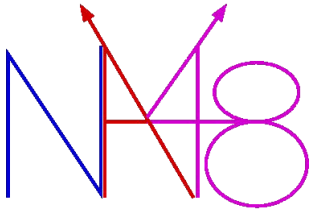


Charged Hodoscope L0 Trigger on 2012 run

Mauro Piccini
(INFN - sezione di Perugia)

Introduction

The old NA48 charged hodoscope will operate on 2012 run, mainly for trigger purposes:

Work for cabling, front-end electronics (discriminators) and HV is already ongoing; signals will be collected by a TEL62 boards exploliting the PISA TDCB

Here we start to think to trigger algorithms (to be implemented on the TEL62 FPGA) that possibly could be used also on the new CHOD (≥2013)

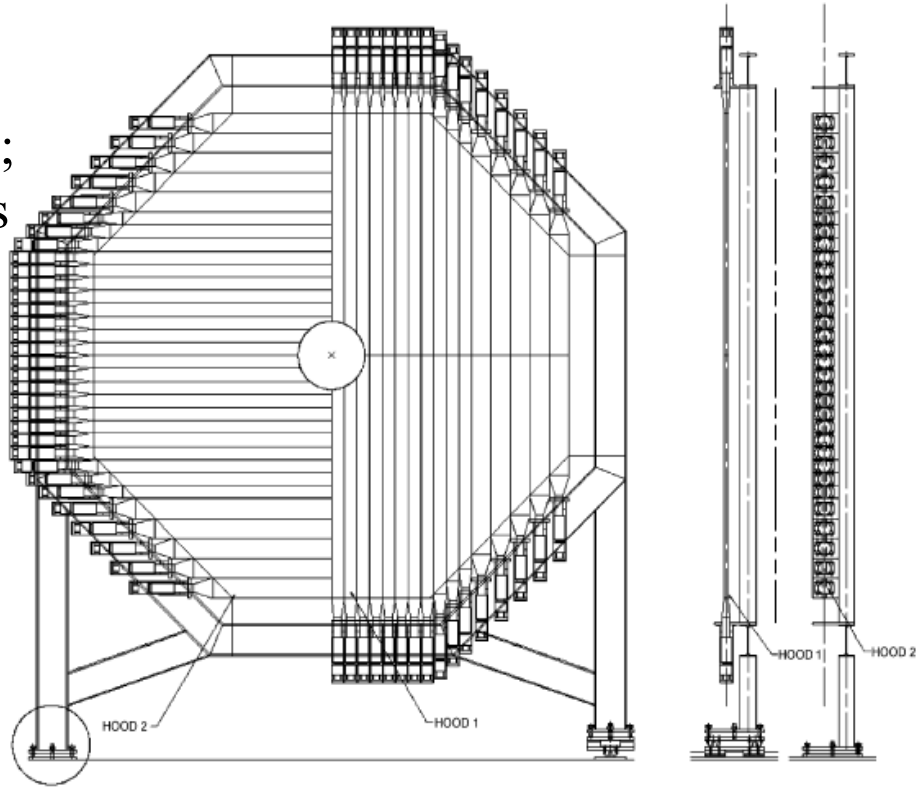


Fig. 20. Charged hodoscope.

LUT

A possible solution is to build a look-up-table (LUT) that, giving two hits in the hodoscope (one on the vertical plane and the other on the orizontal plane), will:

- automatically correct the two measured times for the impact point correction (taking into account the scintillator lengths)
- apply a raw slewing correction on the basis of the measured time-over-threshold

Looking for coincidences on CHOD quadrants → Four look-at-tables with 256 (16x16) entries each

Starting to work on the subject in Perugia: Cristiano Santoni (FPGA designer), M.P.

CHOD has 128 channels → in the same TEL62 we could also read-out the 256 OR of the NINO chips coming from the RICH read-out, good opportunity to implement L0 primitives given by data collected from two detectors:

- Improved online time resolution
- Cut on detector acceptance (track angle from RICH, position from CHOD)

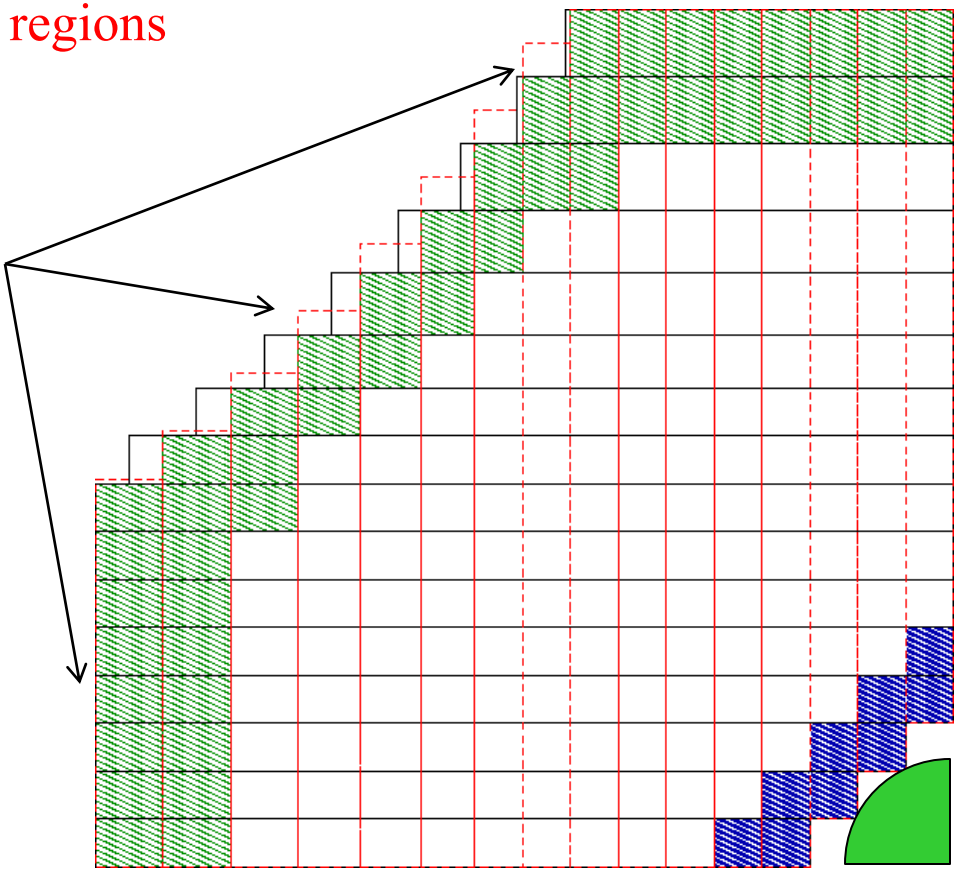
(G. Lamanna)

Further steps

Once the look-at-table is implemented it could be used for selective trigger algorithms

i.e. we can exclude regions from L0 trigger:

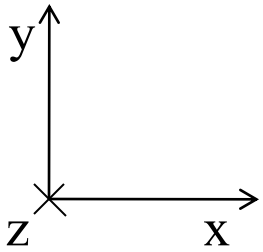
No trigger from these coincidences (outside the MUV acceptance ?)



CHOD quadrant

No trigger from these coincidences (inside SAC acceptance ?)

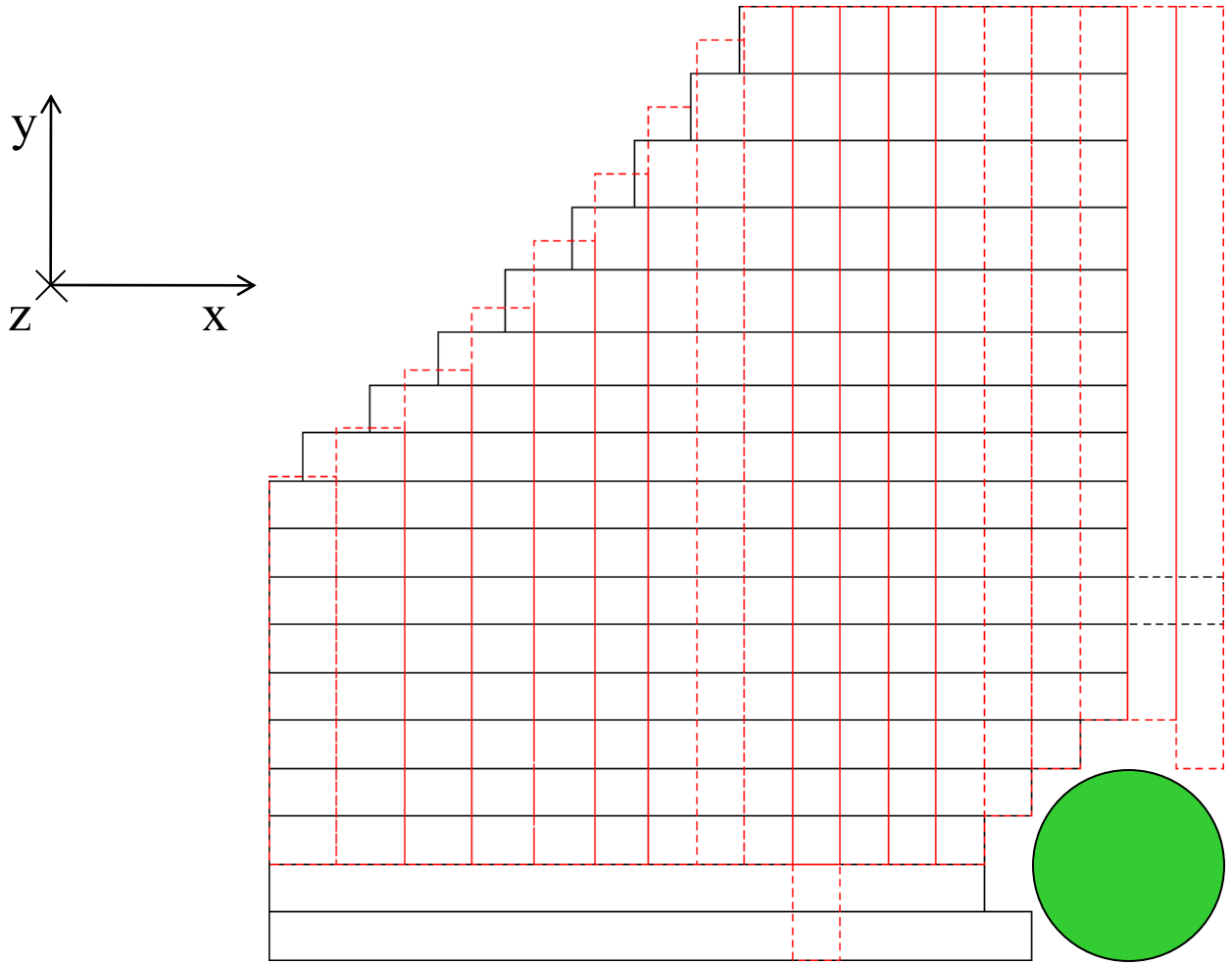
Beam pipe



But hits (if the event will be selected) will be recorded offline for veto purposes!

Extensions

Extension of coincidence matrix is under consideration to recover tracks entering with some angle in the CHOD acceptance - near the bounds between the 4 quadrants

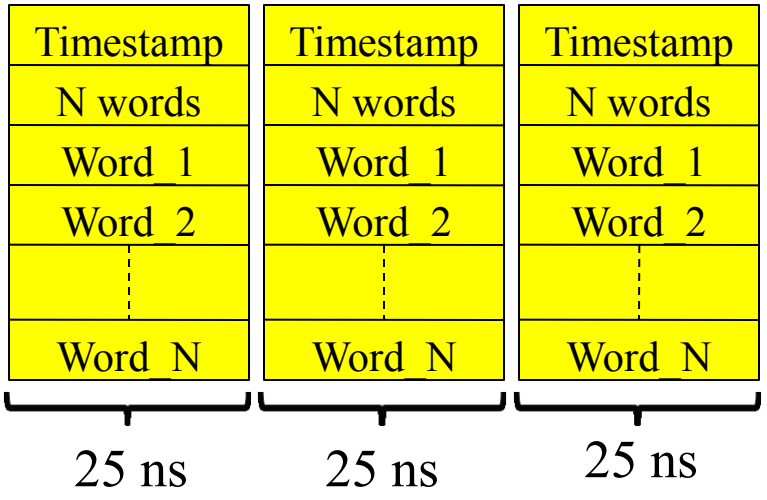


Increase LUT dimension:
17x17 or
18x18
(not an issue)

LUT values will be evaluated by already existing data.
They can be refined during data taking.

Draft scheme

Data flow



Word

Word time
TDC number
Ch. number
Time

To match the algorithm speed to the data flow rate:
- Serialization
- Parallelization

Looking for extra hits in the neighbour bins

Find x,y (H,V) indexes to enter on the LUT (~5ns coincidence window on raw times)

LUT

Histogram of coincidence times

Trigger word(s)

DID	Ttype	Fine time
Timestamp		