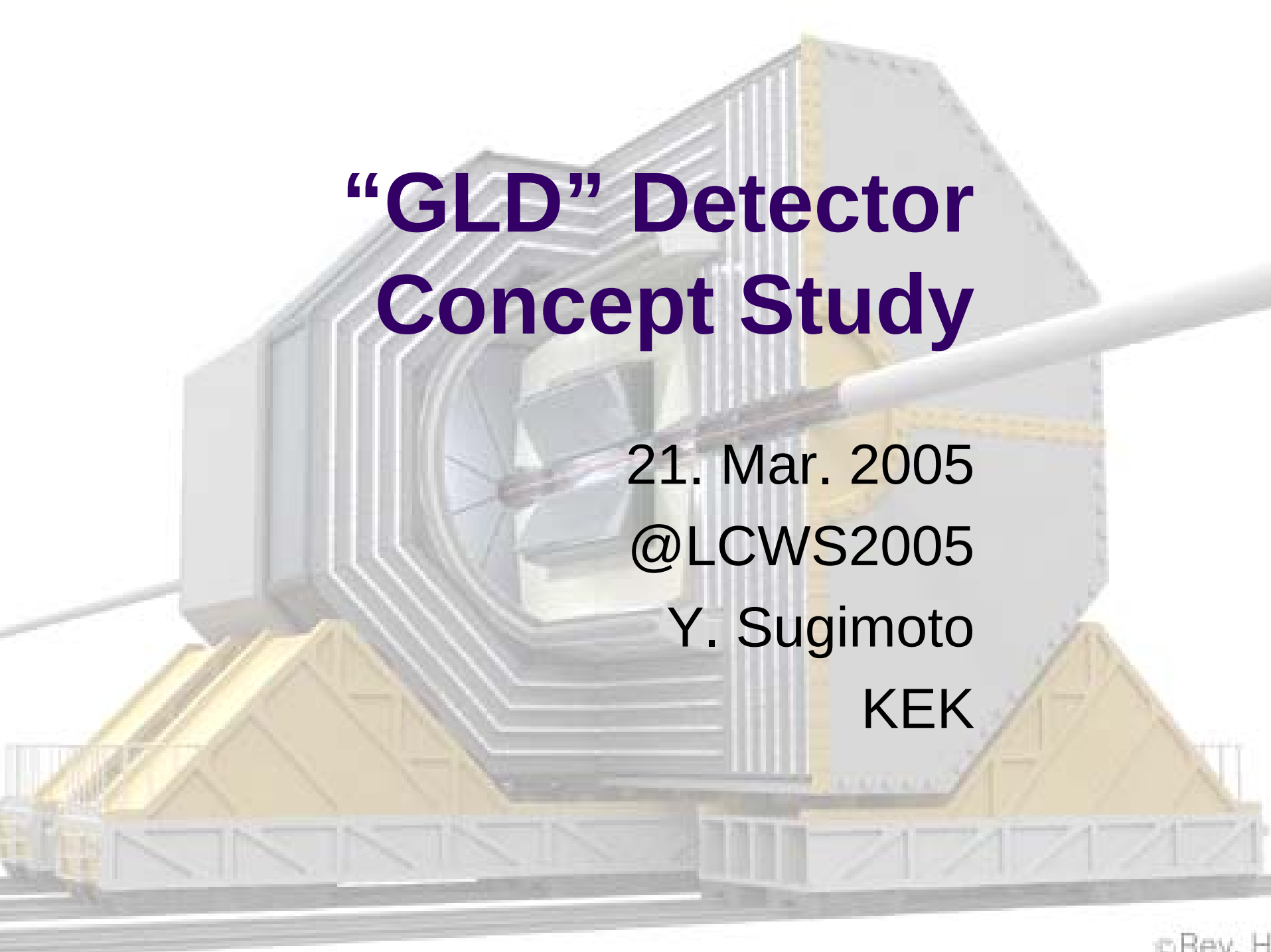


“GLD” Detector Concept Study

21. Mar. 2005

@LCWS2005

Y. Sugimoto

KEK

Contents

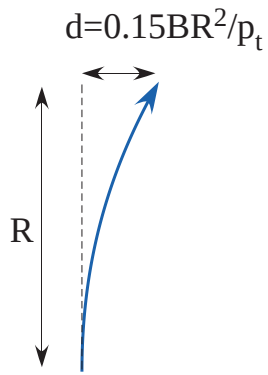
- Basic detector concept
- Present status
- Organization
- Action plan (tentative)

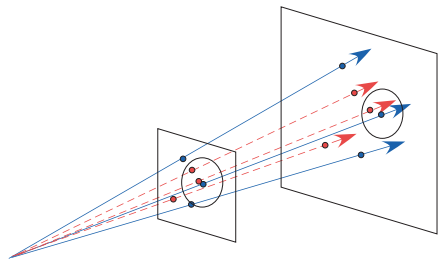
Basic design concept

- GLD detector concept
  - Large inner radius of ECAL to optimize for PFA
  - Large gaseous tracker for excellent $\delta p_t/p_t^2$ and good pattern recognition (efficiency for K^0, Λ, and new long-lived particles)
  - Moderate B field of 3T
- Optimization for PFA
  - Figure of merit (ECAL):
    - Barrel: $B\ R_{in}^2 / R_m^{effective}$
    - Endcap: $B\ Z^2 / R_m^{effective}$

    R_{in} : Inner radius of Barrel ECAL

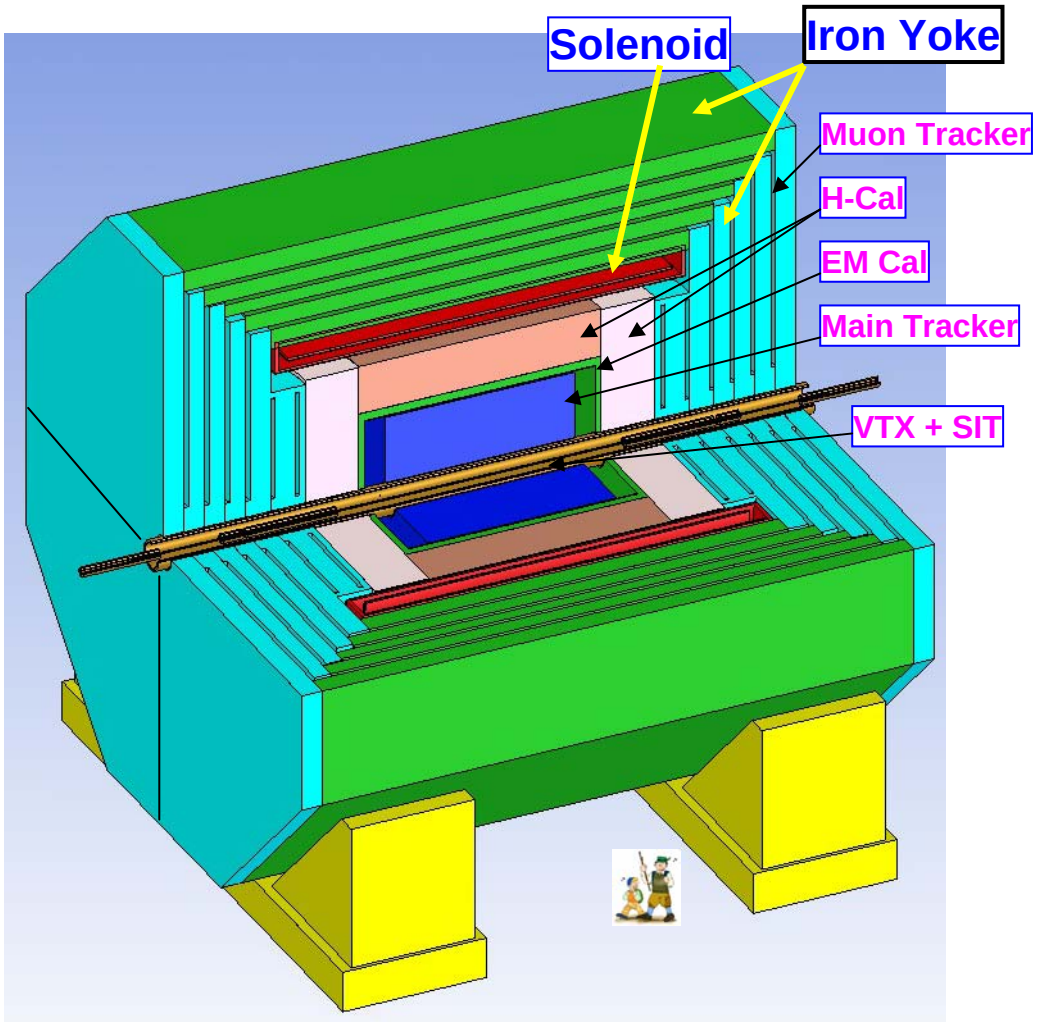
    Z : Z of EC ECAL front face





(Actually, it is not so simple. Even with B=0, photon energy inside a certain distance from a charged track scales as ~R_{in}^2)

Baseline detector design

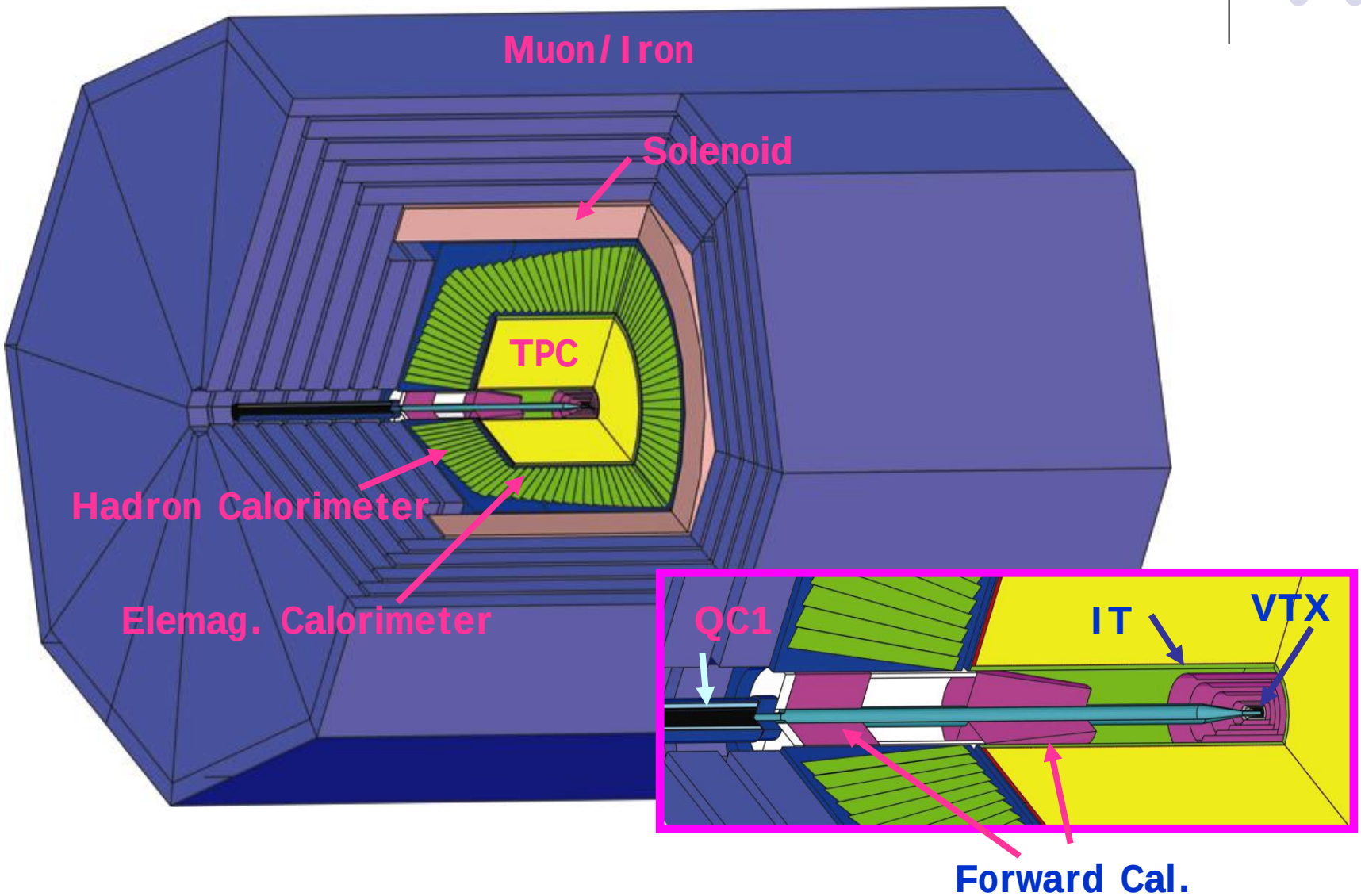


- Some of sub-detectors (forward Si disks, for example) have not been seriously studied yet

Present status

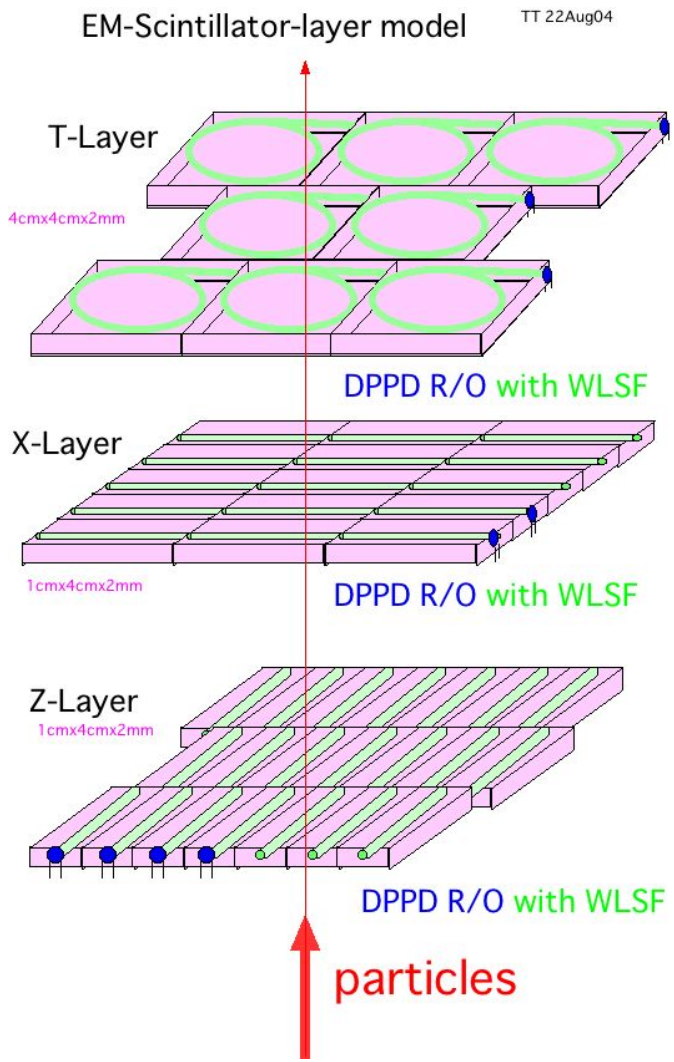
- GEANT4-based full simulator JUPITER
- Hardware R&D
  - CCD Vertex detector
  - Si intermediate tracker
  - TPC
  - W/Scintillator calorimeter
  - etc.
- Study of 3T solenoid and mechanical structure

Geometry in JUPITER



R&D for W/Sci CAL

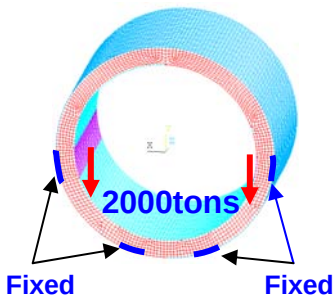
- Study of scintillator tile/strip with SiPM readout

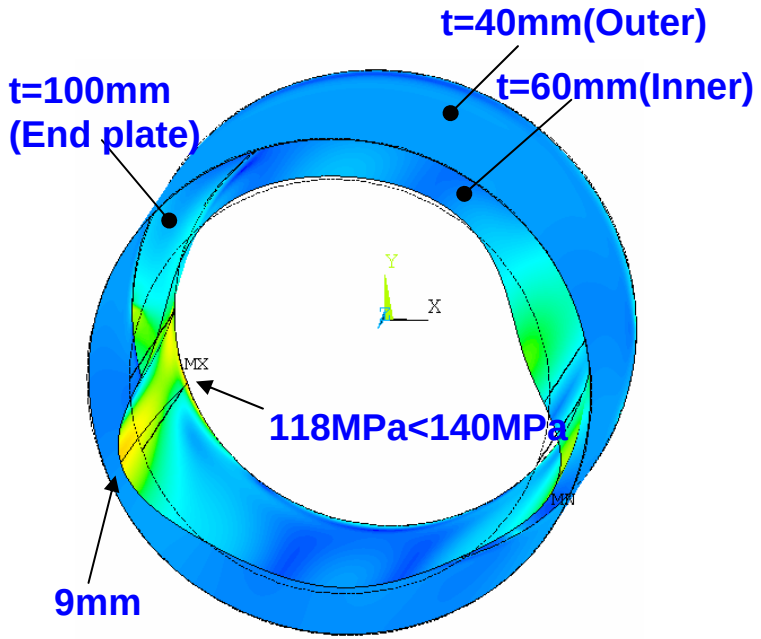


Study of mechanical structure

- Deformation of solenoid cryostat by CAL weight (2000t)

Material: SUS304





Important

Weight of the calorimater should be supported at horizontal position.

- Calorimeter is divided to several modules in the axial direction.

- One module of calorimeter has to be stiff enough.

Organization

- Contact persons
  - 2 from ASIA H.B. Park, H. Yamamoto
  - 2 from Europe R. Settles, M. Thomson
  - 2 from N.A. G. Wilson, +1 candidate being contacted
- Executive board
  - Simulation, benchmark, sub-detectors representatives
  - To be formed by the contact persons

Tentative Plan

- After this workshop
  - Selection of physics/detector benchmarks
  - Prepare fast simulations for the benchmarks
  - Studies of subdetector parameters
    - Analytical estimations, fast simulations, GEANT simulations
  - Preparations for cost estimates
  - Communicate with the R&D panel, identify critical and missing R&Ds
  - Subdetector R&Ds continue

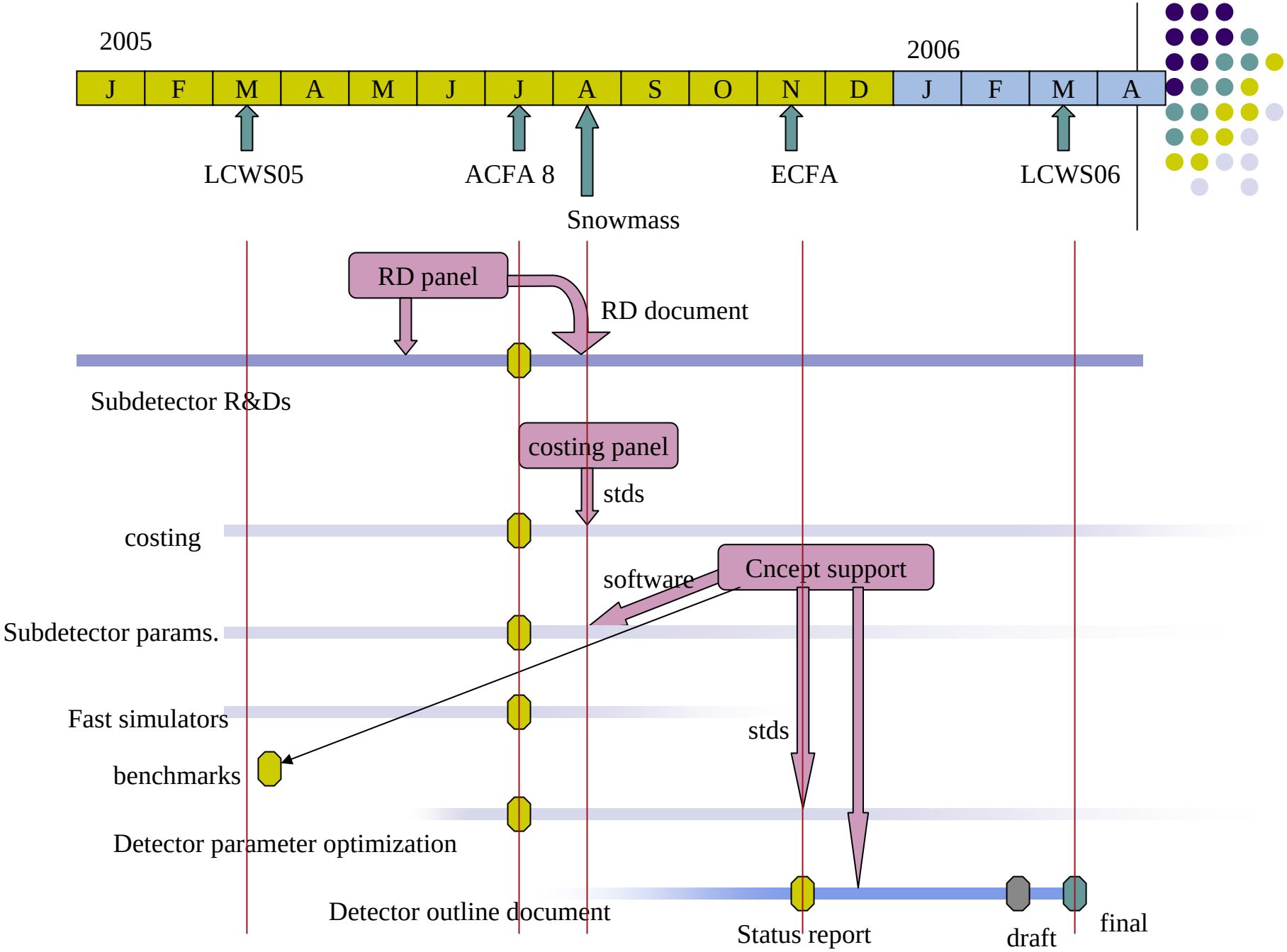
- ACFA08, Daegu, Korea, July 11-14, 2005 (http://chep.knu.ac.kr/ACFA8)
  - Presentations of the results from the studies above
  - First rough cost estimate of the whole detector
  - Start optimization of detector params

- Snowmass, August 2005

  (not possible to move the entire study to Snowmass)
  - Close collaborations with other detector concept studies
    - Sharing notes on benchmarks, detector parameters
  - Active communications with the machine side
    - Bunch patterns, crossing angles, IR design, forward detectors, solenoid conpensations, etc. etc.
  - Close cooperation with the cositng panel, R&D panel
    - Refine the cost estimate of the whole detector
    - Assist R&D panel in producing the R&D document

- ECFA, Vienna, Nov. 2005
  - Preliminary status report on detector outline

- Up to LCWS06, March 2006
  - Prepare the first draft of detector outline document by Feb. 2006
  - Presentation of detector outline at the workshop


2005
2006
J
F
M
A
M
J
J
A
S
O
N
D
J
F
M
A
LCWS05
ACFA 8
Snowmass
ECFA
LCWS06
RD panel
RD document
Subdetector R&Ds
costing panel
stds
costing
software
Cncept support
Subdetector params.
Fast simulators
stds
benchmarks
Detector parameter optimization
Detector outline document
Status report
draft
final