

# Integration of FCAL in LC detectors



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- Assumptions on integration
- FCAL requirements on IP campus
- FCAL requirements on central campus
- Assembly/test timeline
- Interference with other subsystems
- Second detector?
- Outlook

# FCAL Integration

Requirements and Timeline

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## Outline

Assumptions on integration

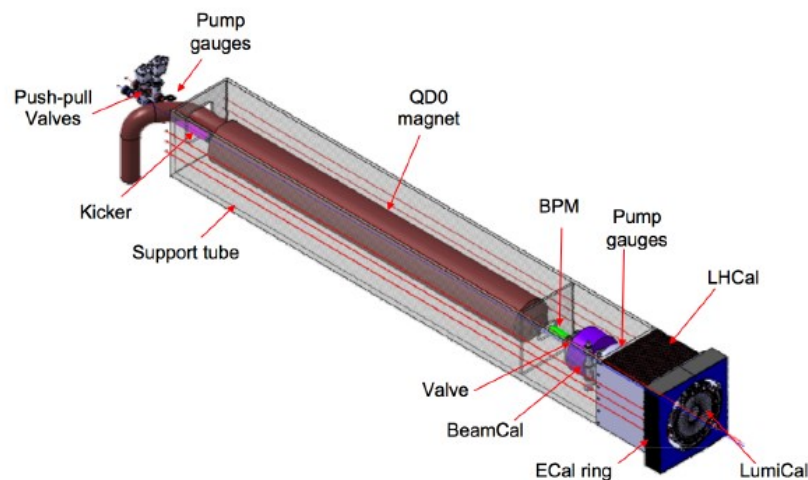
FCAL requirements on central / IP campus

First shot at timeline

## Integration of FCAL Components

### Assumptions:

- QD0 magnet, LumiCal, LHCaI, BeamCal all assembled separately at arbitrary locations in the world.
- Requirements on and timelines of individual production / construction locations to be separately defined.
- Assembly and testing at central campus OR at IP campus



FCAL Integration

TSS

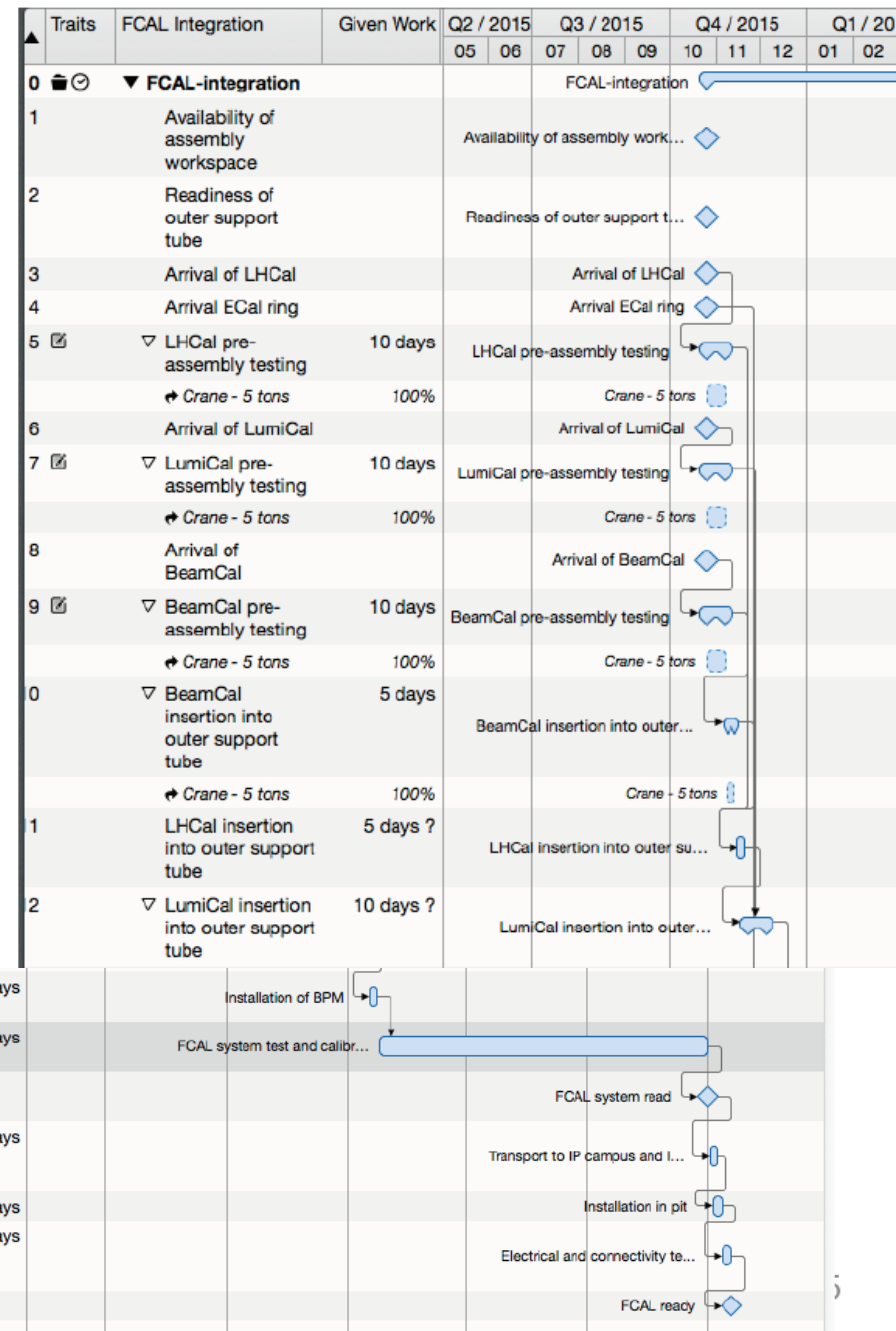
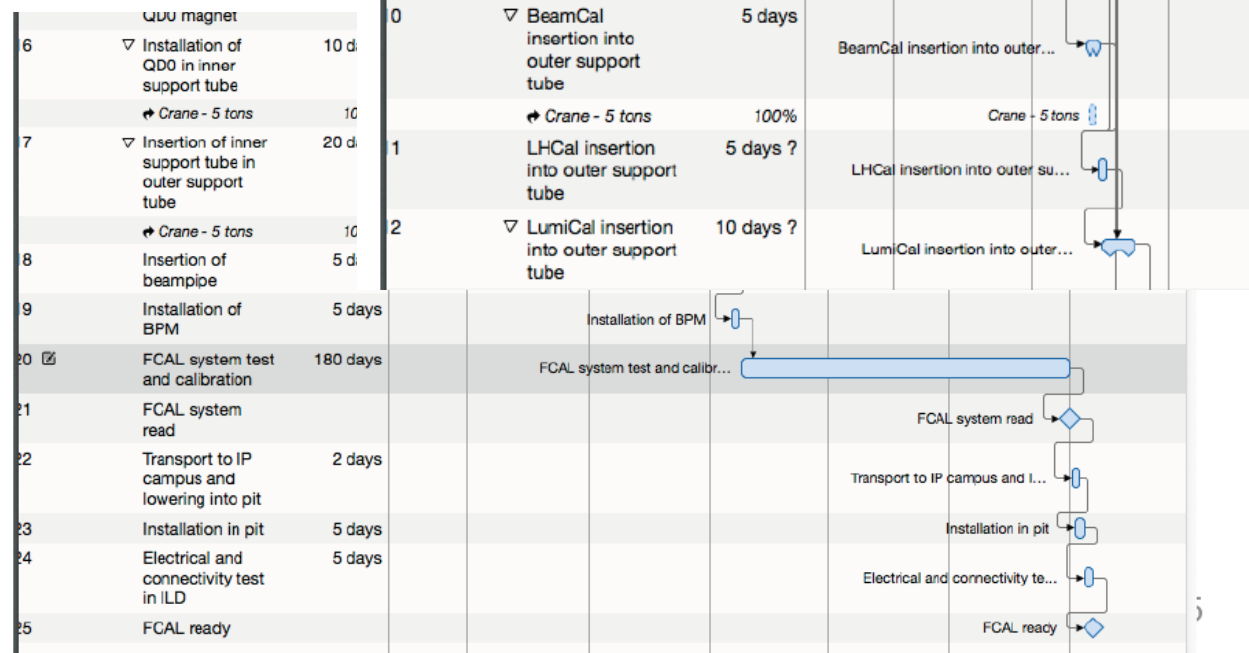
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# FCAL Requirements at Central / IP Campus

- Assembly area: 100 m<sup>2</sup> ISO 7, temperature stabilisation
- Crane: 10 t
- Storage: negligible
- Workshop: normal equipment (HV, cooling media, ...)
- Access to bonding facility
- After assembly at central / IP campus:
  - Full test and calibration runs ~6 months
  - (Transport to IP campus – thermally and vibrationally protected)
  - Lowering and installation in ILD (1 week)
  - Short electrical / connection test
  - Commissioning (1 month)

## Draft Timeline

- Assumptions see pages before, discussed again with Karsten.
- Questions
  - Many ;-)
  - Do we need BPM and / or QD0 in for FCAL system test?
  - Can we work on / install all three Cals simultaneously?
  - What are realistic times for the individual steps?
  - ...



## Assumptions on integration

- Parts of LumiCal, LHCAL and BeamCal produced separately at other locations in the world
- Test assembly of sample parts is done at the participating labs
- Final assembly at IP campus
- Test and calibration of the FCAL calorimeters ~1/2 year
- Installation in the support structure: 2 scenarios: -
  - at the IP campus (support tube, QDO, part of beampipe, BPM, cooling, cables, ECAL ring, etc. etc.) - seems to be not very attractive due to the interference with other subsystems and need of large amount of additional equipment
  - assembly and test of calorimeter halves at IP campus, lowering parts down to IP and final assembly there - in my view preferable
- Calibration period before installation? - how to do and what equipment is needed
- Computers, back-end electronics, power supplies, cables - to be specified

## Infrastructure

- Assembly area 100 m<sup>2</sup> ISO 7 temperature stabilized
- Gas and cooling media supplies
- Additional area for long term calibration? Same requirements as for assembly area
- Delivery area 50 m<sup>2</sup>
- Room for power supplies, computers etc. 25 m<sup>2</sup>
- storage: we also need something, not much, but there are usually crates, instruments, spares, materials to be used for assembly which have to be kept somewhere nearby ~20 m<sup>2</sup> is sufficient.
- office space is also necessary. Lets assume there are 20 people present, 5 offices for 4 people each, or 10 for two is a good ansatz. Seems like it is more relevant for the central campus.

# Installation schedule

- Installation 1 week per side (since in fact these are 3 detectors per side, BeamCal LumiCal and LHCAL) there is also the Ecal ring, which would be not in the responsibility of FCAL but may cause some interference/collaboration with ECAL.
- Comment from Thomas: So we say a month in order to be on the safe side - 2 weeks per side
- The calorimeters should be installed on each side by the same people, first LHCAL, then LumiCal, then BeamCal, two days per device (too optimistic?)

# Outlook

- We need to prepare a document, summarizing our assembly, installation and test plans + preliminary timeline
- According to the plan we need to formulate our infrastructure requirements
- Probably we could also include there our plan for later usage of infrastructure at IP campus

It is all about ILD... What about the second detector?