ALEPH 88-86
TRIGGR 88-8
M. Panter
15.7.1988

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Minutes of a meeting on triggers concerned with the luminosity measurement

(Held at HEIDELBERG on june 10th, 1988)

Present: R. Geiges, C. Geweniger, P. Hanke, J. D. Hansen, E. E. Kluge, M. Panter, B. Rensch, K. Tittel, M. Wunsch

The first part of the discussion delt with the hardware. The θ border between an inner and outer ring of the luminosity calorimeter is given up on the detector side. The twelve ϕ segmentats remain, so in the detector electronics 64 pads instead of 32 are summed up to one signal for the trigger logic. 72 signals are passed to the trigger, 12 ϕ segments, three storeys each, for the two directions.
The front-end electronics is the same as for the ECAL, but the summing circuit is developped by Copenhagen. A detailed description of the pulse shape, as seen at the mixer input of the trigger logic, will be sent to Heidelberg.

If the gain of the front end electronic is not changed, 2V will correspond to 45/38*20 GeV = 23.7 GeV, reflecting the different sampling of the luminosity calorimeter with respect to the ECAL. This seems still to be too low an energy to trigger on Bhabhas. It was agreed to attenuate the signals at the detector side to reach saturation (above 2V) in the receiving circuits of the trigger at 50 GeV. This results in a step size for the trigger tresholds of 200 MeV.

The signals of the third storeys have to be amplified by a factor of two as for ECAL in the trigger mixers.

The second part of the discussion aimed at defining the triggers necessary to record all Bhabhas and understand the background up to the point, where the luminosity is determined to better than 1% accuracy.

The Bhabha triggers will consist of coincidences between segments of the luminosity calorimeters opposite in ϕ and z. These segments are built up by two adjacent trigger segments. Since they overlap, each calorimeter contains twelve such segments.

To define the triggers completely a threshold in energy has to be given. Two values, 25% and 40% of the beam energy are envisaged as starting points. Real beam conditions might change them.

Actual triggers would be :

(1) high(-z) * low(+z)
(2) low(-z) * high(+z)
(3) low(-z) * low(+z) downscaled

Trigger (3) has to be downscaled to obtain reasonable trigger rates. A trigger "high(-z) * high(+z)" is just the "AND" of (1) and (2) and therefore it can be realized by software easily. No extra trigger is needed.

In this context the question of a selective read-out was raised. The present trigger logic doesn't foresee this. The online group should be asked, if they want to steer the read-out depending on the trigger mask.

To determine the background and the threshold behaviour of the mentioned triggers, single arm rates should be recorded too. This results in four more triggers. They will be the "OR" of the twelve triggersegments and have to be downscaled :

(4) low(-z)
(5) high(-z)
(6) low(+z)
(7) high(+z)

Even so (5) is contained in (4) and (7) in (6), these triggers must be independent to yield comparable statistics. The independent prescaling of the +z and -z sides is advisable for the same reason.

In the design of the trigger logic there are eight triggers foreseen which can be downscaled. Three triggers of that type are known since long, the GBX trigger (empty event), the two photon trigger without veto and a loose track trigger. Obviously the five different downscaled luminosity triggers exhaust the possibilities of the trigger system as it is now. It was therefore concluded that the triggers (5) and (7) are given up in case

another request of competitive importance for downscaling comes up. The alternatetiv, to give up the independence of the two sides, will be considered, if trigger rates suggest this to be the better solution.

At last the idea of counting delayed coincidences was discussed. They would monitor the accidentals for each of the four different bunch crosses online. Read-out is not possible without inducing tremendous dead time. Since it would need extra electronics to be built for the trigger, counting delayed coincidences between the luminosity calorimeters was postponed until the trigger system is built in the present design. Anyway, an upgrade will be necessary when polarized beams are in LEP and each bunch has to be identified.

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