

Asunto: my personal preparatory notes for the RandD page

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Fecha: 29/5/18 14:03

Para: JuanFuster <Juan.Fuster@ific.uv.es>

Dear Juan,

FYI, below is a piece of my personal notes intending to lead to the page on ILC driven R&D.

Probably only for your personal use at the moment..

Best wishes

Marc

Sources:

See TDR vol 4 &2.1

See TDR-DBD intro §4.5 and following text

Back-up document: to be done (could be the evolving LCB detector document)

CONTENTS:

- Motivations for R&D (wrt state-of-the-art, i.e. LHC), guided by PFA:
 - . specific balance between physics driven and running conditions requirements
 - . push the performance limits of conflicting parameters in a corner of parameter space which was never reached
- Which experimental sub-systems:
 - . tracking: pixellated vertex and inner trackers, large area SC and large volume gaseous trackers
 - . calorimetry : ECAL, HCAL
- Which specific aspects and parts were prominent targets of the R&D
 - . aspects: power cycling in high magnetic field
 - . parts: detection system, read-out architecture, complete thermo-mechanical and service integration, down to central powering and acquisition
- Which types of tests were performed:
 - . proof of concept
 - . performance assessment on beam
 - . beam tests include combine sub-system evaluations with feedback improving GEANT-4 and the realism and algorithms of PFA
 - . running conditions: power pulsing in high magnetic field
- Outcome:
 - . inject individual concept details and associated performances in detector Monte-Carlo for experimental physics performance assessment
 - . improved GEANT-4
 - . New state-of-the-art technology-base sub-systems and related prospects for new generation of detectors at future facilities

1) Detector R&D motivation

Detector requirements at ILC are substantially different from those developed for LHC: they are more demanding in terms of resolution (granularity) and material budget (thus of power saving) but much less in terms of read-out speed and radiation tolerance. The

balance between those of these parameters which are conflicting is therefore very different than for LHC. Moreover, the detector steering and read-out architectures are also specific: they should be operational triggerless and designed to exploit the machine duty cycle for the sake of power consumption.

In several cases, individual performances targetted by the R&D could have been considered as nearly achieved outside of the ILC programme, but the R&D aimed at their combination at a level well beyond previous achievements.

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