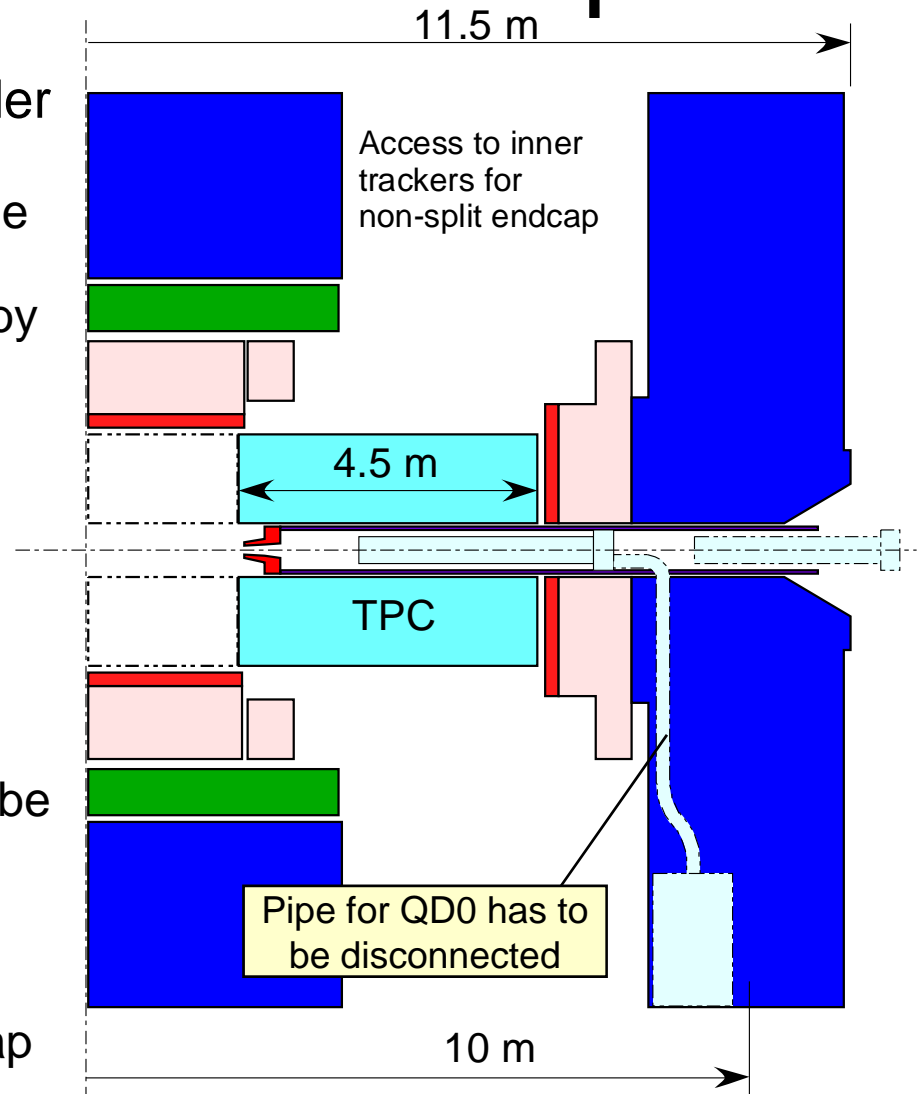# FD Support and Pacman for GLDc
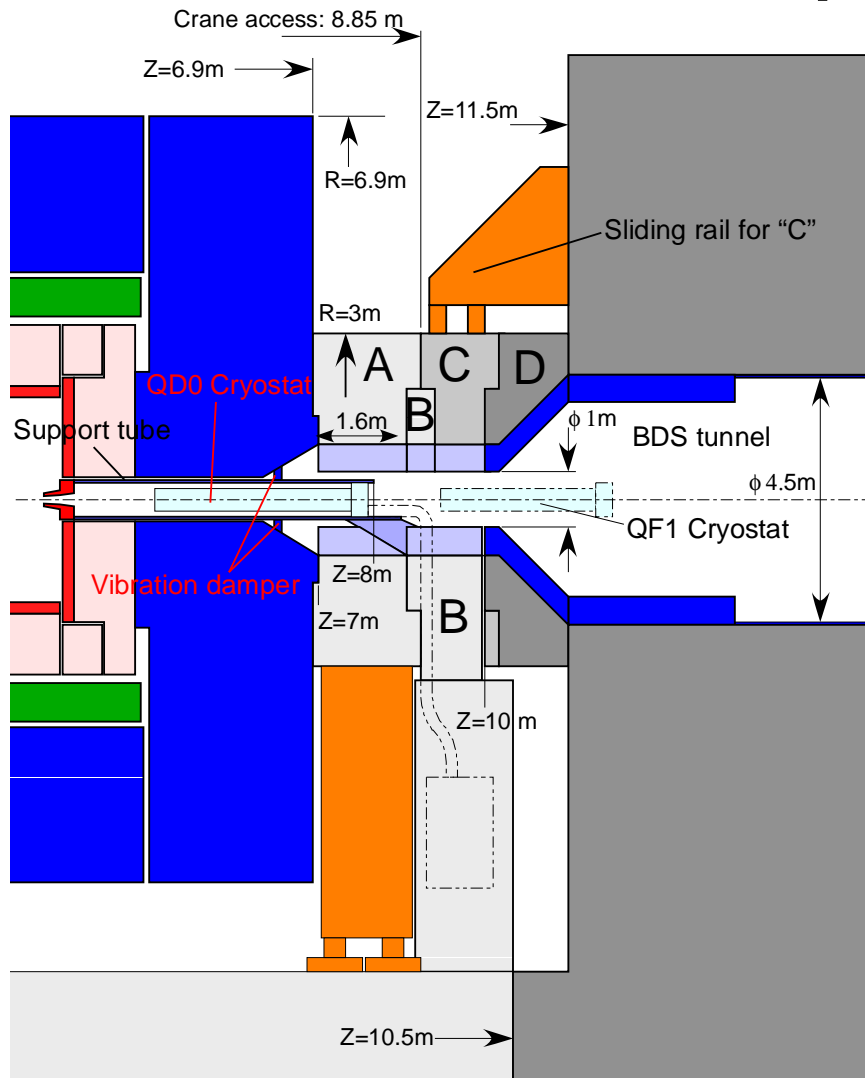
27 Aug. 2007

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KEK

QD0 Support from Endcap

- TPC has to be shifted by 4.5 m in order to make access to the inner trackers
  - Support rail sticks out by >4m from the CAL
  - Inner trackers are usually supported by TPC, but will be supported by the support rail when TPC is shifted
    ➔ Deformation of the rail has to be reasonably small
  - If 300 kg (FCAL and W-mask) is applied to the tip of the 4 m long rail (2cmx4cm cross section), the deformation is ~3 m and maximum stress is >2 GPa ➔ Rail breaks
  - Width of the experimental hall has to be >23 m, anyway
  - Even if we ignore the space for TPC shift, crane accessibility, and safety issues, the hall width has to be >20m (=2x{[detector half width(7m)]+[endcap opening on the beam line(1.5m)] +[space for service cryostat(1.5m)]})

11.5 m

Access to inner trackers for non-split endcap
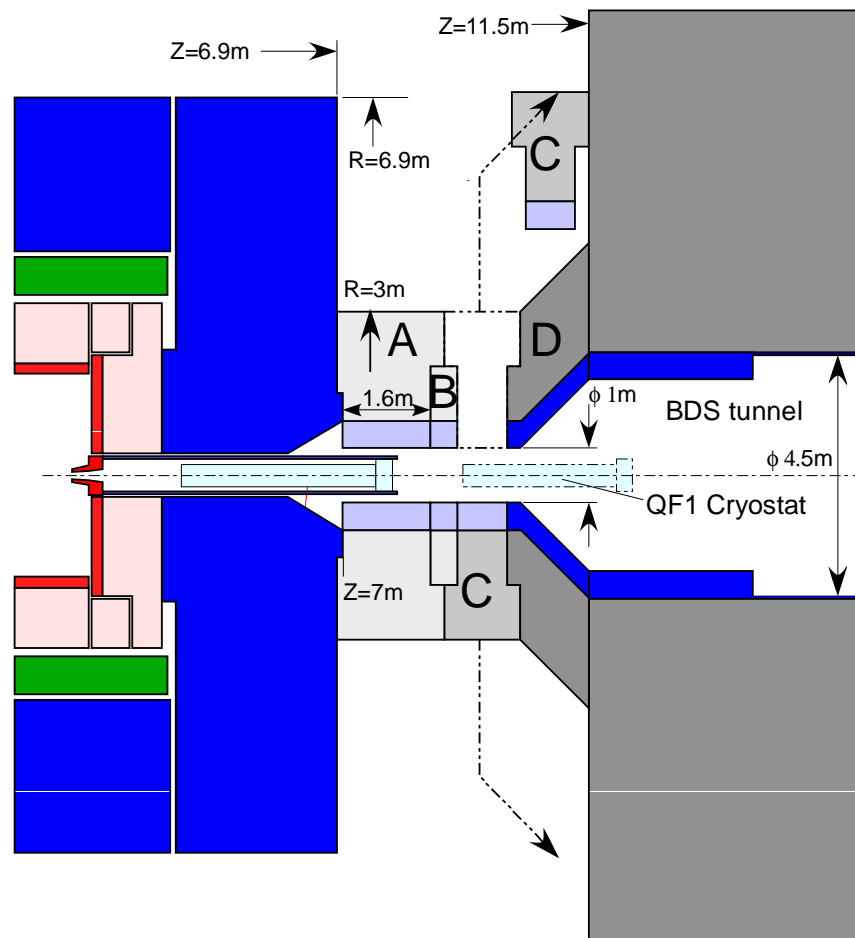
4.5 m

TPC

Pipe for QD0 has to be disconnected
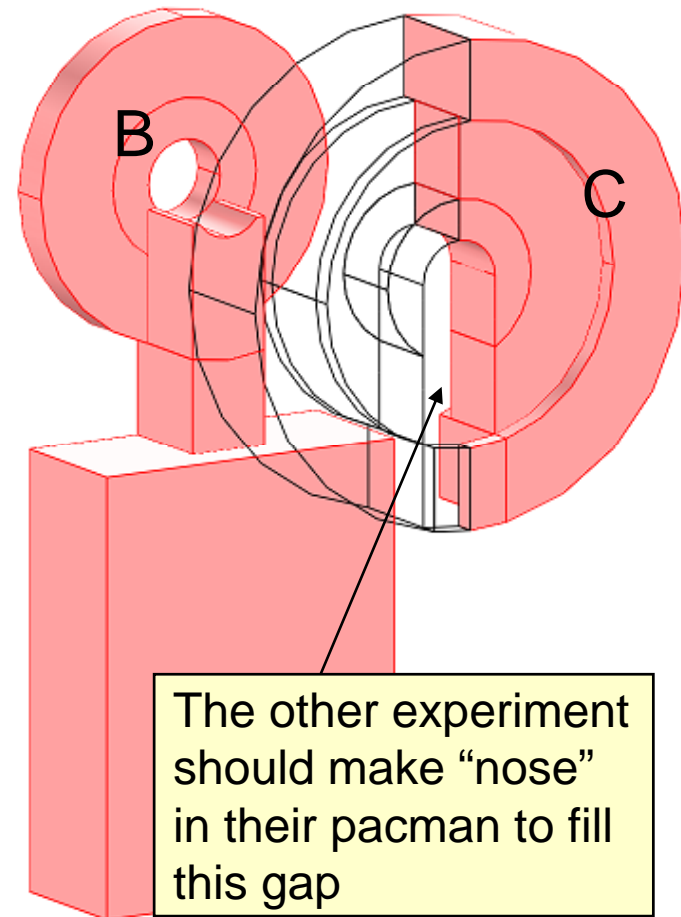
10 m

New Pacman design with Support Tube

- A: slide sideway using air pad
- B: supported from the floor of platform
- Support tube is supported from B
- We can put additional support for the support tube at the entrance of endcap to damp the vibration, if necessary
- Upper part of B (~10 ton) must be removable by crane for installation and removal of the support tube
- C: slide along the wall (D) (common to both experiments)   ~50 tonx2
- D: part of the wall
- Wall distance can be as small as 11.5 m from IP, if the crane can access to 2.65m from the wall
- Construction of C is done by a mobile crane (CMS style)
- Inner radius of pacman should be determined after design of gate valve etc. between QD0 and QF1 is fixed

3
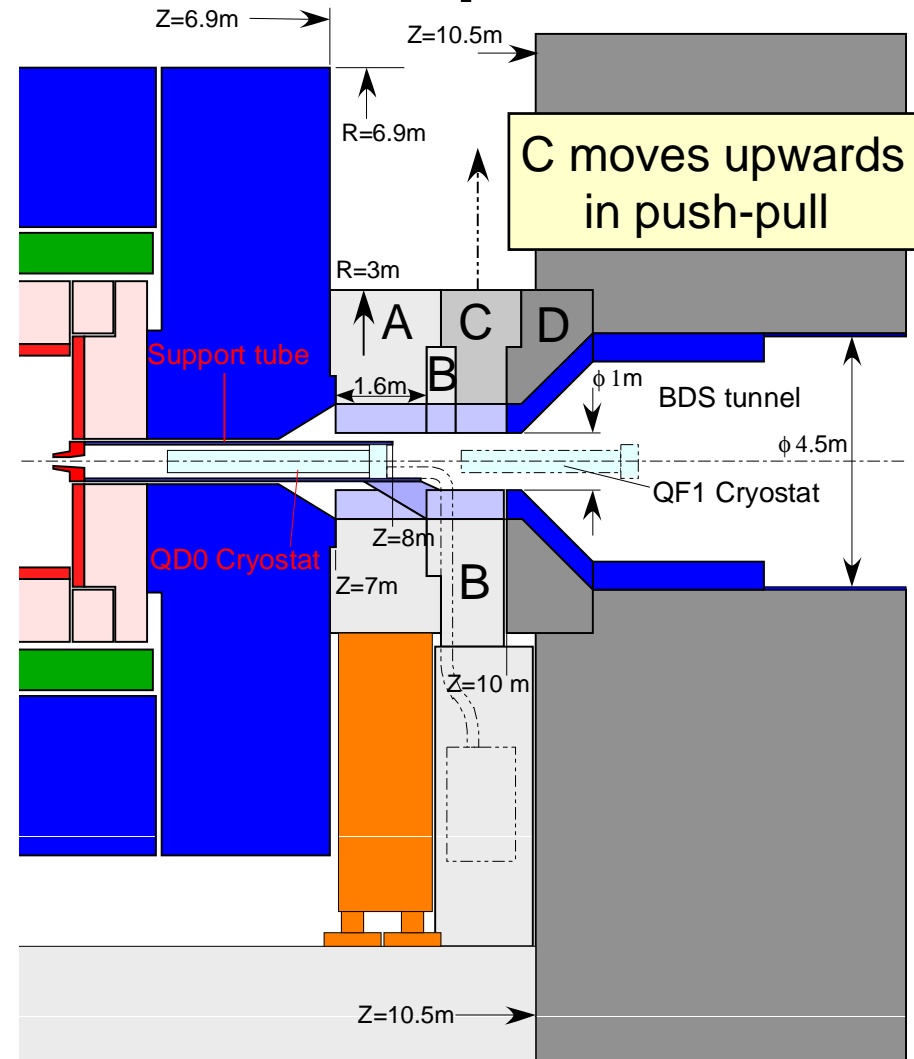
New Pacman design with Support Tube

- Plan view

Z=6.9m →

Z=11.5m →

R=6.9m

R=3m

A

B

C

D

1.6m

Z=7m

C

φ 1m

BDS tunnel

φ 4.5m

QF1 Cryostat

- 3D view

B

C

The other experiment should make "nose" in their pacman to fill this gap

4

Still smaller cavern option

- Forget about crane access
- Forget about safety issues
- Design with cavern floor width as small as 21m can be drawn with the support-tube scheme
  - Pacman "C" moves upwards (using a small gantry crane fixed to the wall?) in push-pull operation
  - There is no way for a person to run away from one side of the detector to the other side

C moves upwards in push-pull

Z=6.9m
Z=10.5m
R=6.9m
R=3m
A C D
B
Support tube
1.6m
φ 1m
BDS tunnel
φ 4.5m
QF1 Cryostat
QD0 Cryostat
Z=8m
Z=7m
B
Z=10 m
Z=10.5m

Summary

- Extension rail scheme for QD0 support suggested by SiD will not work for GLDc
- Hall width difference between QD0 support from endcap and from floor is very small (~50cm=[Width of support leg] - [Width of service cryostat structure])
- If TPC extraction for the maintenance of inner trackers is taken into account, there is no merit for supporting QD0 from endcap
- When QD0 is supported from the floor through support tube, additional support from endcap just to absorb vibration may be useful