SPEC EFICASS

(summer 1994)

$$\left(\begin{array}{c} A.K \\ E.E. \\ G.O. \\ R.T \end{array}\right)$$

SUBROUTINE	Comments

UGMATE New materials have been defined : ethane, isobutane and water vapour, and two gas mixtures used as active media for drift chambers and streamer tubes in SPEC and CALO.

UGGSPE A few bugs have been discovered and fixed. Each stack of spectrometer elements: drift chambers, streamer tube packs, magnets, is aligned individually on the beam axis, using BEAMSLO parameter. Geometry of streamer tube plane has been slightly changed to account for strip plane: 1 mm PVC + 2*50 mkm Al. Active media in drift chambers and tubes have been changed from air to 25% Ar + 75% ethane for drift and 25% Ar + 75% isobutane + 6% of the mixture saturated with water vapores for tubes.

UGHTUB, UGHDRI, UGHBRE slightly changed and bugs fixed.

EFIGEOM.CRD
*   Data on Hxxx cards changed to avoid overflow, which took place for hits in DRI and BRE before, and to obtain better precision for coordinates of the hits in streamer tubes.
*   Data on STPA card changed to account for changed geometry.
*   New card QSTU introduced with data for SPEC streamer tubes digitization.

UGDSTU, UGDSDR, UGDBRE - new subroutines for performing digitization and
(called from GUDIGI) storing DIGI banks for SPEC streamer tubes, drift chambers and scintillators

GUDIGI changed slightly to perform calls to above digitization subroutines for these detectors.

UGTUBZ, UGSDRZ, UGBREZ - new subroutines performing raw data output ≈ DAQ
(called from UGSPEZ) (ZEBRA banks, LUN=36) for SPEC streamer tubes, drift chambers and scintillators

UGGFKY bugs fixed and changed. New card QSTU introduced with data for SPEC streamer tubes digitization.

GUSTEP bugs fixed (there was no way before to produce hits in tubes) and slightly changed.

KEEP sequences GCUGEO and GCUSET changed according to needs of newly produced subroutines.

UGBOOK Many new histograms are booked with ID's as follows:
    7xx - streamer tubes
    8xx - drift chambers
    9xx - scintillators

patch MANUAL

*   BLANKDECK
*   MEMO_SPEC
*   MEMO_STU
*   MEMO_DRI
*   MEMO_BRE

BANKS:		KEYS
	REDR	1016
	RETU	1022
	RETD	1013
	REAN	1014
	RESC	1015

COORDINATE DEVICES in SPECTROMETER
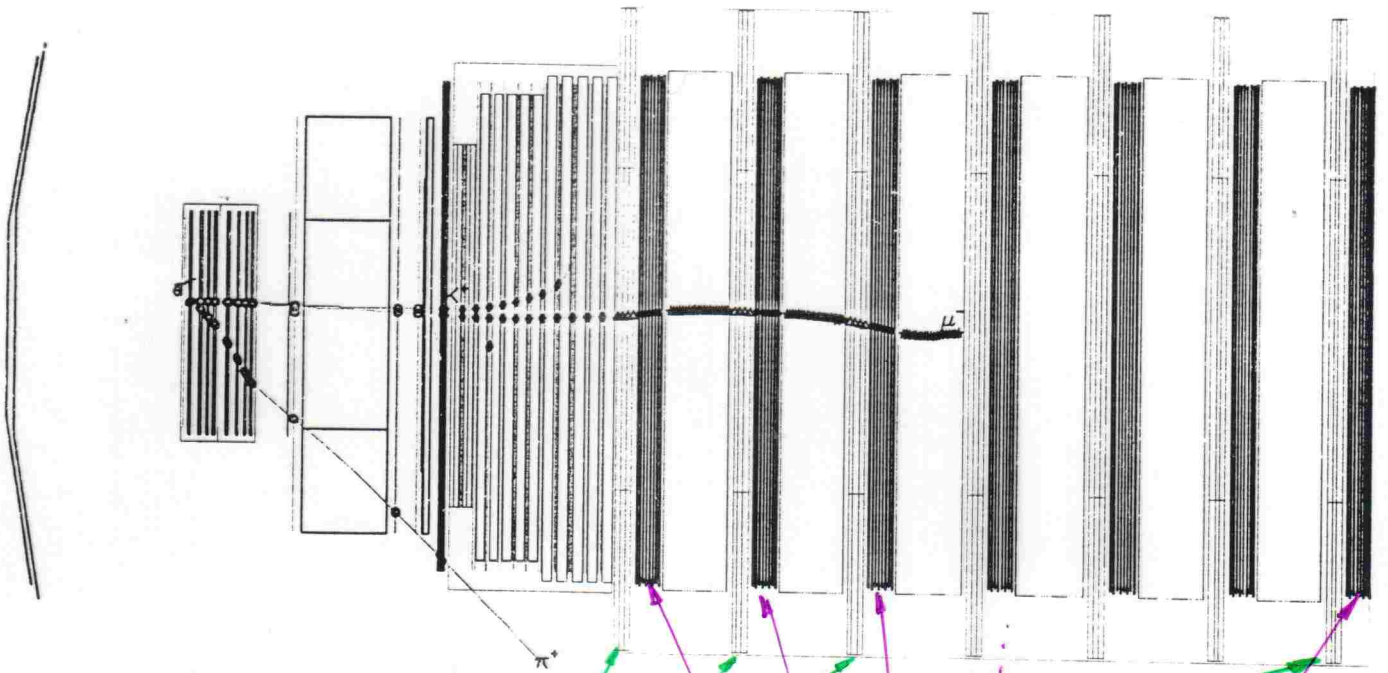
Scintillators:

1152 PM's ⟹ ADC

7 Dr. Chambers × 3 planes × 62 wires = 1302 wires

100 cm
⊢——⊣

H/V ratio = .700
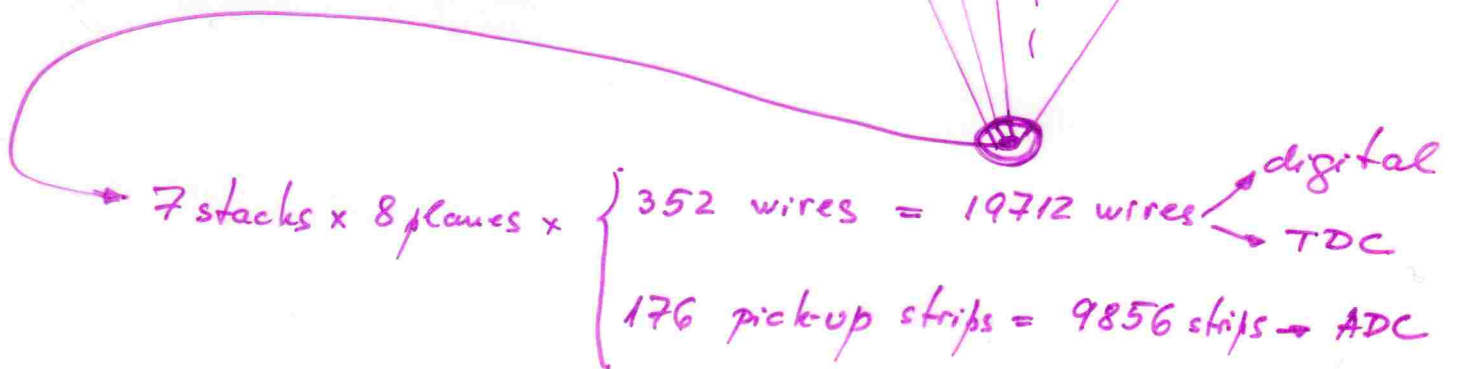
7 stacks × 8 planes × { 352 wires = 19712 wires → digital, TDC

176 pick-up strips = 9856 strips → ADC

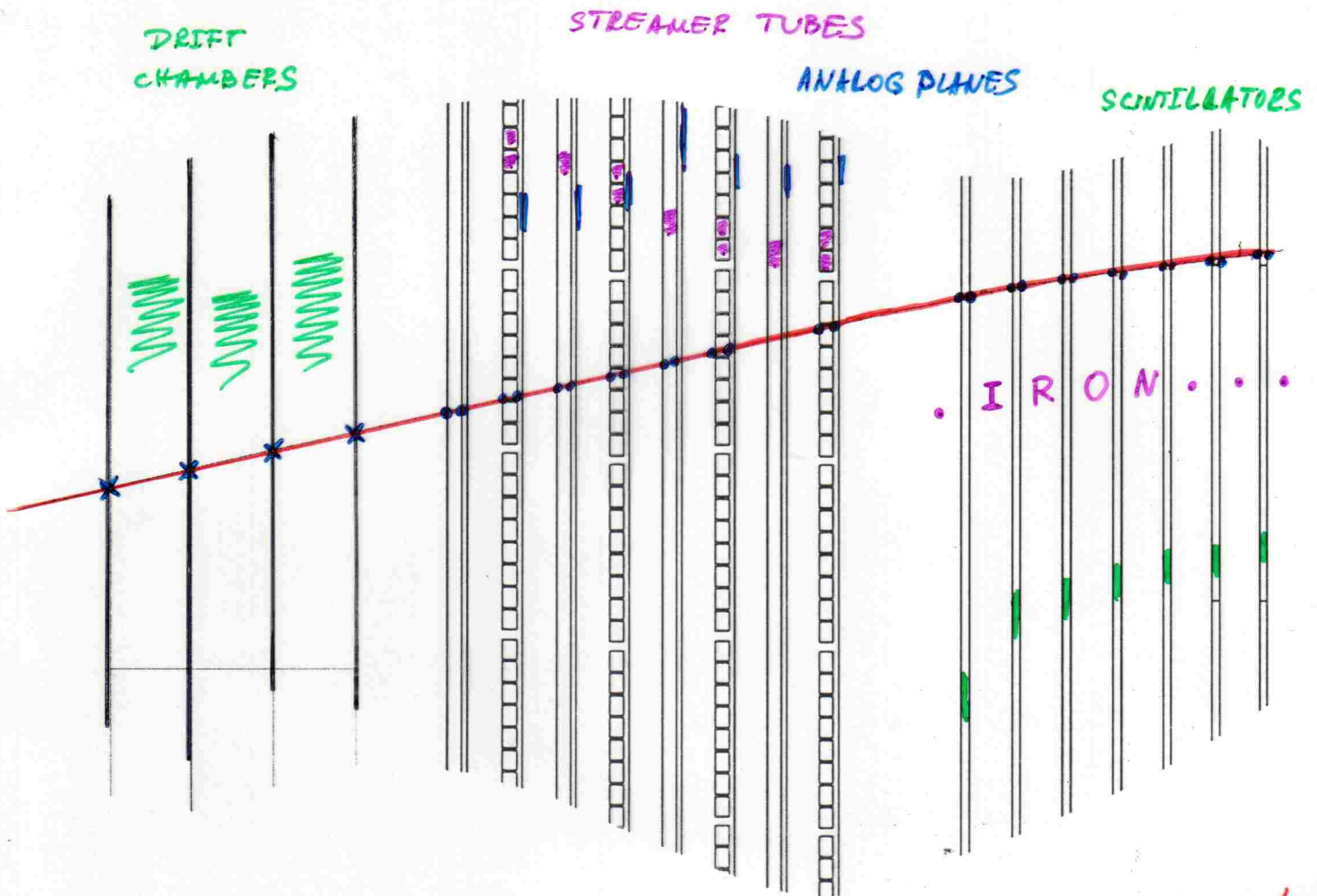84 TDC channels for Dr.Ch. (16 wires to 1 TDC)
19712 digital channels for streamer tubes
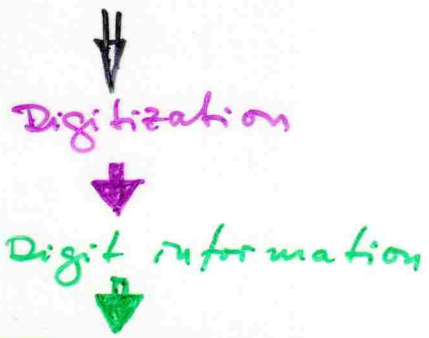616 TDC channels for str. tubes (32 wires to 1 TDC)
9856 ADC channels for strips
576 ADC channels for scintillators (2 PM's to 1 ADC)

30844 information channels

✗ - Hit information: $x, y, z, E_{tot}, E_{los}, itrk = \begin{cases} 0 - \text{primary track} \\ 1 - \text{secondary} \end{cases}$

⬇

Digitization

⬇

Digit information

⬇

STREAMER TUBES

- the number of the tube (wire) which has been crossed by particle track,

- drift time to this wire,

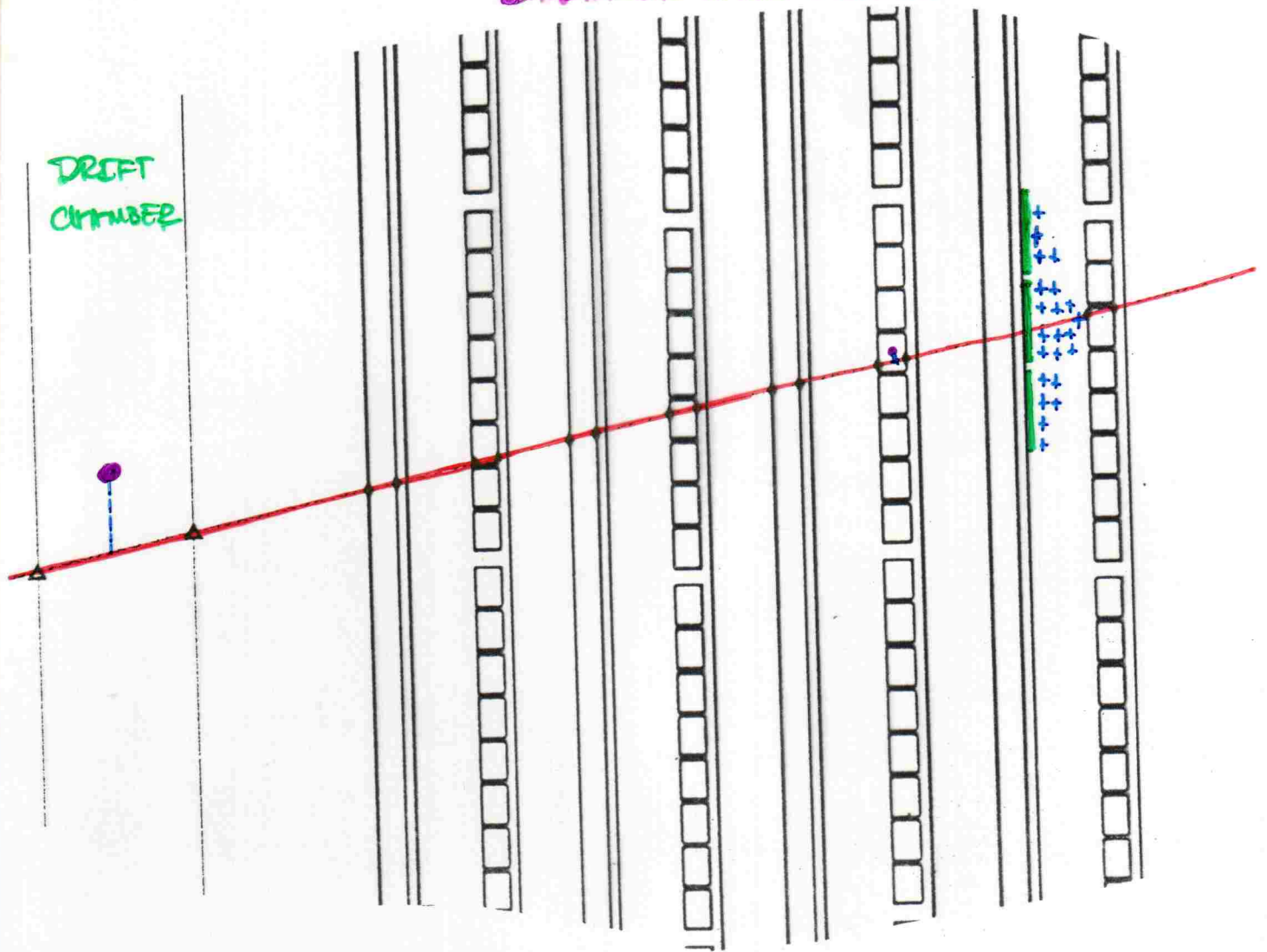- analog (ADC) signals, corresponding to charge, induced on strips.

DRIFT CHAMBERS

- drift time to nearest wire & its number

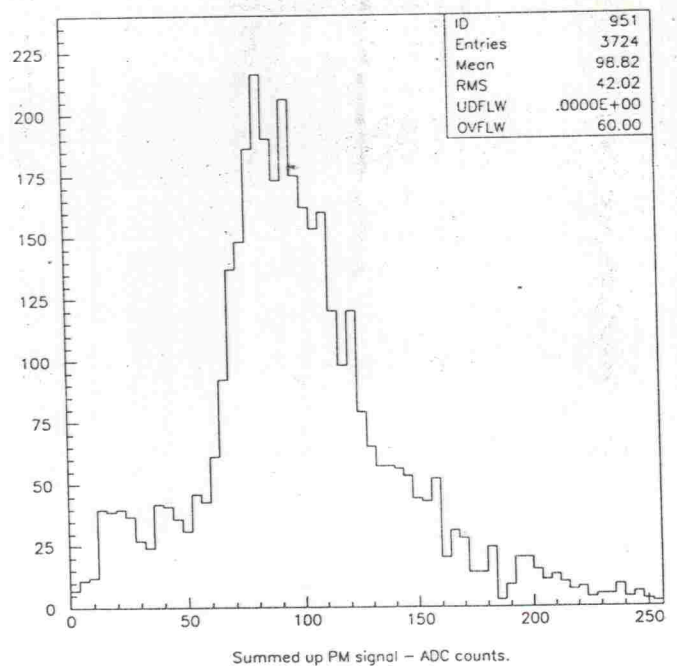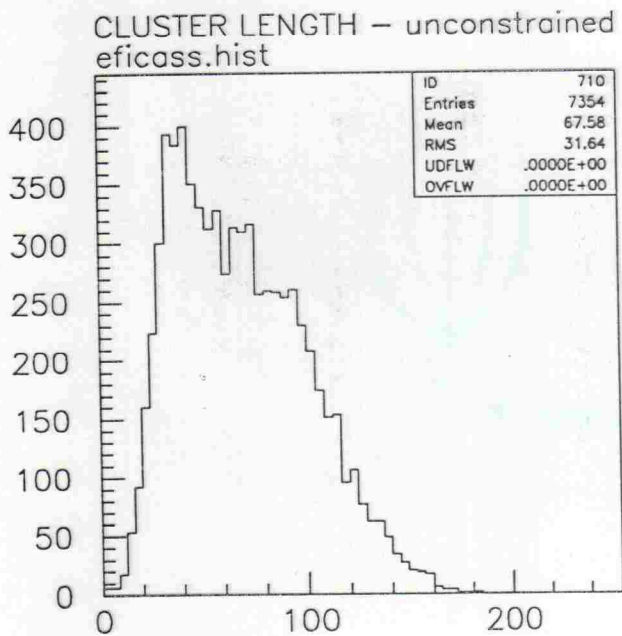**SCINTILLATORS**

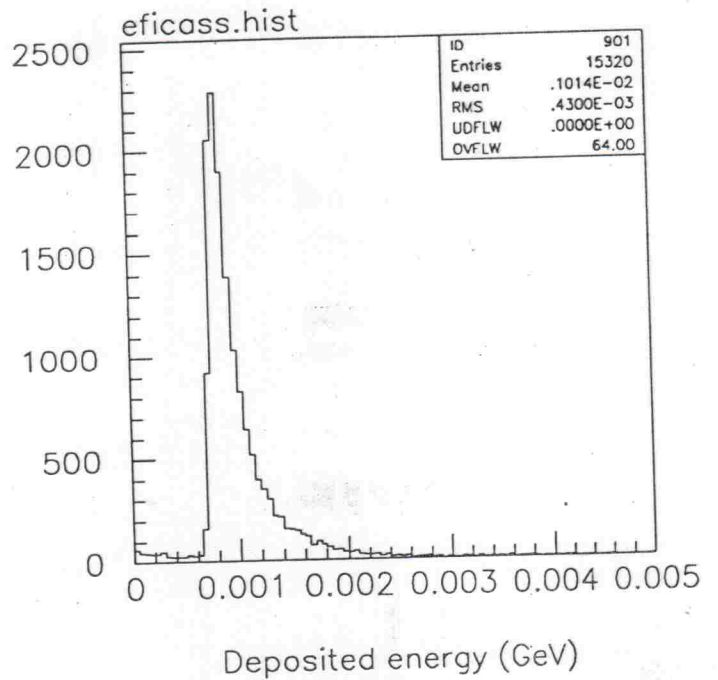- ADC count of summed up 2 PM signals & its number

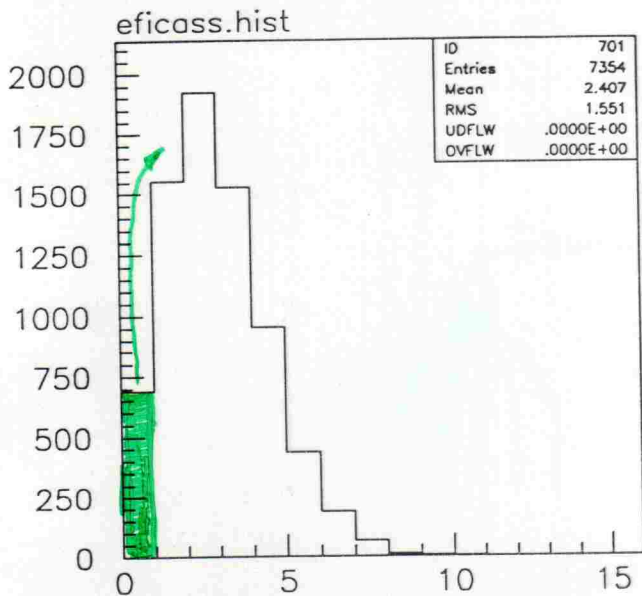**STREAMER TUBES + STRIPS**

DRIFT
CHAMBER

PARAMETERS:

• Drift chambers: DV - drift velocity (cm/s)   } in the code
TDCVAL - one TDC count (s)
SIGMA - R.M.S. of gaussian distribution ⟶ UPARC
used to smear the drift path

• Streamer tubes: DRVELO - drift velocity
TDCVAL - one TDC count
AVCLEN - average length of strip cluster
MXCLEN - max " " " "
AVCHG - charge on the central strip (in average)
RELRMS - relative R.M.S. for induced charge
(on one strip)
RELSEN - relative "sensitivity" of neighbour strip

on "QSTU"
FFREAD data card

SIGMA - the same as for Dr.Ch.
ITZERO - TDS stop signal time

SCINTILLATORS

$$\text{ADC counts} \sim \text{PMSIG1} + \text{PMSIG2} \qquad \text{Poisson distr.}$$

$$\text{PMSIG} \sim \text{PHIEL} * \text{PMQME} * \frac{\text{NPH}}{\text{AVNPH}} * \text{EDEP} * \text{EXP}\left(-\text{DL2}\middle/\text{XACON}\right)$$

10 phot/keV

conversion efficiency of the scintillator

quantum efficiency of the PM cathode

$\text{AVNPH} = 8.$

$\text{EDEP} = E_{los}$

abs. length

all they are in the code itself.

CLUSTER LENGTH – unconstrained

Deposited energy (GeV)

CLUSTER CHARGE – ADC counts, constrained

Summed up PM signal – ADC counts.

Conclusion: (only for SPEC part)

* technical details to be polished;

* READY for use as a tool for apparatus & software understanding;

* tuning of parameters required.

* Access: UNIX AFS directory ~rtsenov/public
files: efi_spec_10401. cmz
efi_spec_10401. cra + cral