30**
- **WG-B, group meeting, September 13**

http://www-conf.slac.stanford.edu/ireng07/agenda.htm

IR hall in RDR

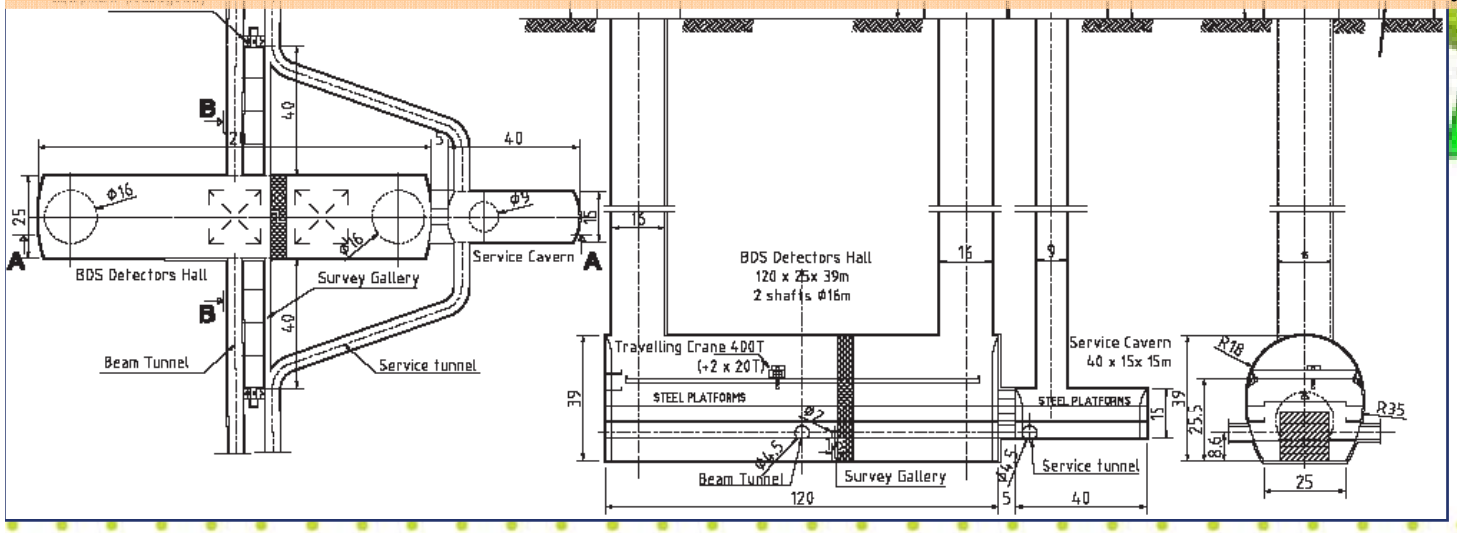
- Buildings for on-surface assembly
- Movable shielding wall to allow not-self shielded detector
- Hall size enlarged to accommodate detector support platforms and service platforms
- Cavern for services & beamline access

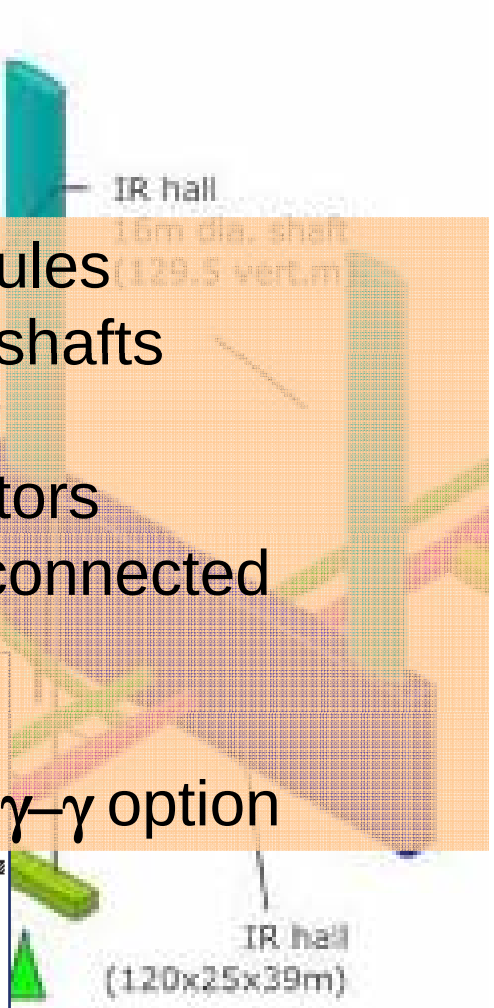




At IRENG07:

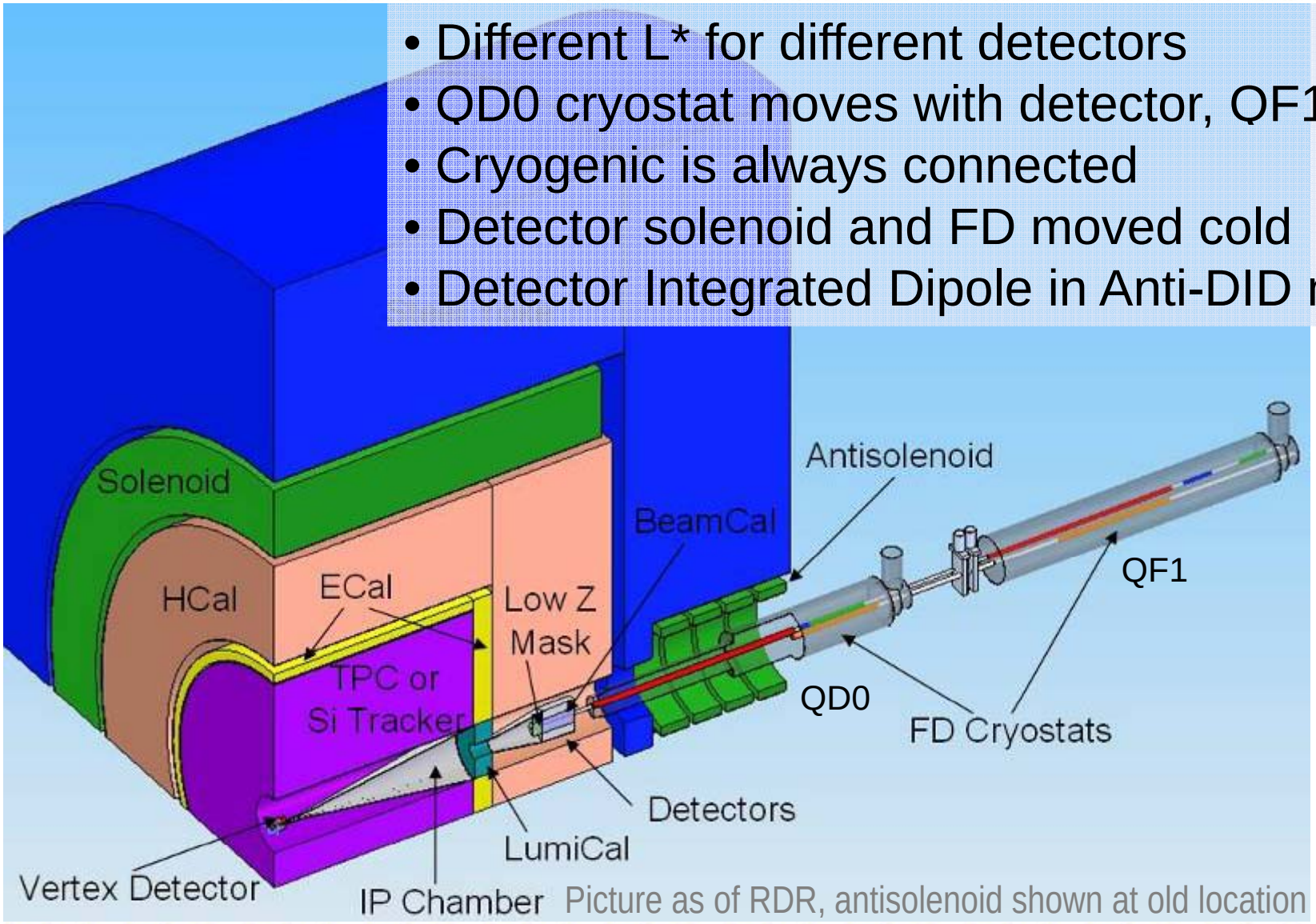
- Consider modifications of layout to meet safety rules
- Discuss optimization of sizes, layout, number of shafts
- Optimization of capacity of cranes
- What are power, water and other needs of detectors
- What are detector services, where placed, how connected
- What are alignment system arrangements
- How the service/access cavern is used
- What tunnels changes needed to accommodate γ–γ option





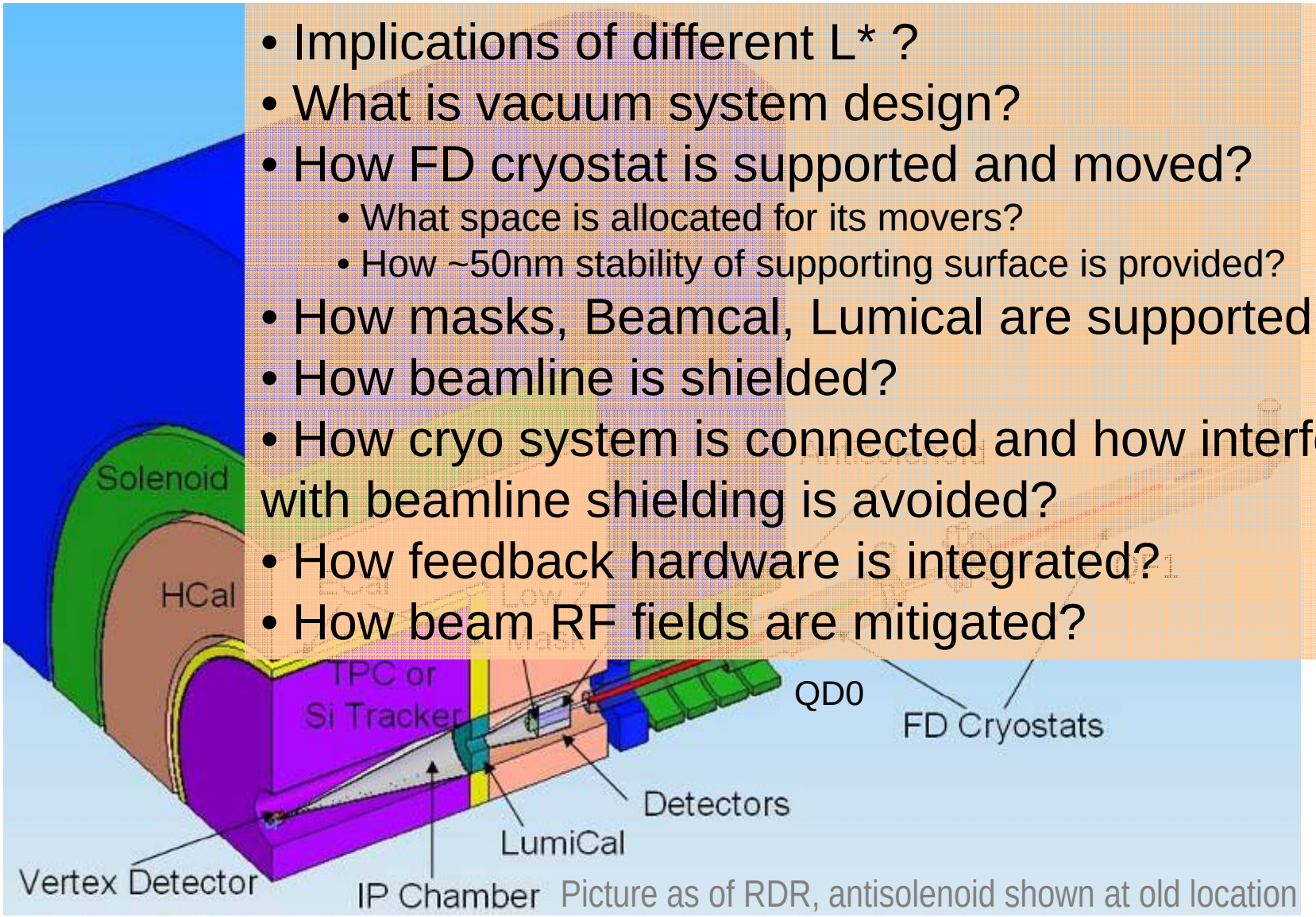
IR configuration in RDR

- Different L* for different detectors
- QD0 cryostat moves with detector, QF1 fixed
- Cryogenic is always connected
- Detector solenoid and FD moved cold
- Detector Integrated Dipole in Anti-DID mode

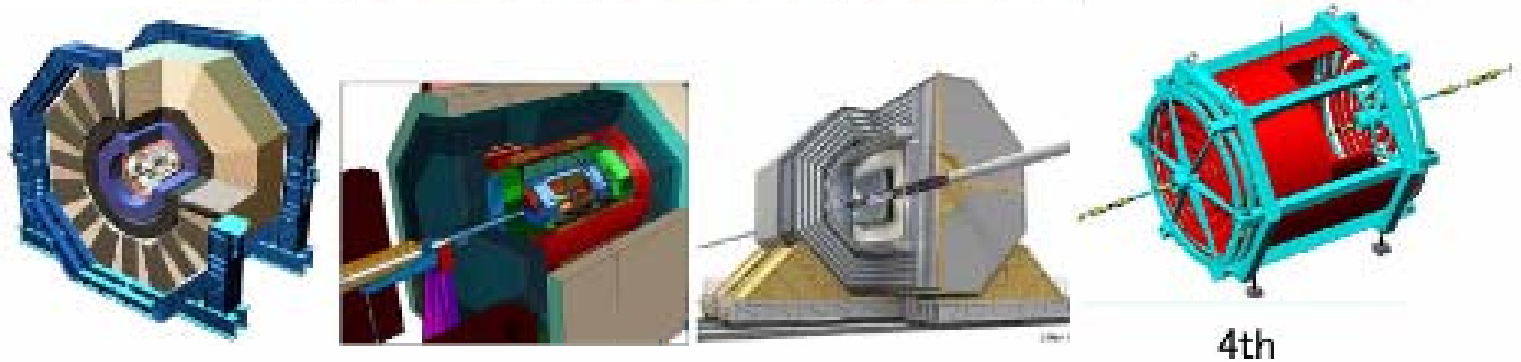


IR configuration, at IRENG07:

- Implications of different L* ?
- What is vacuum system design?
- How FD cryostat is supported and moved?
  - What space is allocated for its movers?
  - How ~50nm stability of supporting surface is provided?
- How masks, Beamcal, Lumical are supported
- How beamline is shielded?
- How cryo system is connected and how interference with beamline shielding is avoided?
- How feedback hardware is integrated?
- How beam RF fields are mitigated?



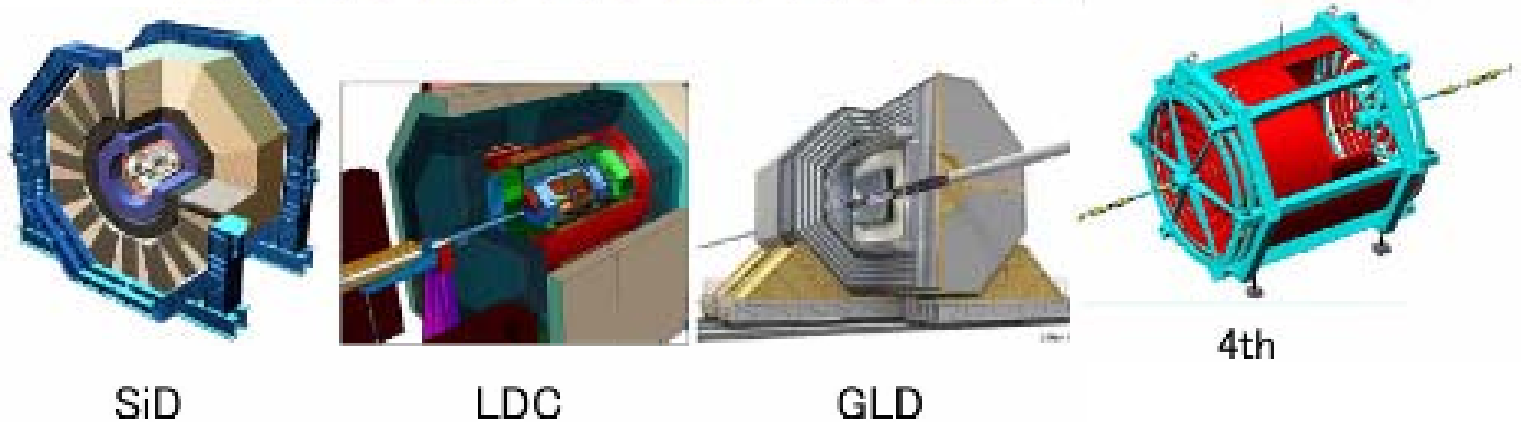
Detector design ?s at IRENG07:



- General parameters (size, weight, field in & out, acceptable L*, segmentation)
- How on surface & final underground assembly is done
  - What are space, cranes requirements, how pieces are moved
- What positioning accuracy needed after push-pull
  - What are detector alignment adjustment systems
- What are opening procedures on-beamline & in garage position
  - What are space requirements in either case and size of the platform
- What are gaps and how radiation shielding is provided
- How fire safety is provided, including these mandatory requirements
  - No flammable gases; only halogen-free cables; smoke sensors in sub-detectors

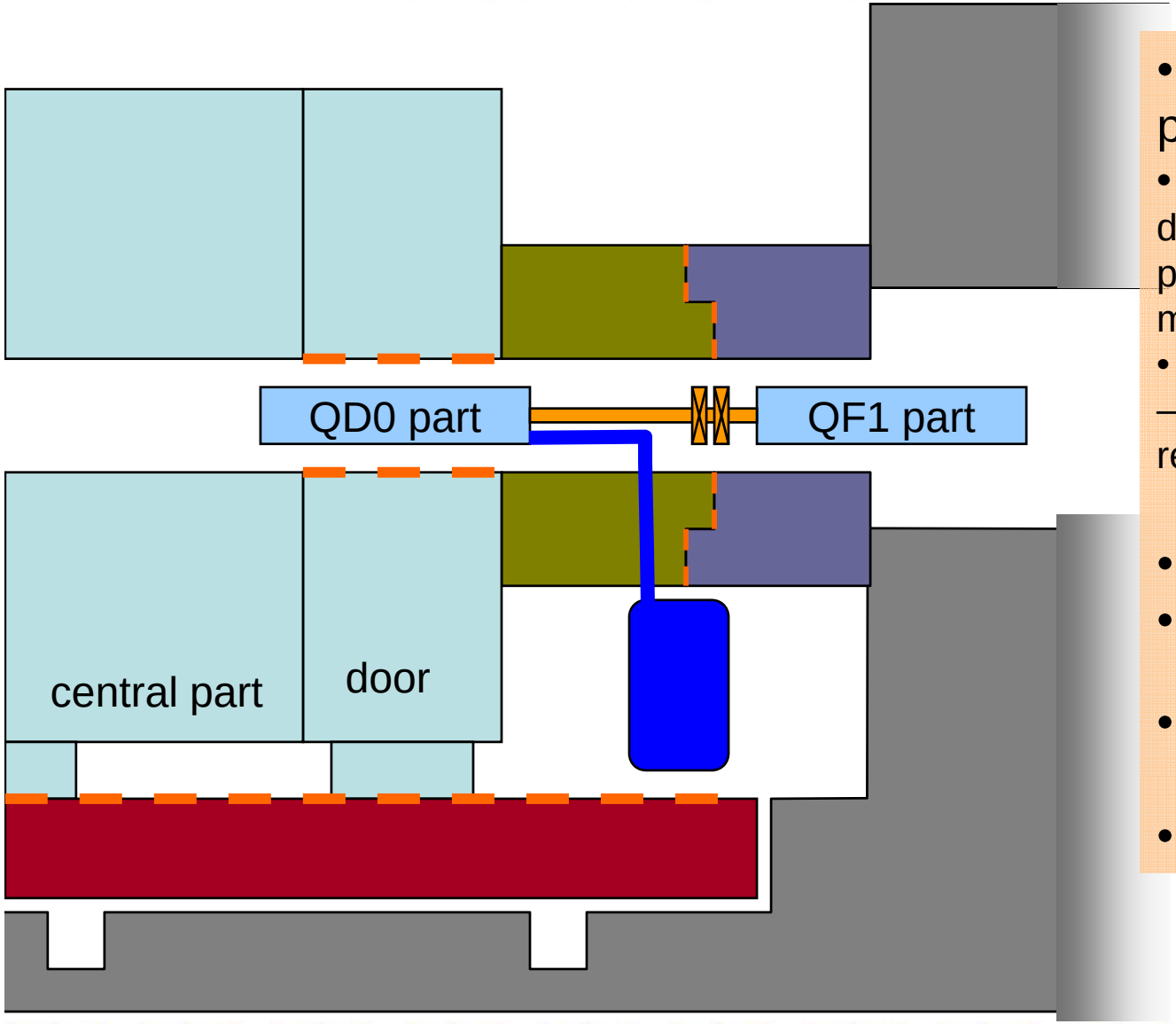
These and other questions were included in the template for detector concept introductory talks

Detector - machine interfaces



- The two complementary detectors for ILC IR may have different design, sizes, etc.
- Differences of their interfaces to the machine should be understood, and if possible, unified

Interfaces & responsibilities, examples



- Surface of the support platform
  - Below the surface, platform design and responsibility for push-pull operation – ILC machine group
  - Above: e.g. opening of doors – detector collaboration responsibility
- QD0 support surface
  - E.g. stability requirements
- Pacman shielding
- etc…

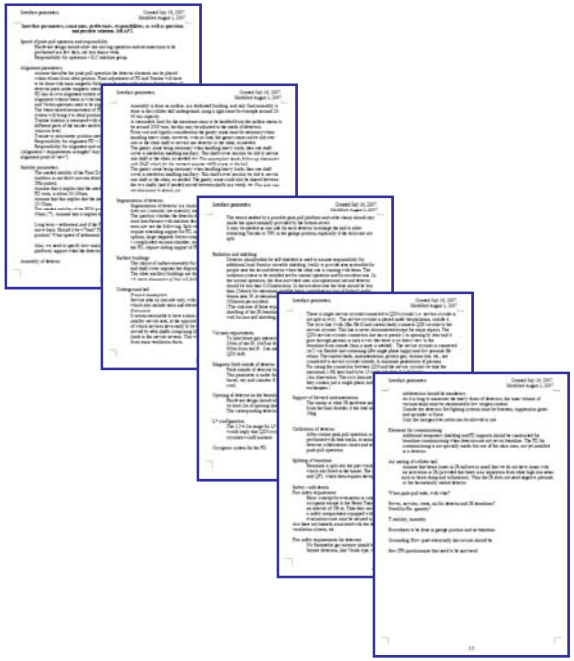
Interface Document

- The most important assumptions, agreements, design features, divisions of responsibilities, will be documented in the “Interface document”

Interface Document includes

- Speed of push-pull & responsibility
- Alignment parameters
- Stability parameters
- Assembly of detectors
- Segmentation of detector
- Surface buildings
- Underground hall
- Radiation and shielding
- Vacuum requirements
- Magnetic field outside of detector
- Opening of detector on the beamline
- L* configuration
- Cryogenic system for the FD
- Support of forward instrumentation
- Calibration of detectors
- Splitting of beamline
- Fire safety for IR hall and detectors
- Elements for commissioning
- And should include other not yet described

The present draft is linked to
http://www-conf.slac.stanford.edu/ireng07/agenda.htm



Interface Document development

- A more developed version of the document will be one of the outcomes of the IRENG07 Workshop
- It will be a step towards more formal documents that would need to be developed during the Engineering Design phase

IRENG07 is a Workshop. What it means?

- We can adjust it structure and schedule on-the-fly, as best suitable for our goal
- To allow for changes, second half of the workshop schedule is not firmly scheduled
- We will have meetings of Conveners & IPAC to discuss the progress and schedule
  - **Today it is ~17:30**

- Let’s start our work

- Next – Detector Concepts talks