PRC closed session, 31th October 2003

Referee’s remarks to

R and D for the TESLA-Detector: Instrumentation of the very forward region (LAT, LCAL)

Jörg Gayler, DESY

PRC received document by Wolfgang Lohmann (for the collaboration), 14. October 2003

this talk :

- **status**
- **some remarks and questions**
- **Conclusions**

Status LAT

Milestones **MC simulations**

- **Dec 03** Optimisation of shape and structure by MC simulations
- **Feb 04** Studies of Bhabha reconstruction
- **April 04** Study of background processes
- **Aug 04** Study of flat mask solution (l* = 5m optics)
- **Dec 04** Systematic uncertainties

Achievments:

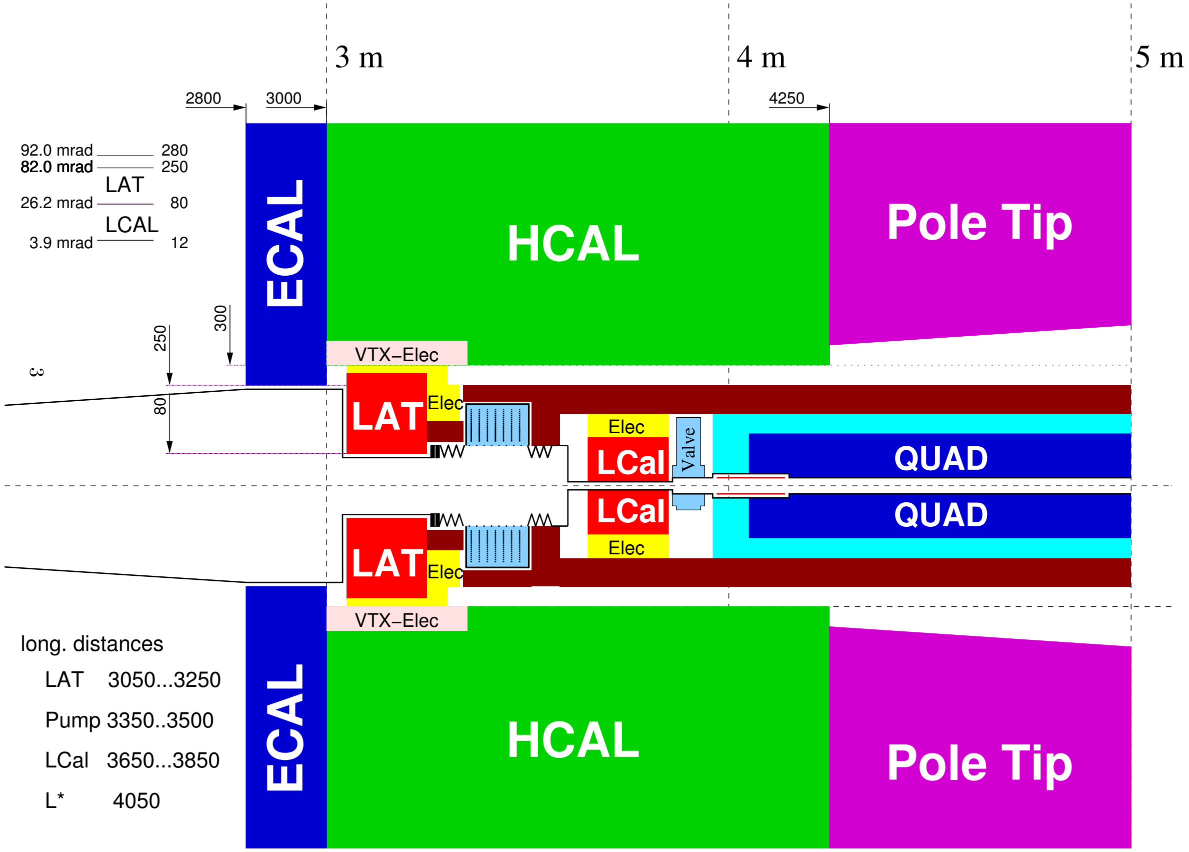
I appreciate activity on various points

in particular:

- detector requirements to reach $\Delta L/L \sim 10^{-4}$ are studied
  $\rightarrow$ design change
- ongoing studies of segmentations and reconstruction
- improved Bhabha MC program

when such optimisations really finished, difficult to define, but clear progress

Now a New Design



a supporting document?

level of acceptance?

- luminosity by Bhabhas in LAT. Goal: precision $\approx 10^{-4}$
- beam diagnostics (+ physics) with Lcal

Status LAT (cont'd.)

Milestones **hardware developments**

- **Sep 03** Design and manufacturing of a first single sensor prototype
- **Dec 03** Studies of alignment system
- **Feb 04** test of prototype 1 using cosmics and radioactive sources
- **June 04** Design and manufacturing of a large sensor prototype 2 with pad structure
- **Dec 04** test of prototype 2
- **Dec 04** design of a laser interferometer for alignment studies

reported progress:

- proto-type silicon sensors under investigation
  first sample delivered
- work on laser alignment system has just started
  (no results yet)

Status Lcal, Option Diamond-Tungsten

Milestones

- **March 03** First sensor prototypes
- **Dec 03** Basic characteristics of prototype sensors of $\approx 1\ \mathrm{cm}^2$ from several suppliers
- **June 04** sample of sensors of $\approx 10\ \mathrm{cm}^2$ with pad structure
- **Oct 04** Basic characteristics of sensors with pad structure
- **Oct 04** Prototype for readout electronics

Achievements:

- **Sensors from Fraunhofer Institute (Freiburg)**

  electrical characteristics measured (no irradiation)

  charge collection distance 10 to 60 μm (of 300 μm)
- **further sensors available from GPI Moscow and Minsk University**

present results: not yet uniform enough

studies after irradiation in progress

Status Lcal, Option Gas Calorimeter

Milestones

- **June 03** Development and construction of a C_3F_8 purity control system
- **Oct 03** Measurement of C_3F_8 parameters
- **June 04** first prototype calorimeter for cell noise studies and readout optimisation
- **Oct 04** aging studies with C_3F_8 in an ionisation chamber
- **Oct 04** development of readout electronics for the prototype cell
- **Oct 04** design of a prototype forward calorimeter for testbeam measurements

Achievements:

- beam tests performed with C_3F_8 at pressure up to 1.8 atm, 1.5 and 3 mm lead
  early results NIM A 494 (2002) 369
  technique works
- measurements of purity and gas properties shown
- Lcal design is studied with W absorber, PCB layers with pad structure
- MC simulations, energy resolutions vs angle etc

Status Lcal, Option Crystals/Scintillating Fibres

Milestones

- **June 03** performance measurements with optical fibres in a longitudinal segment
- **Aug 03** light output measurements with Cerenkov radiators
- **Oct 03** light output measurements with radiation hard fibres
- **May 04** Results with APD (Avalanche Photo Diode) readout
- **Oct 04** comparision of performance of different heavy crystals

Achievements:

- **Some response and cross talk tests at Zeuthen**

no further funding

$\rightarrow$ search for new collaborator

Option Crystals/ultra-thin photo-triodes

a proposal is submitted to British funding agency

General Remarks

Most milestones, as phrased, may be reached, but the corresponding work has to go on

e.g. LAT :

Optimisation of shape and structure by MC simulations is just on the way

A first sensor just delivered, no results yet

e.g. Lcal, diamond-tungsten

no sensors yet established as o.k.

The status report is rather narrow

Further material is available in various talks

Disadvantage: not obvious, what is tentative, what the opinion of some speaker,
and what is really the agreed status of the collaboration

I would appreciate a report which puts evidences and arguments together

Some remaining questions

LAT:

Can pad uniformity, including threshold energy cut, be controlled to required level?

(6.5 μm inner radius for $\Delta L/L \sim 10^{-4}$)

What must be done to know the effective acceptance to few μm level?

Position resolution: $\sim$ 100 μm ? How to verify/measure it?

Is it necessary to overcome steps in θ reconstruction just by many cylinders?

(I assume the algorithm can be changed to reduce bias)

Are different presented simulations for θ resolution really consistent?

Only odd ring readout same RMS($\Delta\theta$)? Plausible? (coarse structure equally good?)

New LAT/Lcal design: Old design insufficient: Arguments written up?

LCal:

Determination of beam parameters look extremely optimistic (admitted)

(e.g. bunch width in x : nominal 550 nm, precision 1.2 nm ?)

but is it really sufficient to vary parameters together?

(non-uniformities in LCal might have large influence)

Conclusions

Collaboration is active

Milestones essentially met for

- **LAT**
- **LCAL diamond/tungsten**
- **LCAL gas calo**

at present not further pursued: scintillating fiber readout of crystals.

somewhat difficult to judge on precise status and on activities for next milestones