
LVL1 Trigger for sLHC

Participants : HJS, ST, KM

	Calorimeter	Muon	Tracker
ATLAS	yes	yes	unclear
CMS	yes	yes	yes

Important questions to answer

- Virtues of track trigger
- Matching of detector systems on LVL1

There is probably no aspect of LHC detectors for which “real life experience” is as important as for the LVL1 trigger

Assessment of trigger aspects (threshold curves, efficiencies, background structure, is the most important work for the immediate future.

Do we need a LVL1 track trigger ?

Improve fake rejection (Leptons, Photons)
Efficiency determinations

Which physics quantities can be measured ?

transverse momentum threshold
transverse momentum measurement
geometric track-cluster matching (noncov. Gamma)
1-prong / 3-prong topologies (Tau)
E/p track cluster matching (Electron)
pTrack/pTMuon matching
Secondary Vertices
....

LVL-1 Track Trigger is a truly new challenge

Current activities worldwide :

ATLAS : nobody at this point in time

CMS : several groups (e.g. US, Europe,

Track Trigger requires close cooperation between tracker design, tracker electronics, trigger electronics

- connectivity (on / off tracker)
- increased material budget
- increased power budget

Local trigger logic (correlators) “on-tracker” have to be custom made ASICs, not FPGAs

- size, rad- hardness, power

Calorimeter Trigger Upgrade

ATLAS : Mainz, Heidelberg, existing group, US,

CMS : mostly existing groups, possibly more

Challenges

- Improve energy measurement, granularity
- ATLAS : Common MZ/HD work, processors, links analog-digital conversion
- Possible matching with tracks

First 2 points well under way, close cooperation with track-trigger activities essential

Essential work (for HGF Alliance !?)

Analyse data in terms of trigger performance (common work with ATLAS, CMS ??, HGF assesment workshops ?? CMS ?)

Study requirements for calo-trigger upgrade (under way, requires cooperation with calorimeter, mostly beyond HGF)

Study track trigger virtues (physics) and define quantities to be measured (requires close cooperation with tracker, calorimeter, muon. Interesting within HGF)

Get groups into ATLAS track trigger (possible interest in Mainz, Heidelberg, tracker groups !?), HGF spin-off ?

Study technologies for track trigger / integration into tracker systems (chips, links, power), good HGF topic.