

# Assembly Hall in Hybrid-A' and ILD

2014/9/6

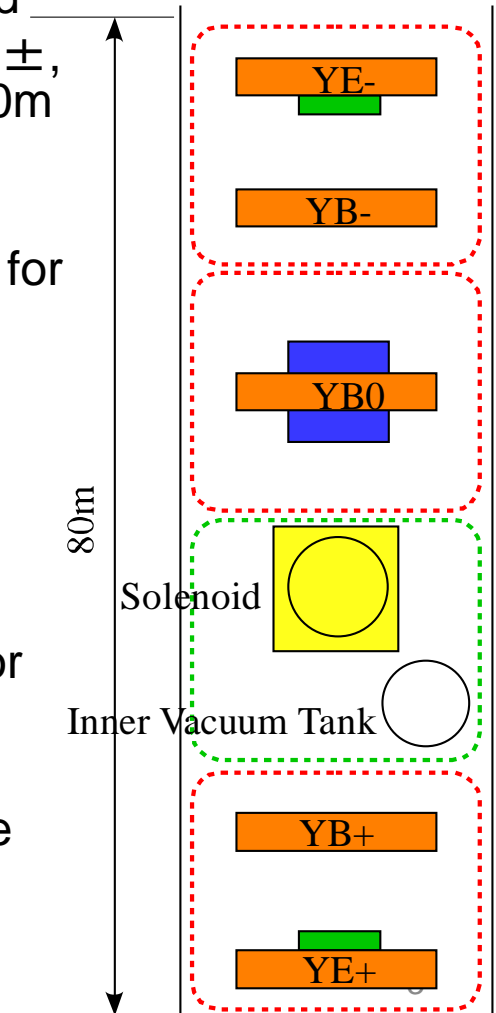
Yasuhiro Sugimoto

# Assembly hall for ILD

- Five pieces of ILD yoke (YE-, YB-, YB0, YB+, YE+) are assembled in the surface assembly hall (AH)
- Each yoke is assembled on the floor, and moved to a platform in AH by air-pads, and lowered to the underground detector hall after installation of some sub-detectors and magnetic field mapping
- Muon detectors, solenoid coil, and barrel/endcap calorimeters are installed on surface (Trackers are installed underground)

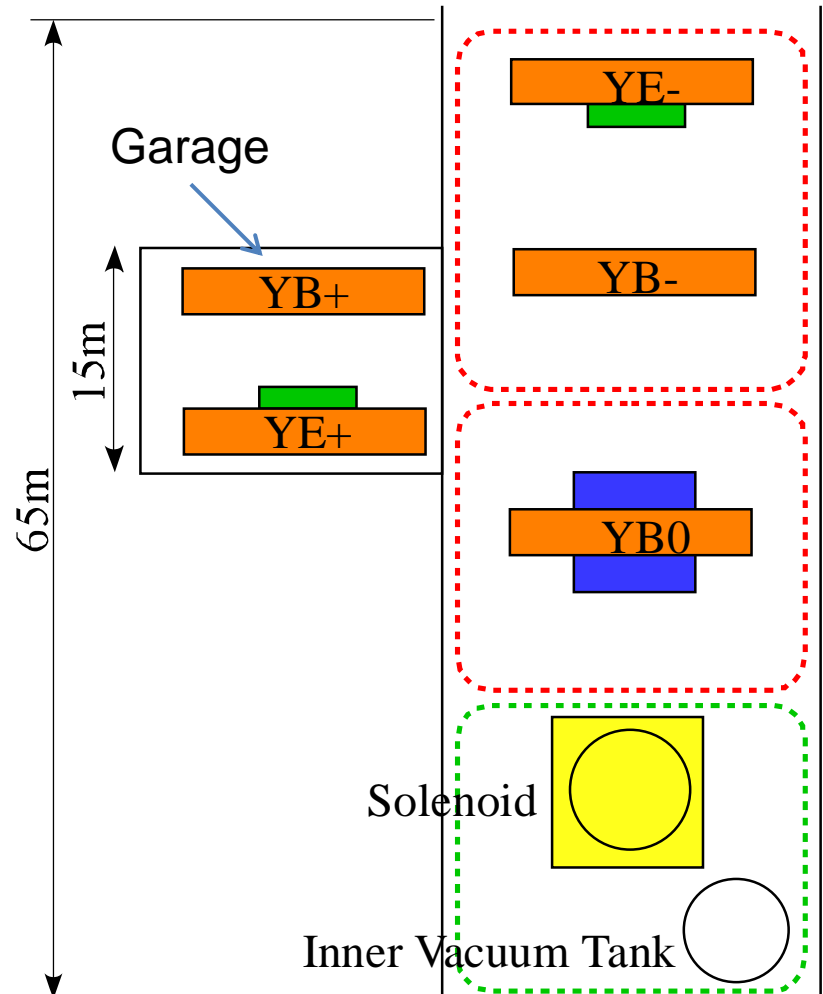
# ILD requirement for AH

- Space
  - ILD needs assembly space for 5 yoke rings and solenoid
  - If we assume 25mx10m space for each of  $YE_{\pm}$  and  $YB_{\pm}$ , and 25x20m for  $YB_0$  and solenoid, respectively, 25mx80m space is necessary
- Crane
  - A 250 ton crane for yoke assembly and an 80 ton crane for solenoid/detector assembly and installation are needed
  - ~4000 ton gantry crane for detector lowering
- Hall height
  - 22.6m from the floor to crane rail, 6m from crane rail to ceiling, plus alpha for lights and fans on the ceiling
- Cryogenics
  - He gas pipes have to be connected from the compressor building for magnetic field mapping in AH
- Platform
  - ILD should have its own platform on surface to avoid the risk of delay of SiD construction



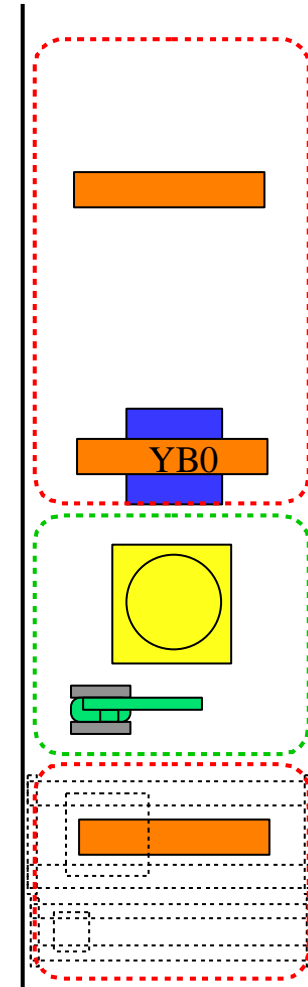
# AH with a garage

- AH should have a garage (alcove) for ILD to put 2 pieces (YE+, YB+) aside
- This configuration gives several merits



# Merits of AH with garage

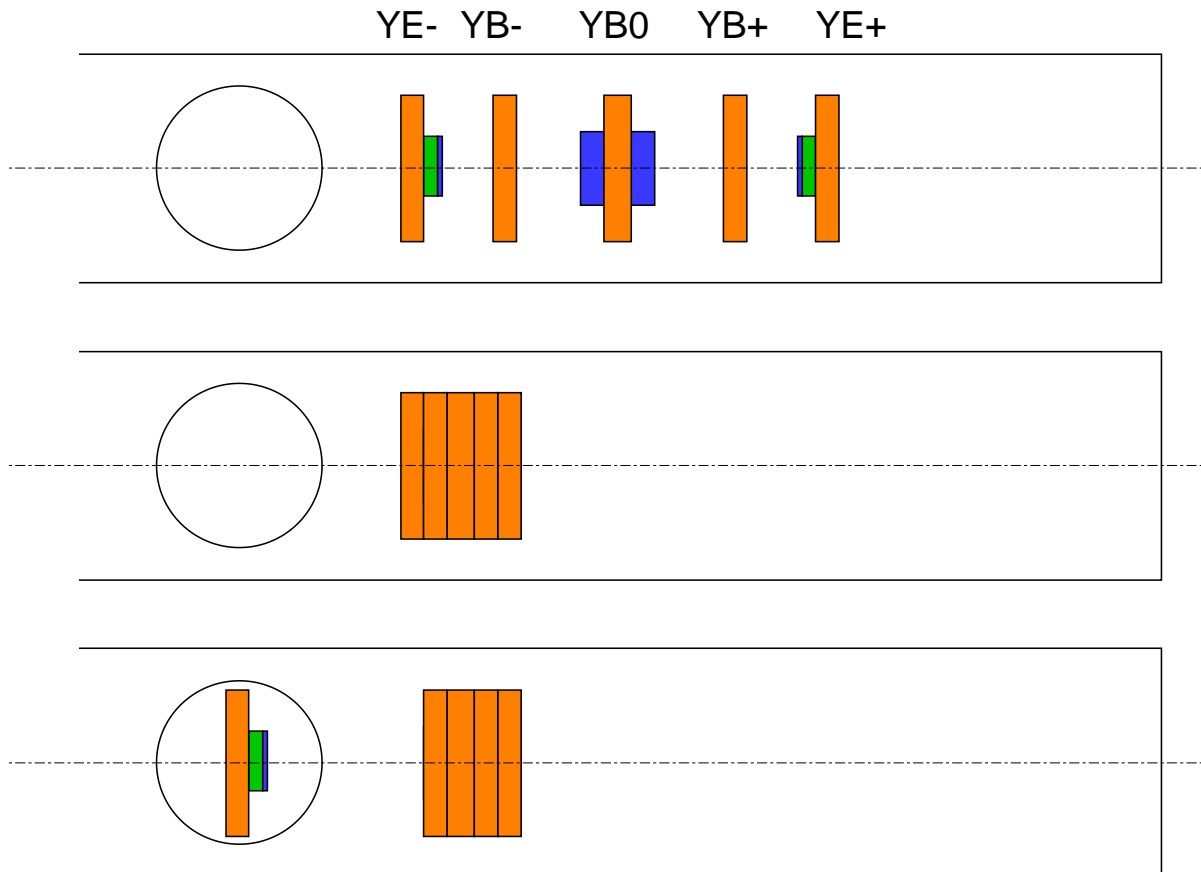
- Shorter AH
  - ILD assembly area: 80m→65m
- Flexibility of assembly area configuration, and effective use of 2 cranes
- Preferable lowering order of ILD
  - YE- → YB- → YE+ → YB+ → YB0 is preferable, and can be achieved if we have a garage
  - YE- → YB- → YB0 → YB+ → YE+ might be OK if cryogenic apparatus on YB0 is small enough



80t crane has no task at this stage

# Lowering order of ILD

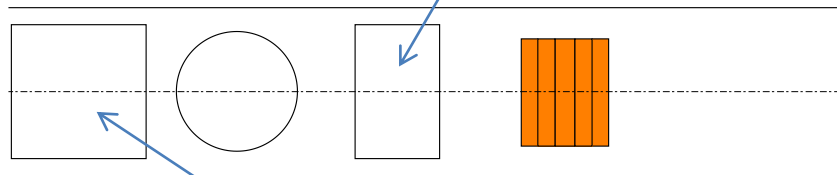
- AH w/o garage



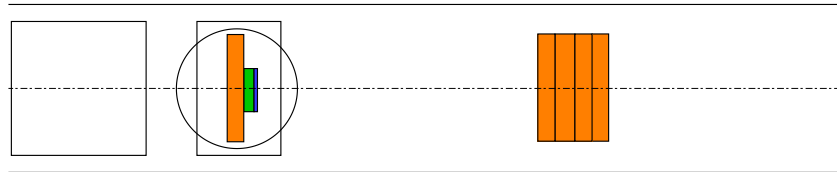
# Lowering order of ILD

- AH w/o garage using SiD platform

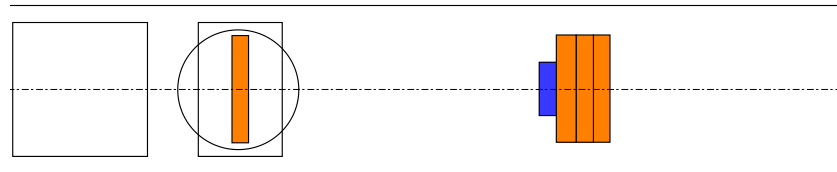
1. Field mapping



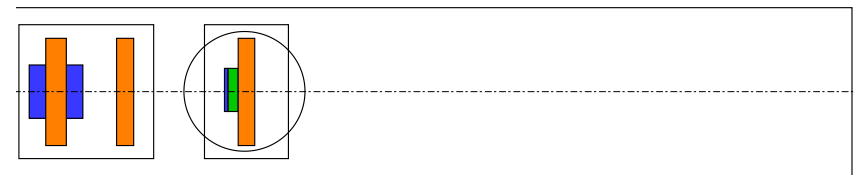
2. YE-



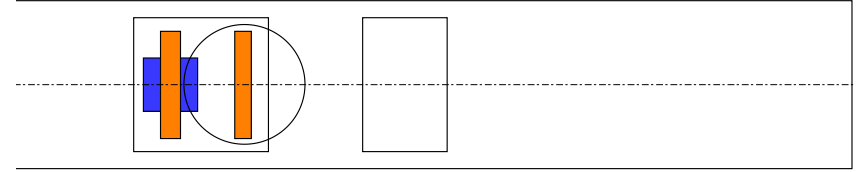
3. YB-



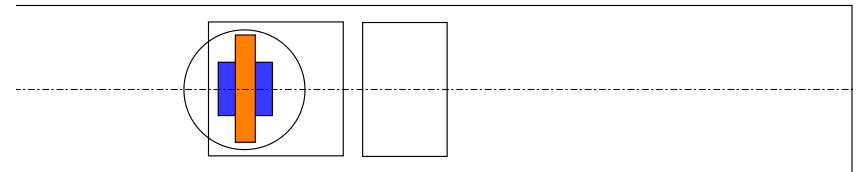
4. YE+



5. YB+



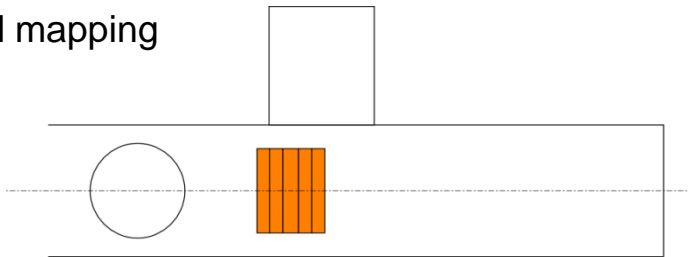
6. YB0



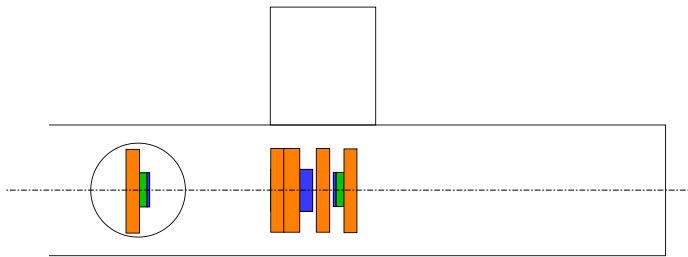
# Lowering order of ILD

- AH with a garage

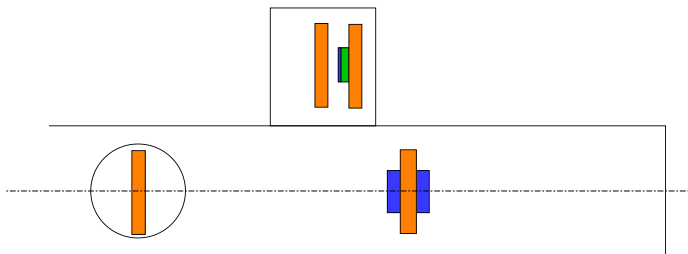
1. Field mapping



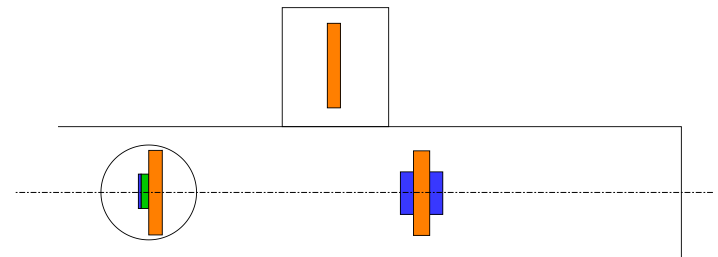
2. YE-



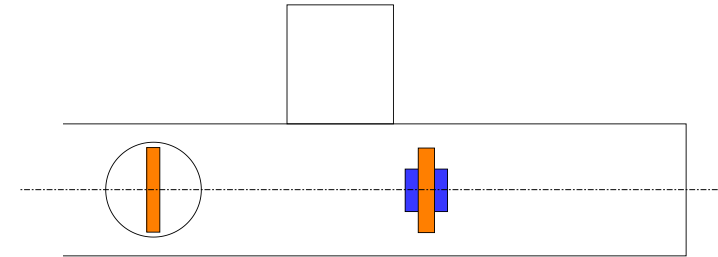
3. YB-



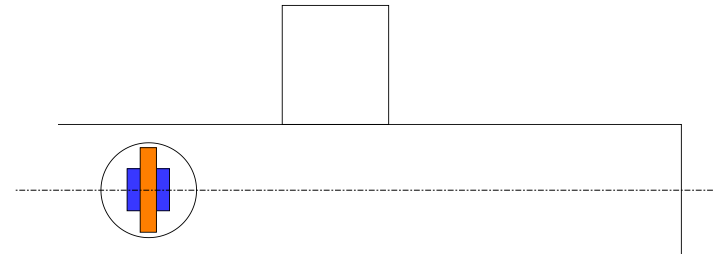
4. YE+



5. YB+



6. YB0

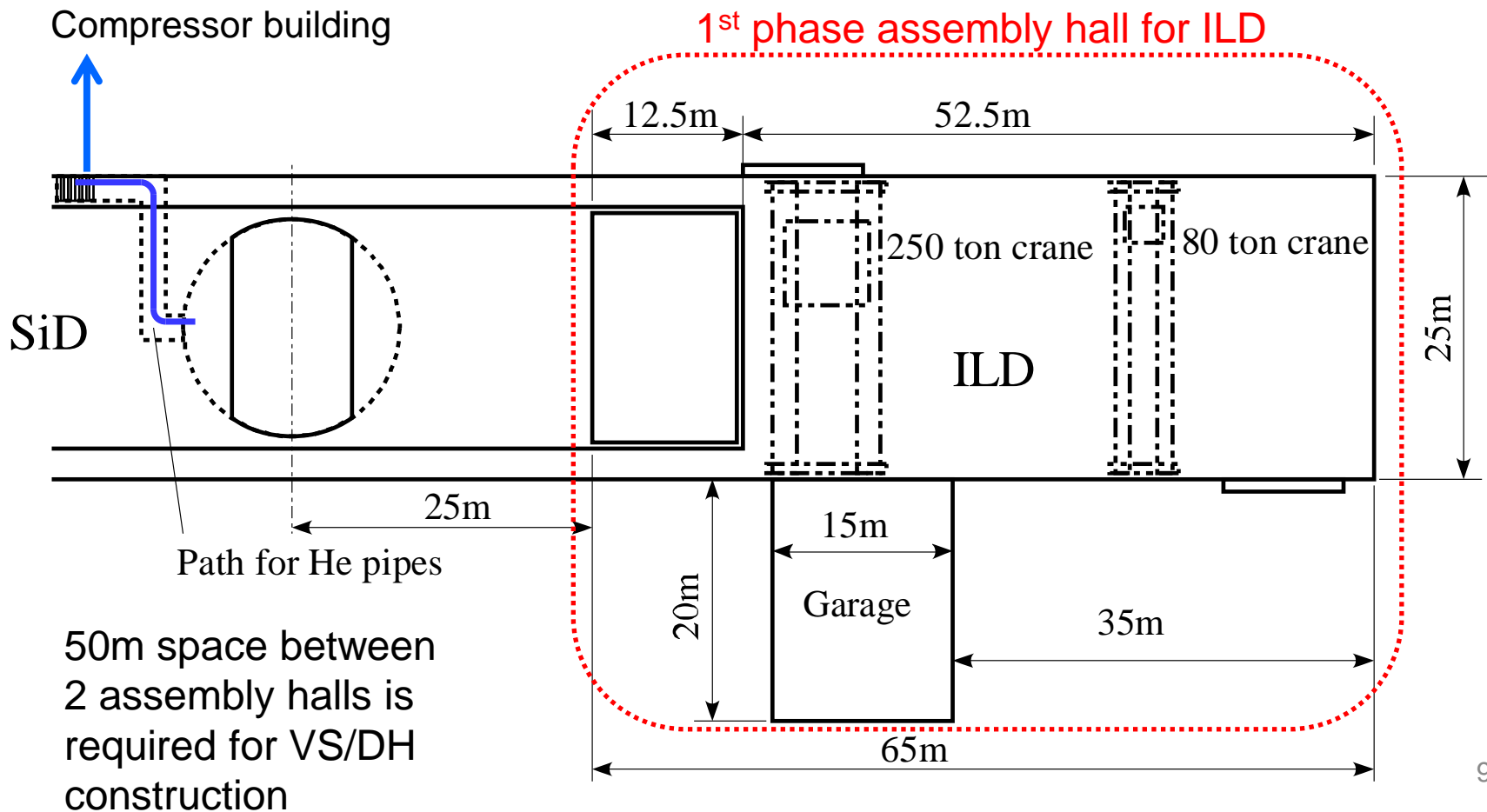


YE+, YB+ step aside  
YB0 step back



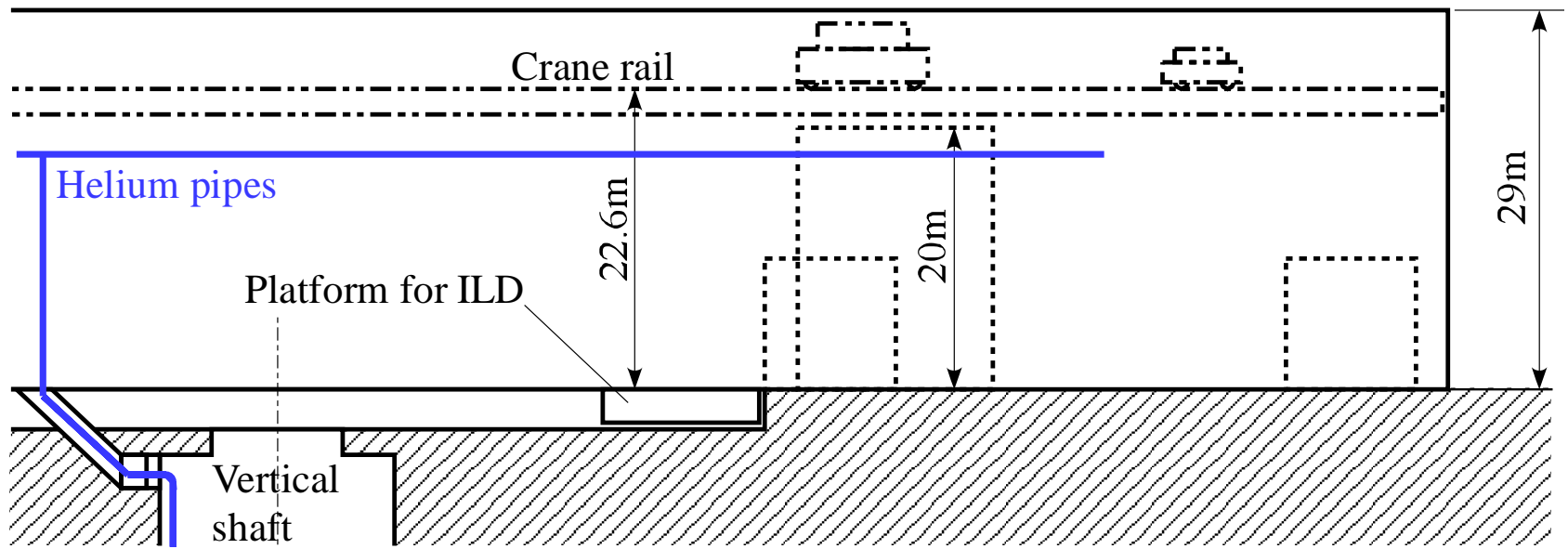
# A possible design of AH

- Plan view

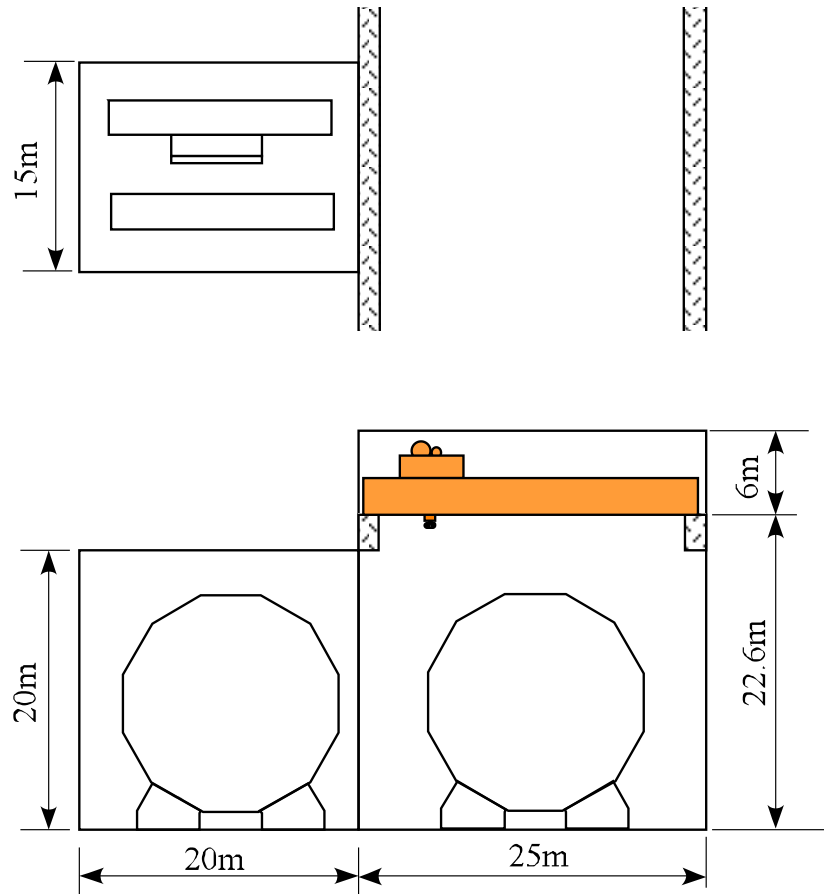


# A possible design of AH

- Side view



# Size of garage

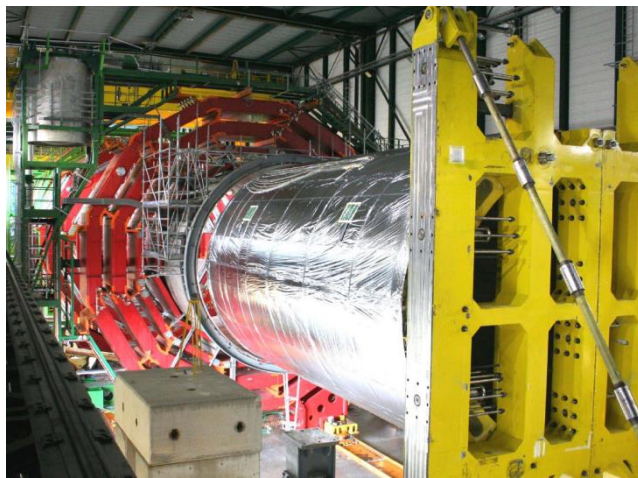


# A possible ILD assembly scenario

- Assumption
  - Similar timeline as Fig.14.10. in TDR Vol.3.II
  - Surface AH shown in the previous pages
  - Same assembly scenario of superconducting magnet as CMS; YB0 → Outer Vacuum Tank (OVT) → Coil → Inner Vacuum Tank (IVT)



OVT assembly

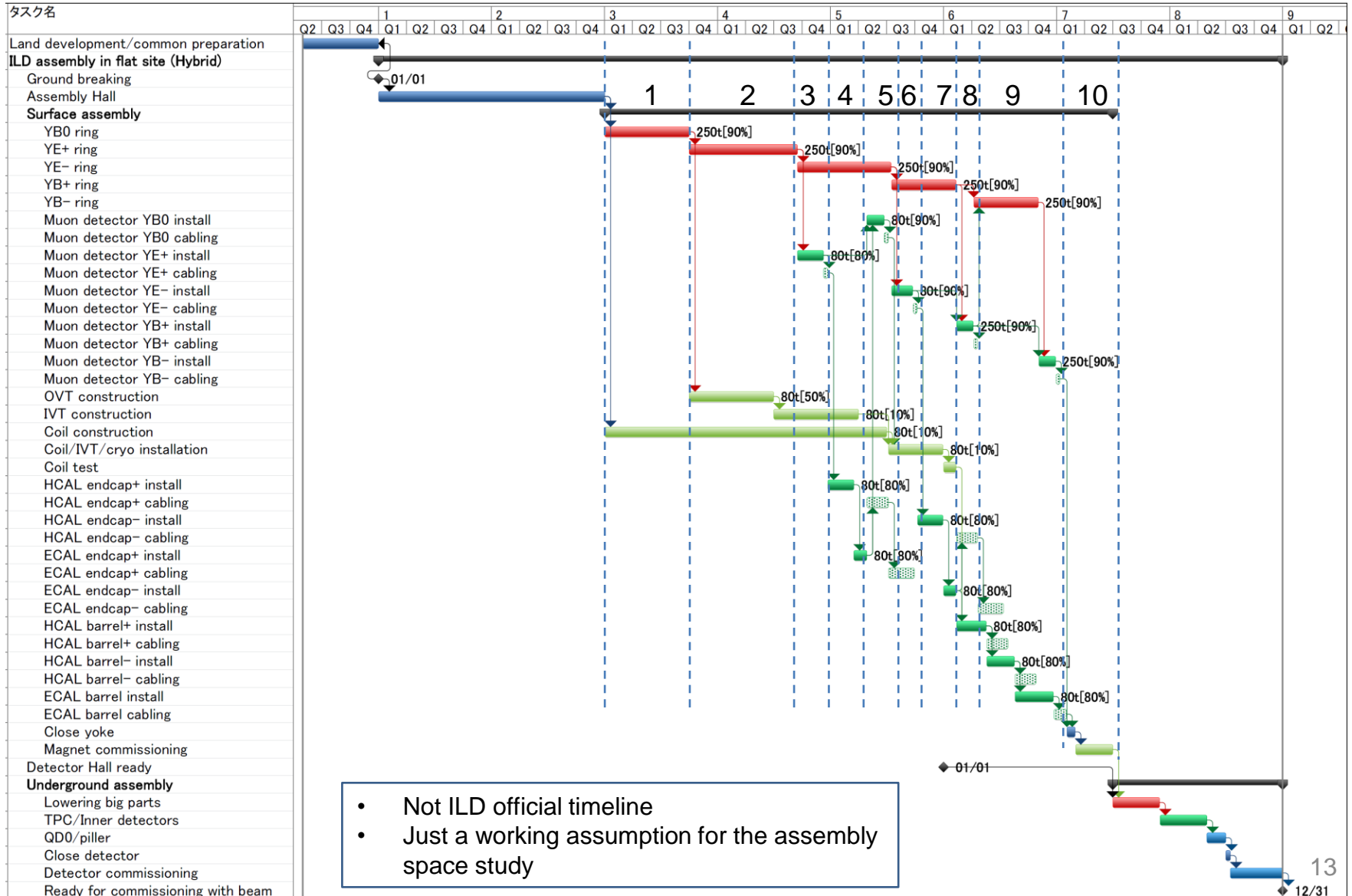


Coil insertion



IVT insertion

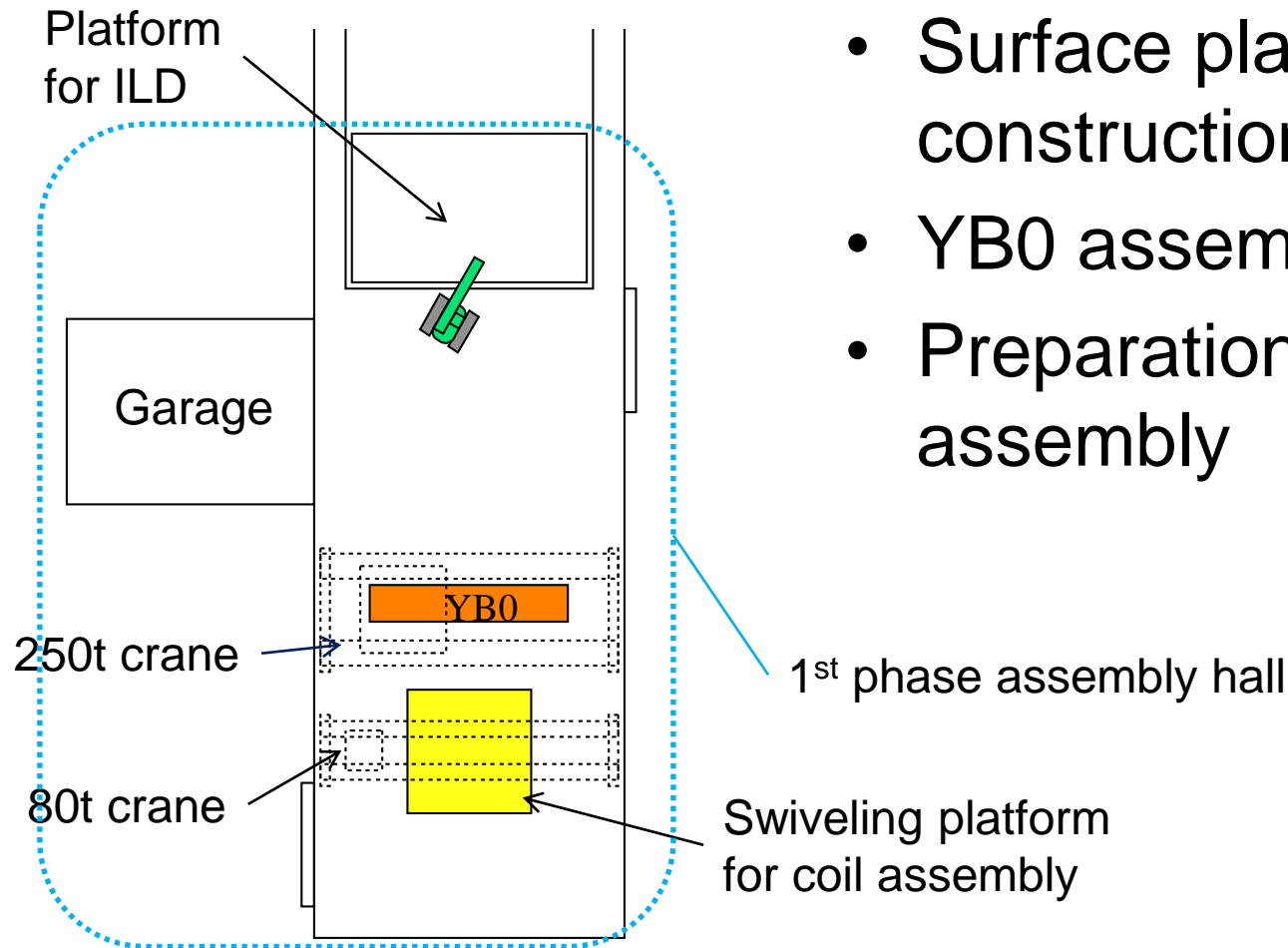
# A possible ILD assembly scenario



- Not ILD official timeline
- Just a working assumption for the assembly space study

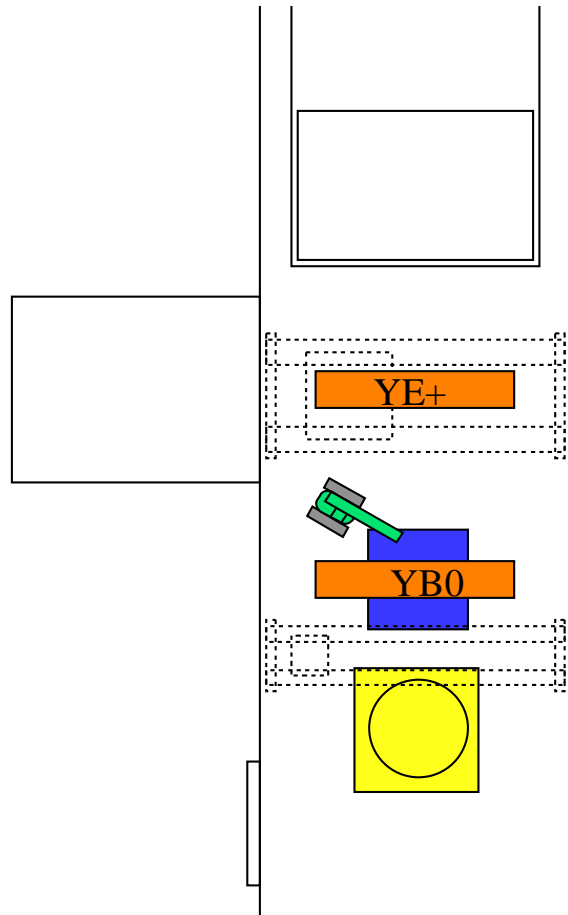
# A possible ILD assembly scenario

## Step-1



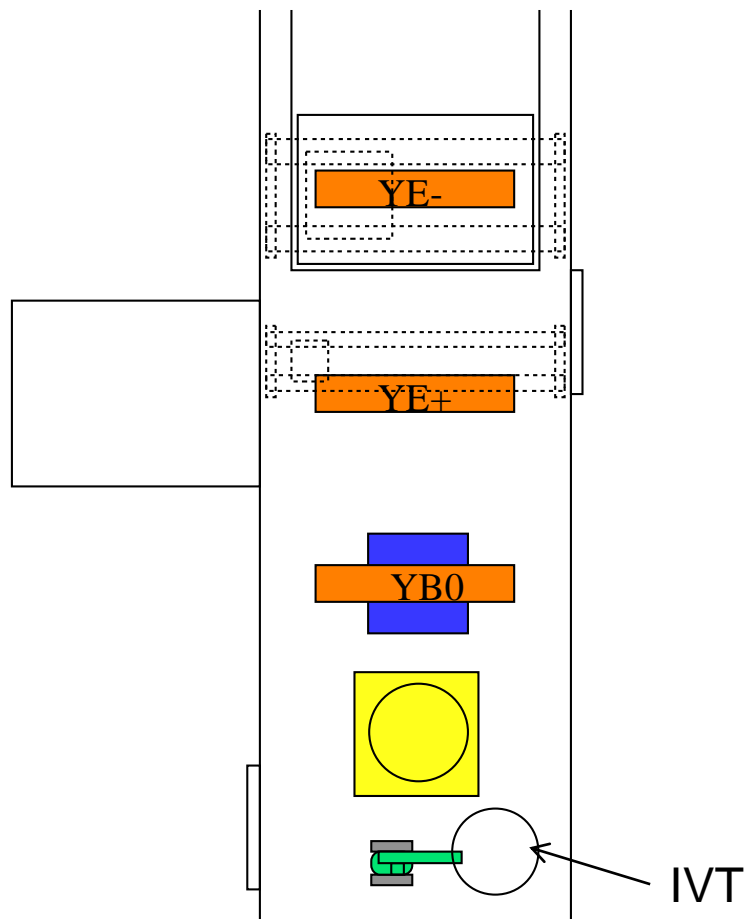
- Surface platform construction
- YB0 assembly
- Preparation for coil assembly

# Step-2



- YE+ assembly
- Coil outer vacuum tank (OVT) assembly
- Coil assembly

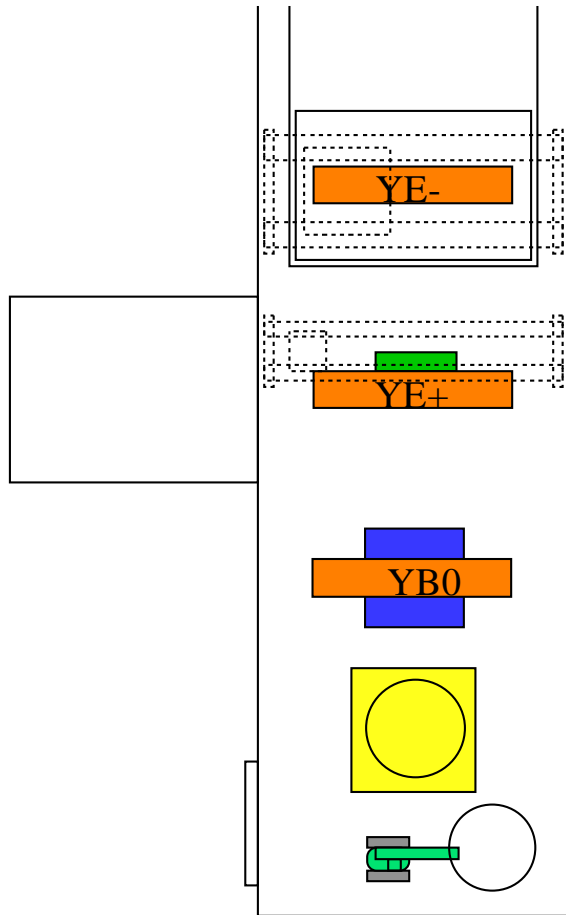
# Step-3



- YE- assembly
- YE+ Muon detector installation
- Inner vacuum tank (IVT) assembly
- Coil assembly

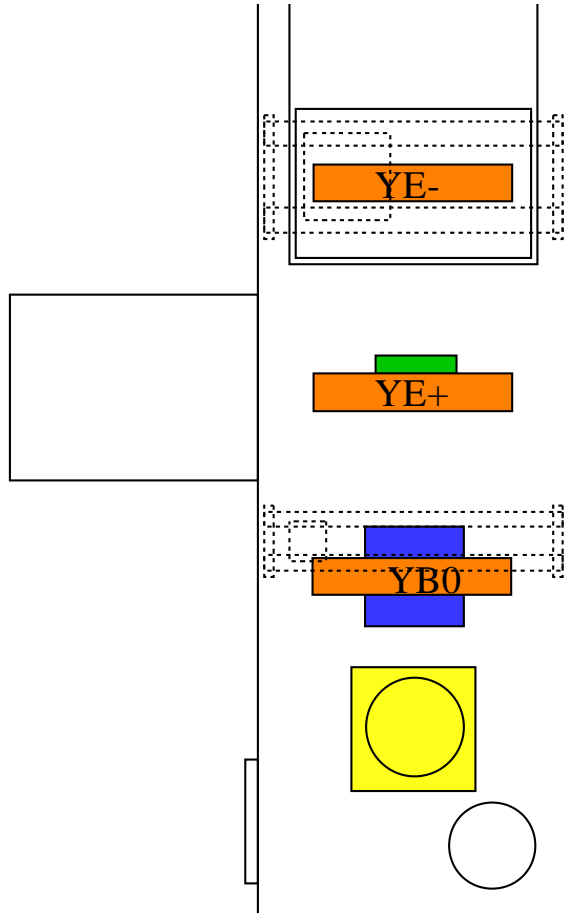


# Step-4



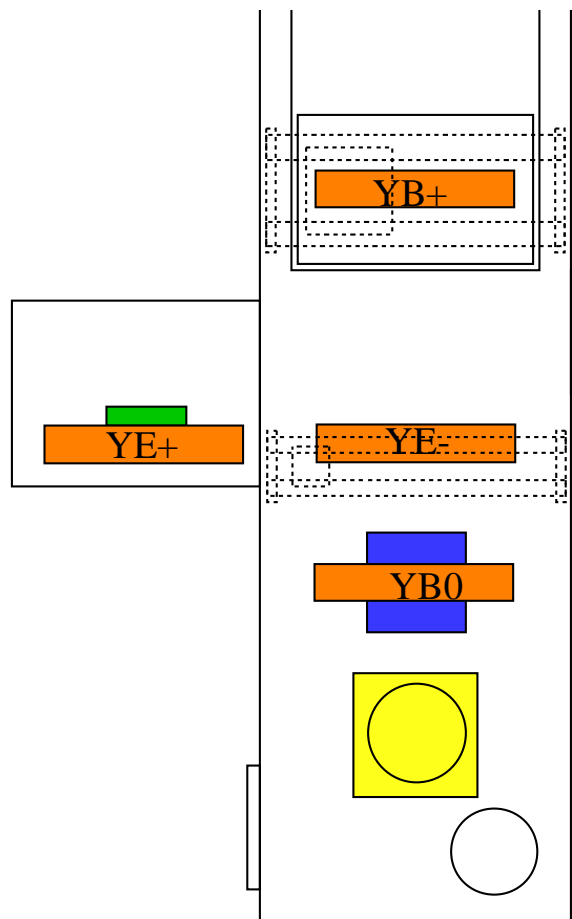
- YE- assembly
- YE+ Calorimeter installation
- IVT, Coil assembly

# Step-5



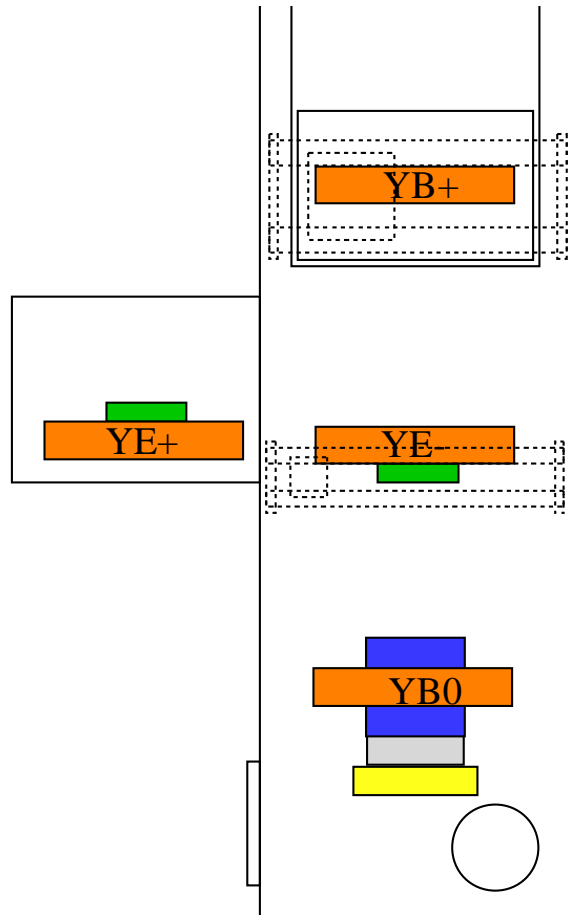
- YE- assembly
- YE+ Calorimeter cabling
- YB0 Muon detector installation
- Coil assembly

# Step-6



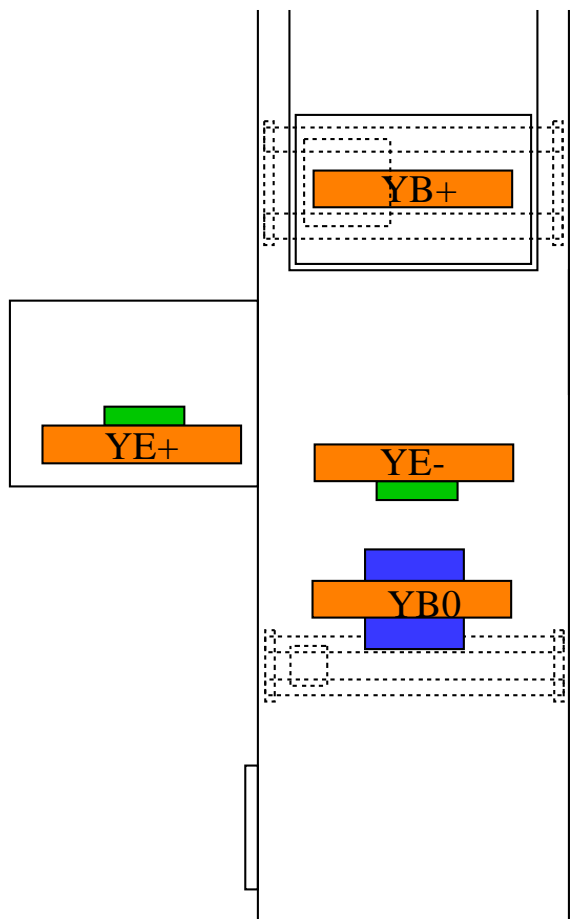
- YB+ assembly
- YE+ pushed into garage, ECAL cabling
- YE- Muon detector installation
- Coil assembly

# Step-7



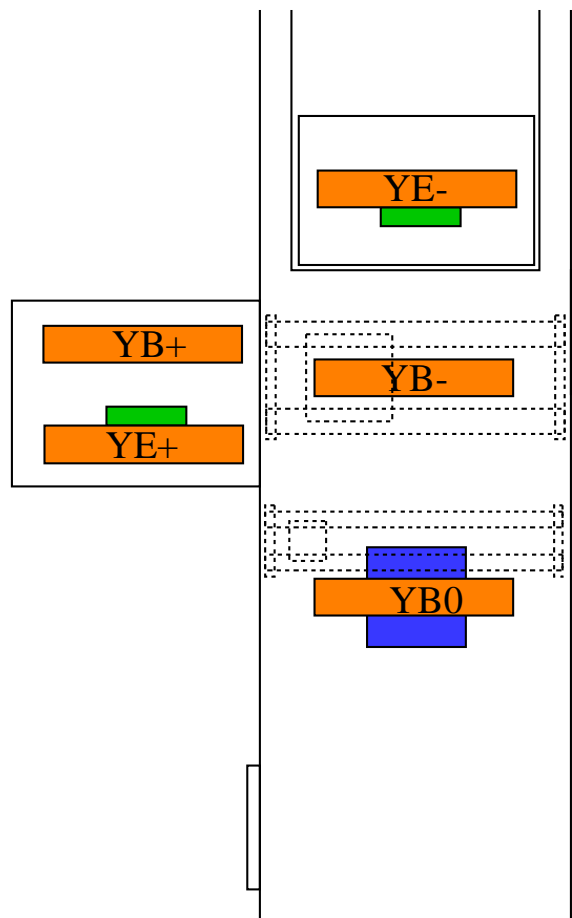
- YB+ assembly
- YE- Calorimeter installation
- Coil, IVT installation  
→ test for vacuum, cooling, and low current

# Step-8



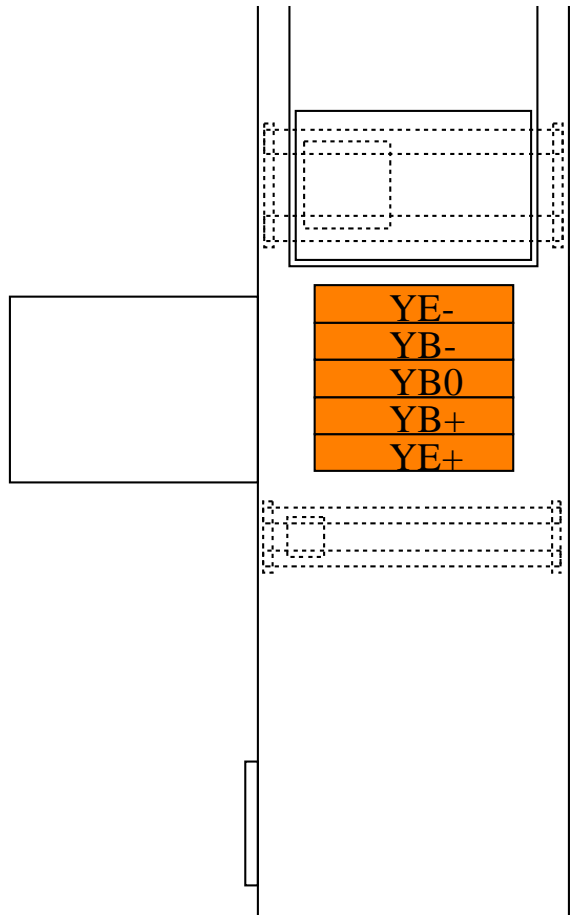
- YB+ Muon detector installation
- YB0 Calorimeter installation

# Step-9



- YB+ pushed into garage
- YE- pushed to vertical shaft side
- YB- assembly, Muon detector installation
- YB0 Calorimeter installation

# Step-10



- Close detector
- Field mapping (SiD is >50m away from ILD)

# Conclusion

- AH with a garage has several merits for ILD
- If AH can have a garage, ILD can be assembled with 65m (=52.5m+12.5m) length of AH (1<sup>st</sup> phase AH)
- Total length of AH could be ~180m (65+50+65m) if SiD requires same length of assembly area