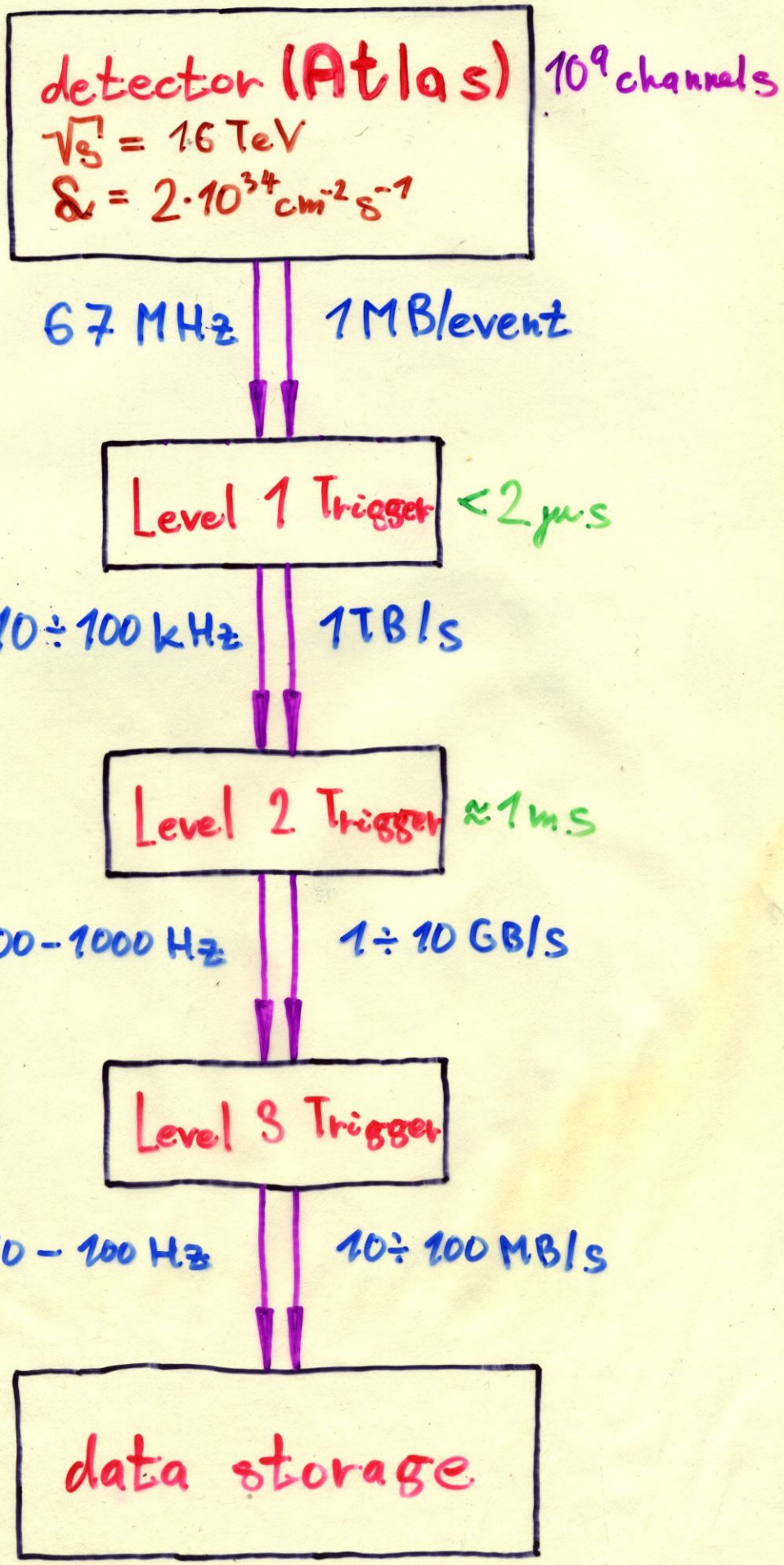
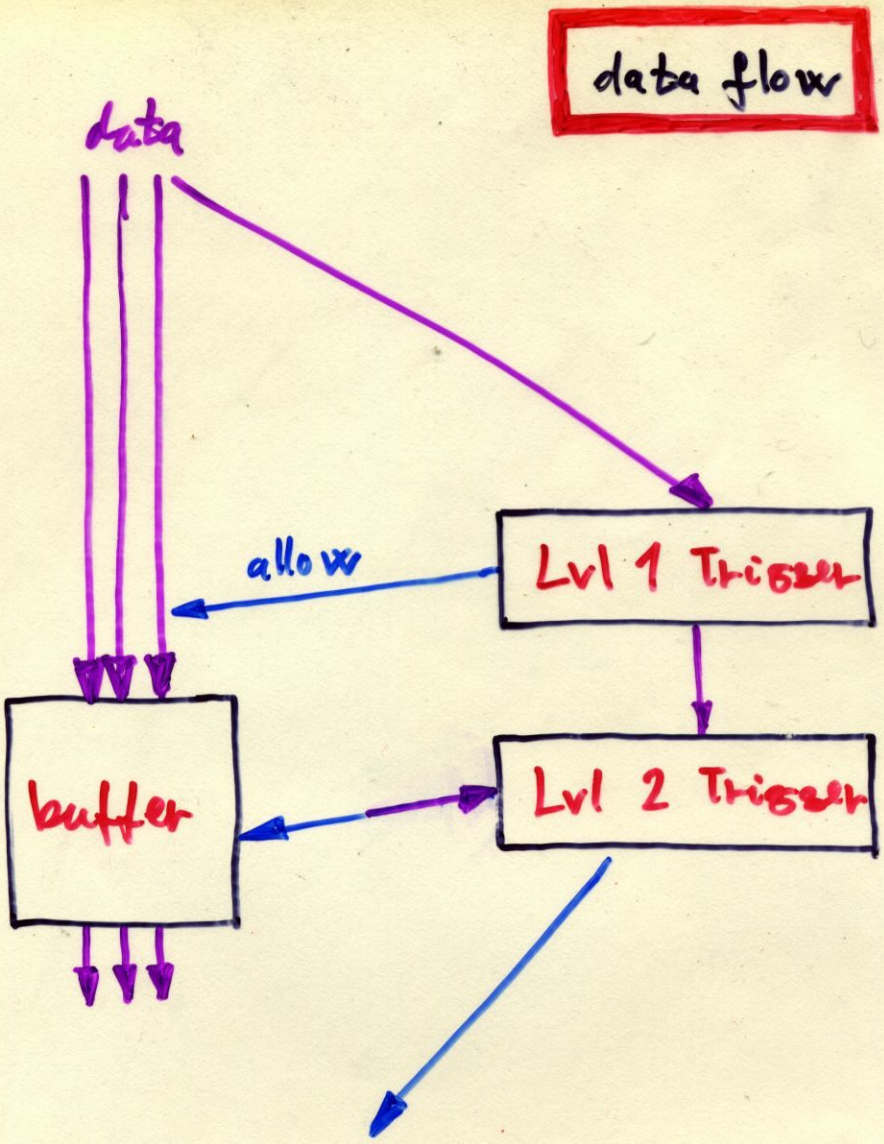
Trigger for the LHC

A.N.N. ?

- some detector
- trigger rates
- examples of Lvl 1 - Triggers
- examples of Lvl 2 - Triggers
- short note about Lvl 3 - Triggers
- !!!
- A.N.N. ?!?

Trigger Rates

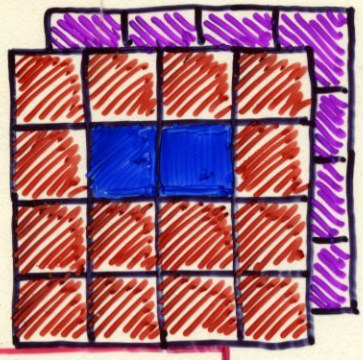



data flow
data
allow
Lvl 1 Trigger
buffer
Lvl 2 Trigger

Lvl 1 Trigger

EM

elmag
hadr
elmag



$E > \ldots$

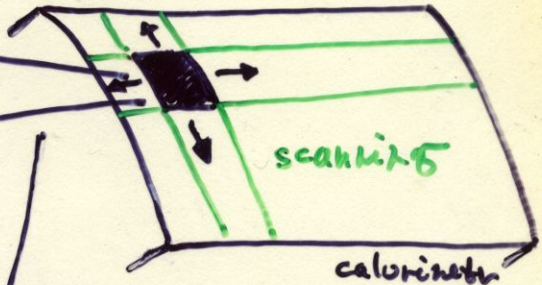
$E < \ldots$

$E < \ldots$

jet

elmag
hadr
elmag
hadr

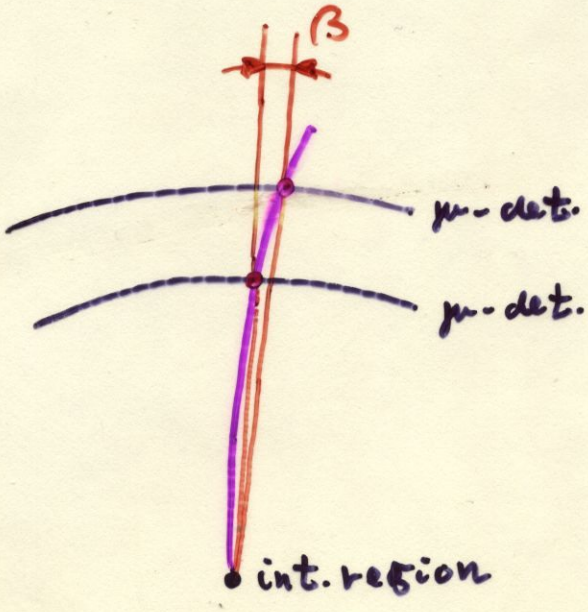
$E > \ldots$



missing p_t

$|\Sigma \vec{p}_t| > \ldots$

μ



$\beta < \ldots$

TRD

Jets

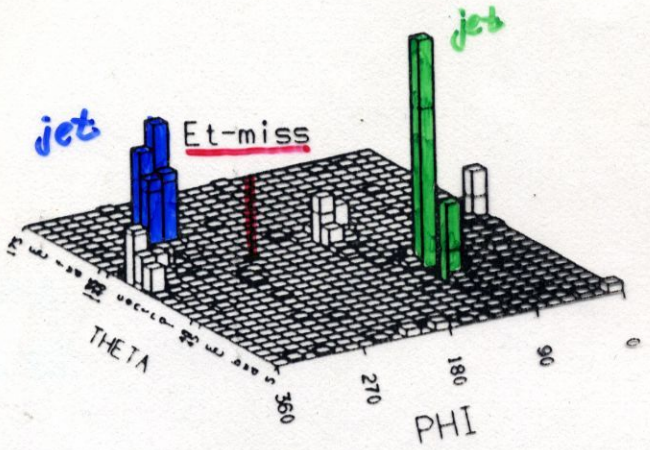
UA2 r:5931 t: 39185

Date: 881119 Job date: 890224 Evt: 1
Bits: 21 4A Et4 2JH4 2JL4 1J4 PUP2 +MUX

SumEt (tot)=191.9 .(CC)=111.3 .(FD)= 55.5 .(BD)= 25.2

10.00 GeV
10 GeV

Bottom : EM
Top : HD



FULL
CALORIMETER
TRANSV. ENERGY

Offl. (2280) clusters.
Et above 40.0 GeV

THETA/PHI	Et(GeV)
146./288.	55.13
43./111.	50.76

Weights off.

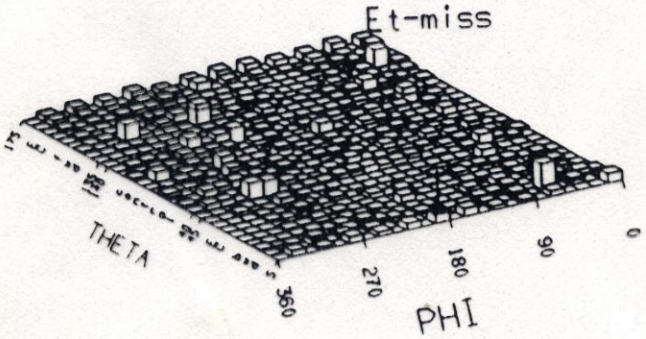
UA2 r:6100 t: 50821

Date: 881120 Job date: 890314 Evt: 1
Bits: Et4 2JH1 2JL1 1J1 EtC1 2ML4 3J2

SumEt (tot)=215.4 .(CC)= 91.1 .(FD)= 68.8 .(BD)= 55.5

10.00 GeV

Bottom : EM
Top : HD



FULL
CALORIMETER
TRANSV. ENERGY

Offl. (2280) clusters.
Et above 20.0 GeV

THETA/PHI	Et(GeV)
163./ 54.	32.18
17./ 82.	31.47
162./230.	30.57
23./275.	30.38

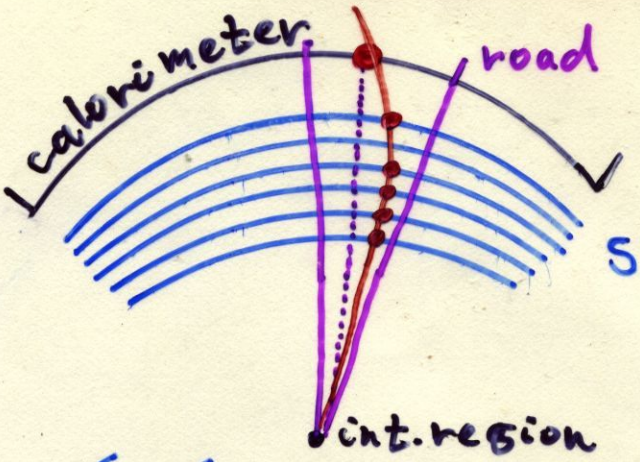
Weights off.

Lvl 2 Trigger

SIT

a) all events

b) no hadron

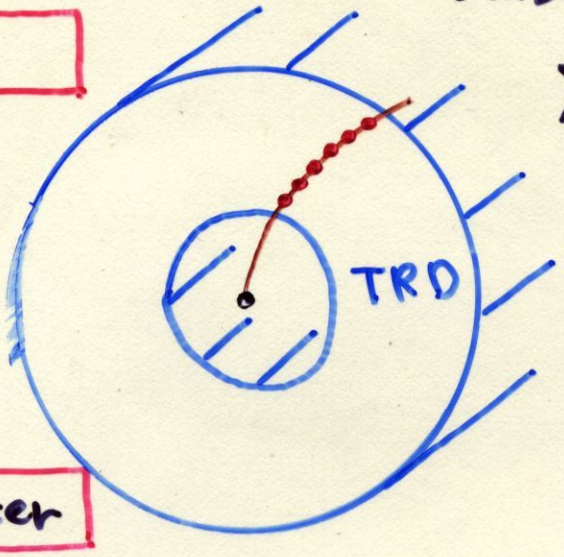


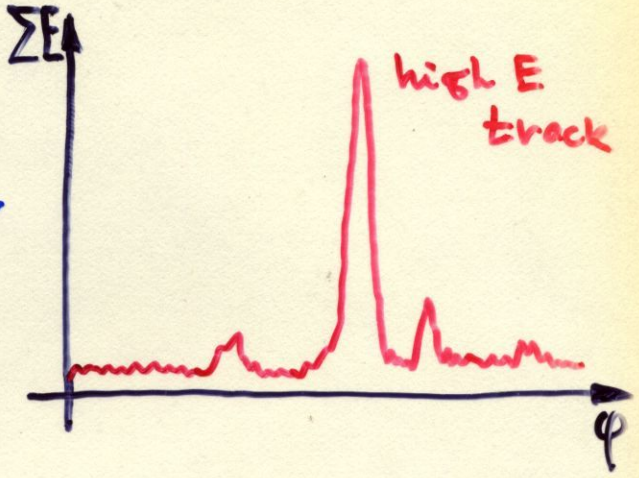
SIT cylinders
at least 5 hits
in a "road"

TRD

a) all tracks

b) e^- (high E)





Calorimeter

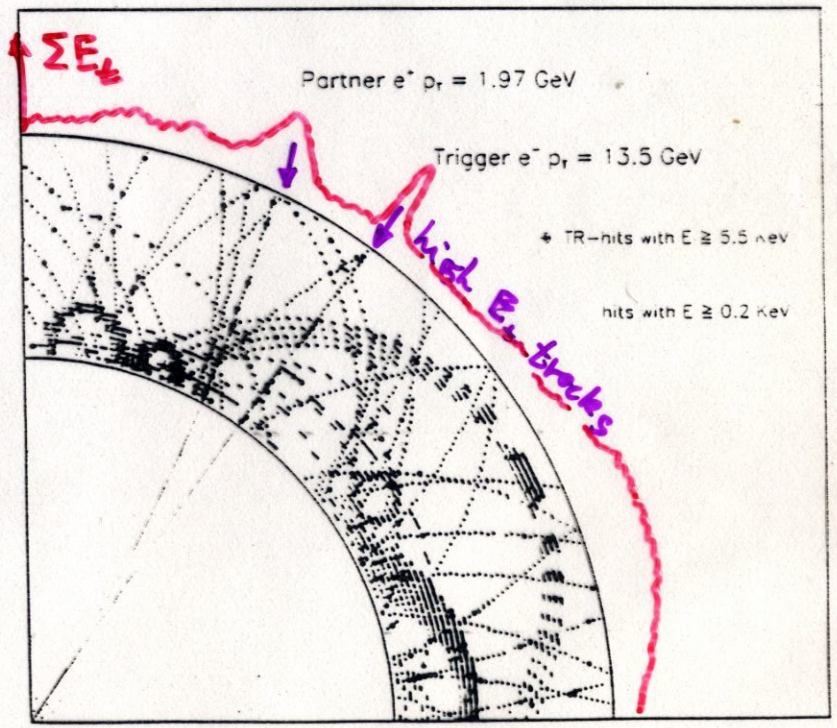
(+ preshower + SIT)

the same as 1st level, better granularity

Example of electron candidate

from 20 GeV π^0 Dalitz decay (+ pile-up from 40 min. bias)

rejected by TRD/T (in barrel region)



Plot all reconstructed tracks with $p_T > 0.5$ GeV

number of TR-hits per track > 7

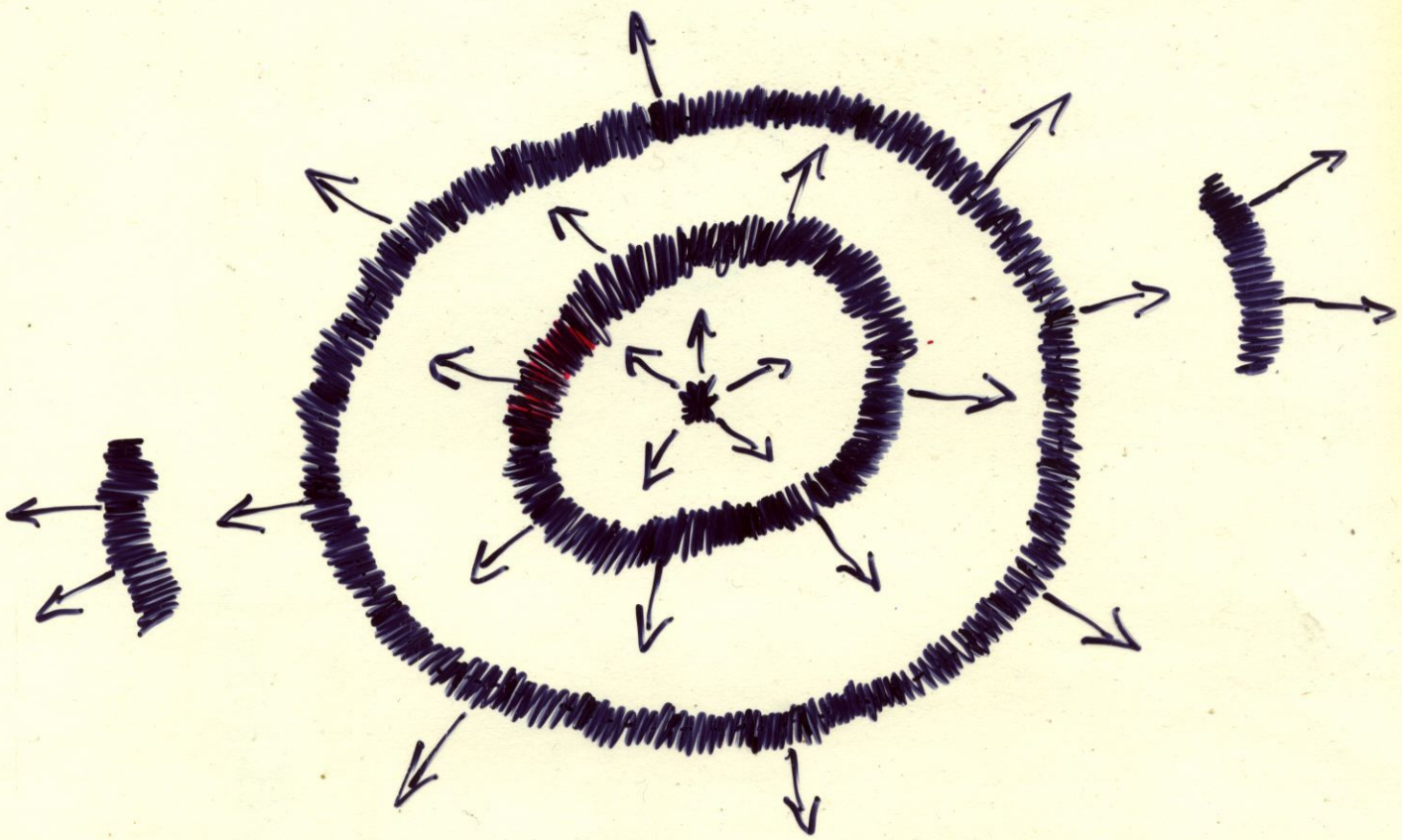
number of TR-hits per track ≦ 7

Lv1 3 Trigger

event builder

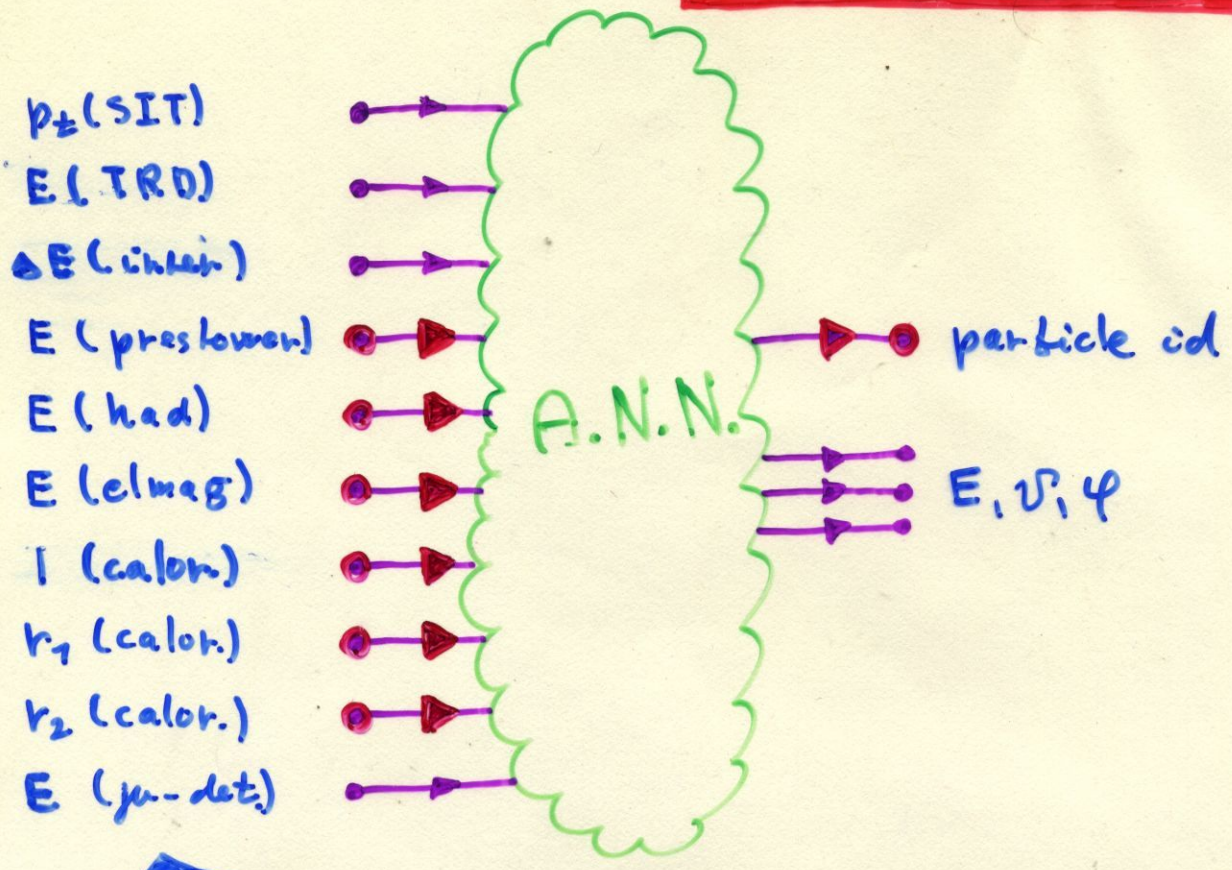
parallel processing

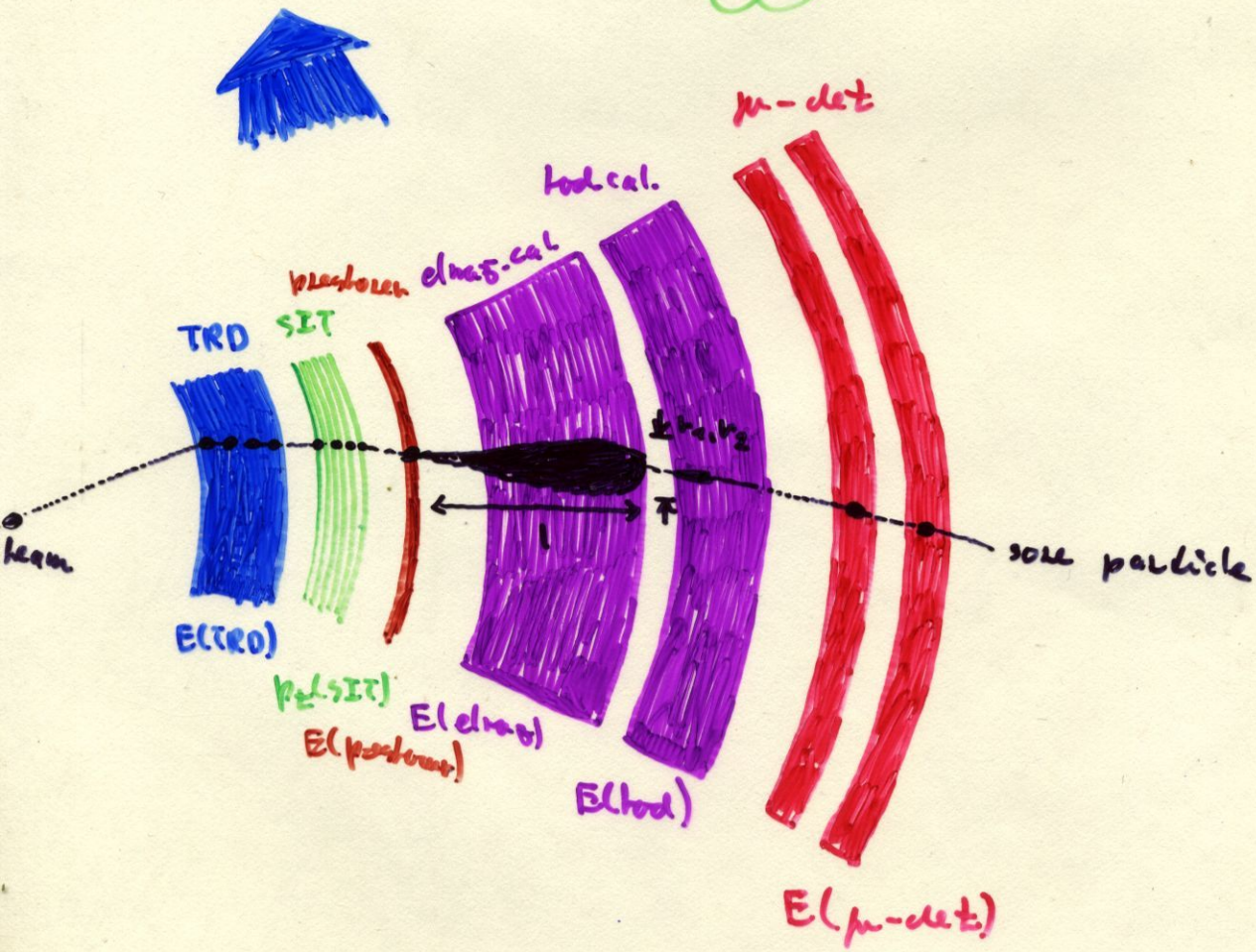
3 events in the detector in the same time



event each 15 ns

Particle identification





particle identification

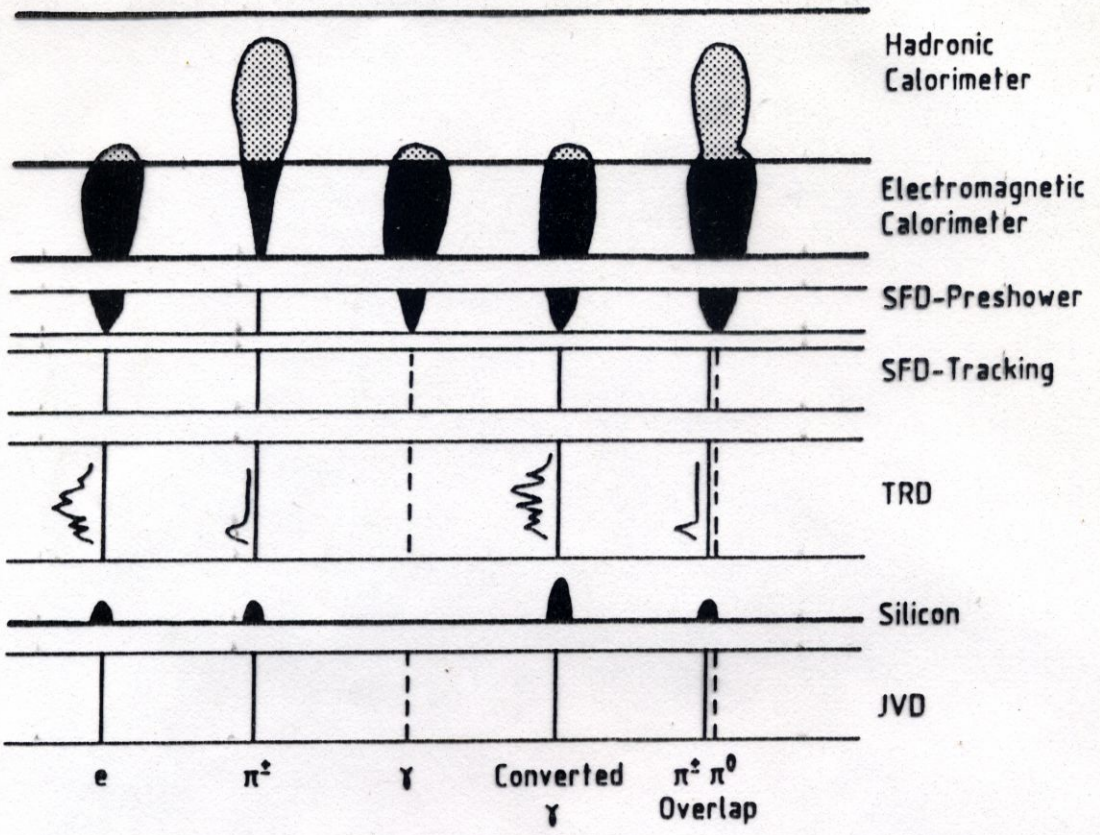


Fig 2 The response of the central detectors to different particles and combinations of particles. This figure illustrates how the combination of an electromagnetic calorimeter cluster, a track and a good track-preshower matching can be used to identify electrons in the detector.

calorimetr showers

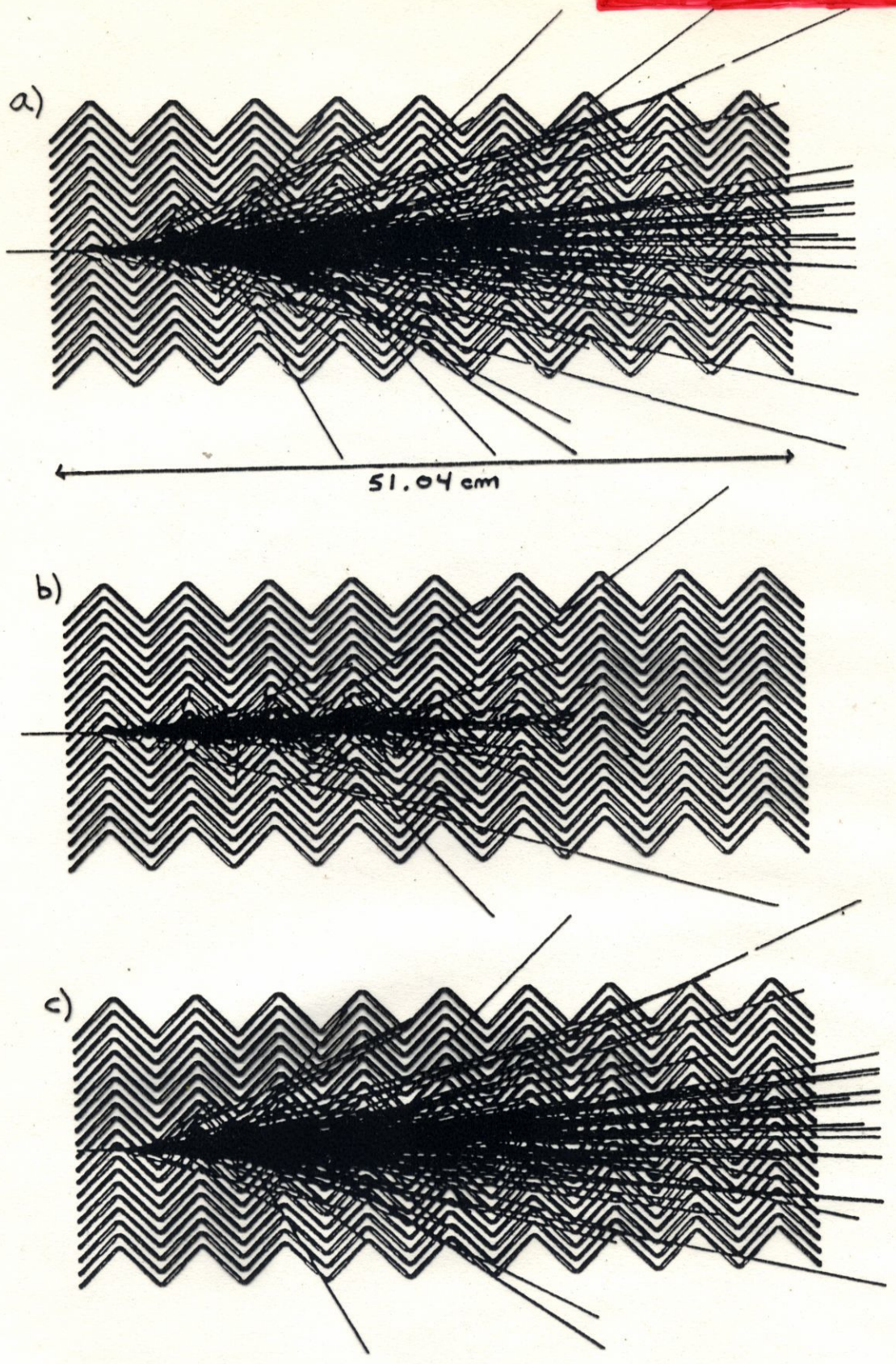
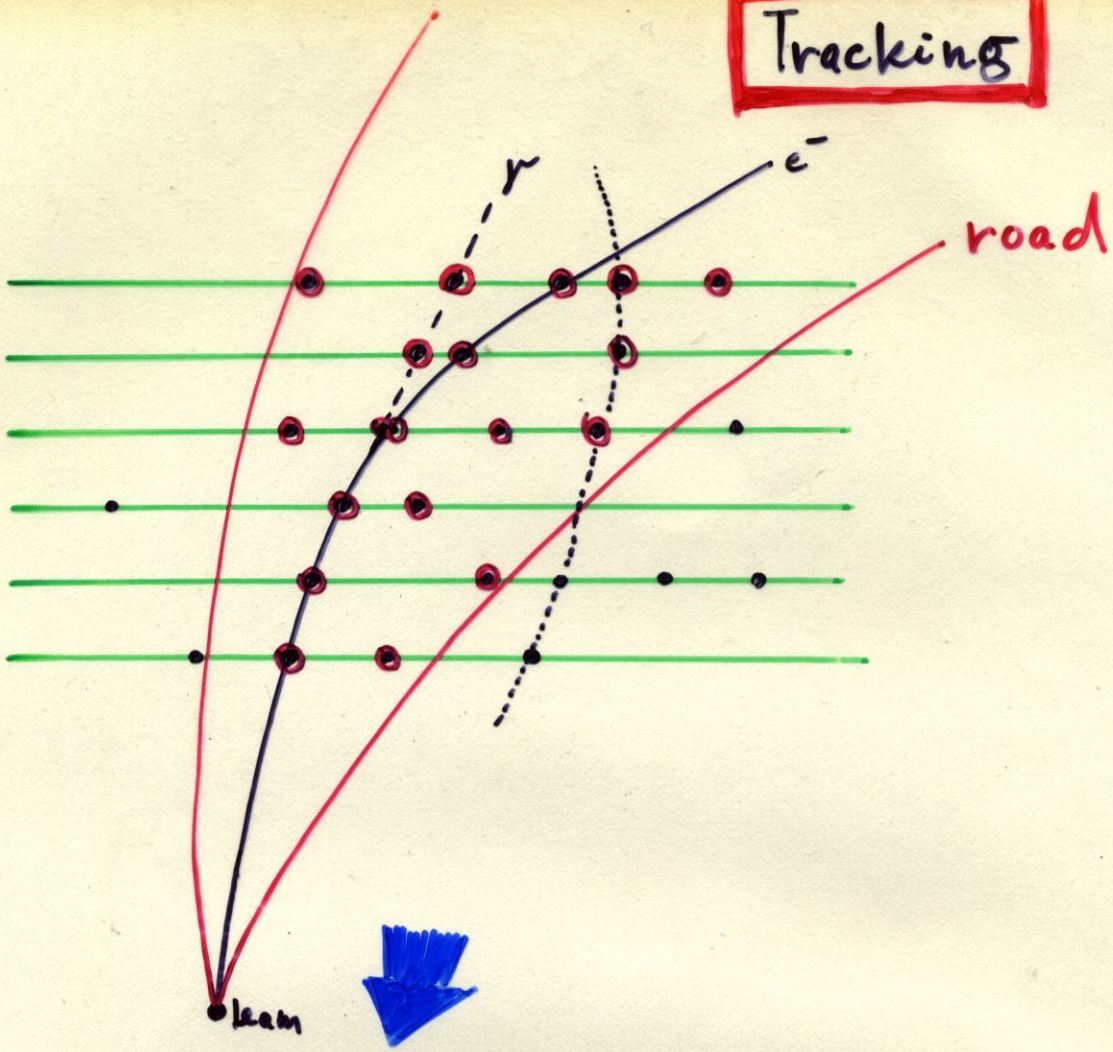
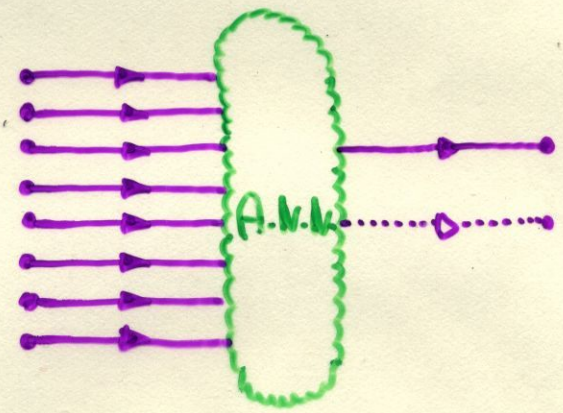


Figure 6: 40 GeV electron shower. All tracks are shown in (a). Only the charged and neutral tracks are shown in (b) and (c) respectively. In these figures, the cutoff energy for electrons and photons is 10 MeV.

Tracking





$\vec{r}$ (hits in road)