JADE Computer Note No. 90

Jet Chamber Cell Inefficiencies in 1986

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January 13, 1987

Introduction The JADE Jet Chamber itself performed as efficient in 1986 as in previous years. Apparent inefficiencies are due to inefficiencies of the readout system or the way it was operated. The defects are shortly described below and their effect on the data is discussed.

Origin of Inefficiencies Immediately after the introduction of the Flash-ADC system the readout software had not been developed to its final form. Modifications had to be applied mainly to improve readout times. When the division of data between the 'virtual' DL8 crate boundaries was changed in this respect a bug was introduced that existed for the first few days of data taking and resulted in omitting some cells from the readout. The range of skipped cells did depend on the event configuration and thus was varying from event to event. This bug did exist up to and including run 24371 after which the software was corrected.

The second inefficiency originated from the SCANNER hardware module. This is the module that scans the Flash-ADC raw data for channels contents above a preset threshold value and thus triggers the microprocessor readout. If the SCANNER does not detect a hit the microprocessor will not read the Flash-ADC data, examine them for valid hits and determine times and amplitudes. In fact, there were predominantly two DL300 crates, where the SCANNER would hang under certain circumstances and a reset signal would have to be issued to that crate. Only later we learned how to reset the crate without losing the hit information. This hardware bug was corrected in the beginning of September 1986, i.e. from run 28365 on.

Effect on the Data The main effect on the track finding comes from cells missing in ring 2. For these cases the pattern recognition program has to extrapolate over a length of $20cm$ and usually fails to connect the two pieces of a track that have been reconstructed in ring 1 and 3. The picture included (Fig 1a) shows an example of how the pattern recognition program failed to link the two tracks seen in a bhabha event. However, when the missing cell is declared a dead cell for the pattern recognition program, it requires a less stringent match between tracks in ring 1 and 3 and the two pieces a properly connected (Fig 1b).

Missing cells in ring 2 do occur with an appreciable frequency only for the first period. The table below summarizes the rates of missing cells in ring 2 normalized to all events on a REDUCONE tape:

First Run	Last Run	Missing cell in ring 2 [%]
24200	24371	6.5
24372	28364	0.1

A second effect of the missing cells is a reduction of the number of hits included for a track, which may affect selection programs that place a stringent cut. For these selections the following section shows, how such events may be identified and how the numbers of hits counted for a track may be modified accordingly.

Identification of Events with Missing Cells Since the 'missing cells' were, in fact, alive they generated the T2 hardware signals read out and stored in bank TRIG, 2. A rather save indication for a missing cell is thus a cell with no hits in the JETC bank but with the associated T2 track trigger bit set. Therefore the already existing

Logical Function DEADCL(ICell, Nrun)

has been modified on the standard library 'F11GOD.PATRECSR' to give a value *.TRUE.* for cells that fulfill the above criterion. This function is automatically used inside the pattern recognition programs (and the new version was used to produce Fig 1b) but may of course also be used by each user to identify events that have to be treated in a special way depending on the selection or the analysis.

Note that the new DEADCL has not been called for the REDUC1- and REDUC2 steps of 1986 data. It is therefore up to each user to take appropriate action for his selection.

DSN F22ELS.DL.REDUC2.G1244.G1273
R-FI SECTION

BEAM 17.500 GEV FIELD -4.8[illegible] KG TALC C879 DATE 12/01/87 TIME 12.24[illegible]
T1A 0802 [illegible] 4101 T2C 8089 CAMAC TIME 45.40.19 19/ 2/198[illegible]

24228 274 68
IDHITS 258
ELGTOT 32714
MUHITS 5
LGCYL 32714
LGCAPS 0 0
FWCAPS 240 0

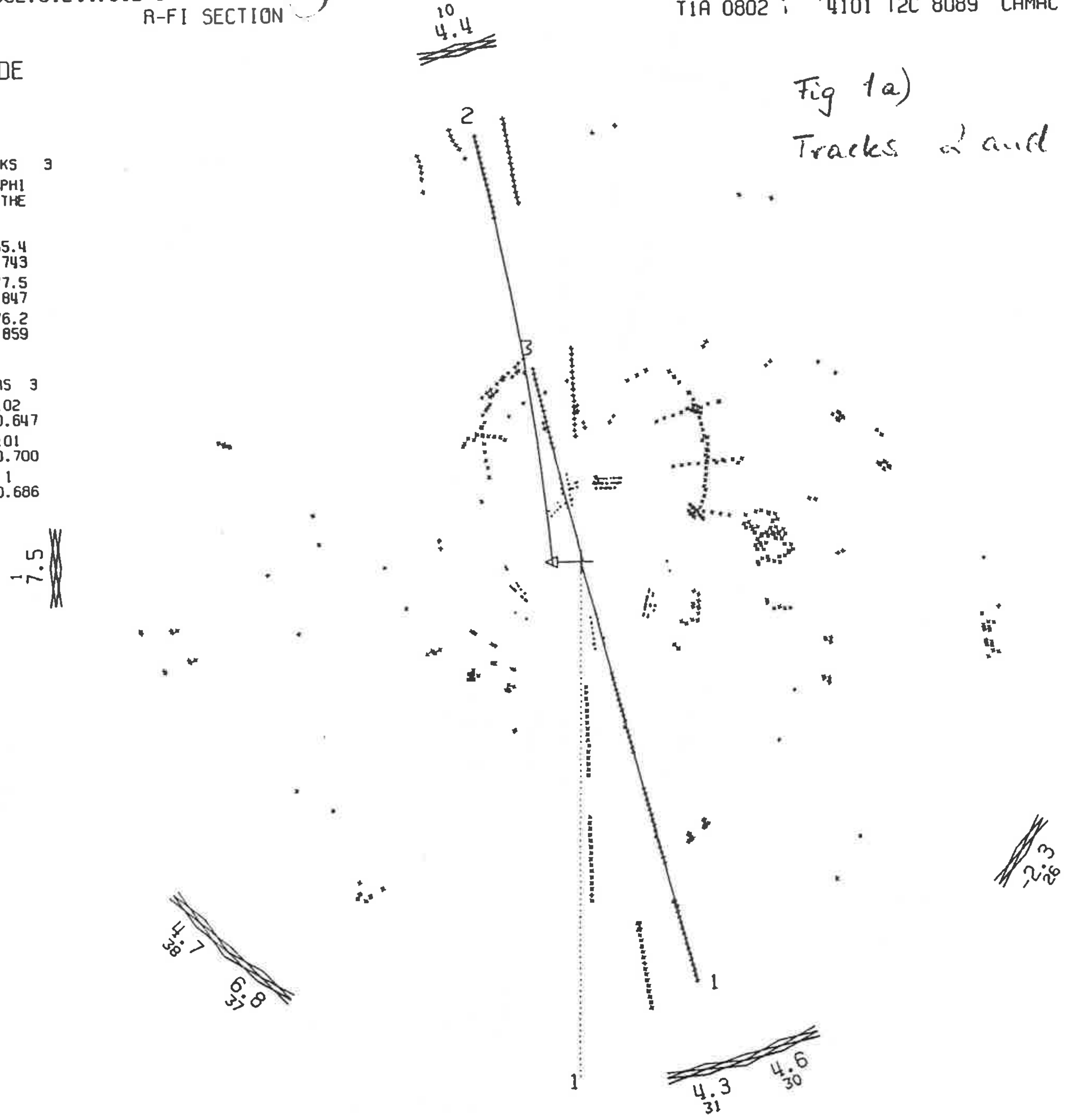
JADE

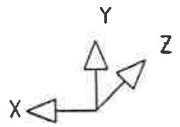
BANK PATR 9 NR OF TRACKS 3
NR +- RMSRFI RMSRZ/HIT PHI
PTOT PLONG PTRANS COSTHE

1 - 0.63/47 39.0/32 255.4
21.694 -16.128 14.510 -0.743
2 - 0.40/16 30.4/15 77.5
1.313 1.113 0.698 0.847
3 + 0.12/16 77.3/12 76.2
3.097 2.662 1.583 0.859

BANK LGCL 1 NR OF CLUSTERS 3
NR 1 BARREL CHARGE 102
E 17.682 FI 76.7 COST 0.647
NR 2 BARREL CHARGE 101
E 18.207 FI 255.0 COST-0.700
NR 3 BARREL PHOTON 1
E 0.928 FI 270.9 COST-0.686

Fig 1a)
Tracks 2 and 3 are separated





*** SUMS (GEV) *** PTOT 26.105 PTRANS 16.791 PLONG 19.903 CHARGE -1
TOTAL CLUSTER ENERGY 36.818 PHOTON ENERGY 0.928 NR OF PHOTONS 1

DSN F22ELS.DL.REDUC2.G1244.G1273
24228 274 68
IDHITS 258
ELGTOT 32714
MUHITS 5
LGCYL 32714
LGCAPS 0 0
FWCAPS 240 0

A-FI SECTION

JADE

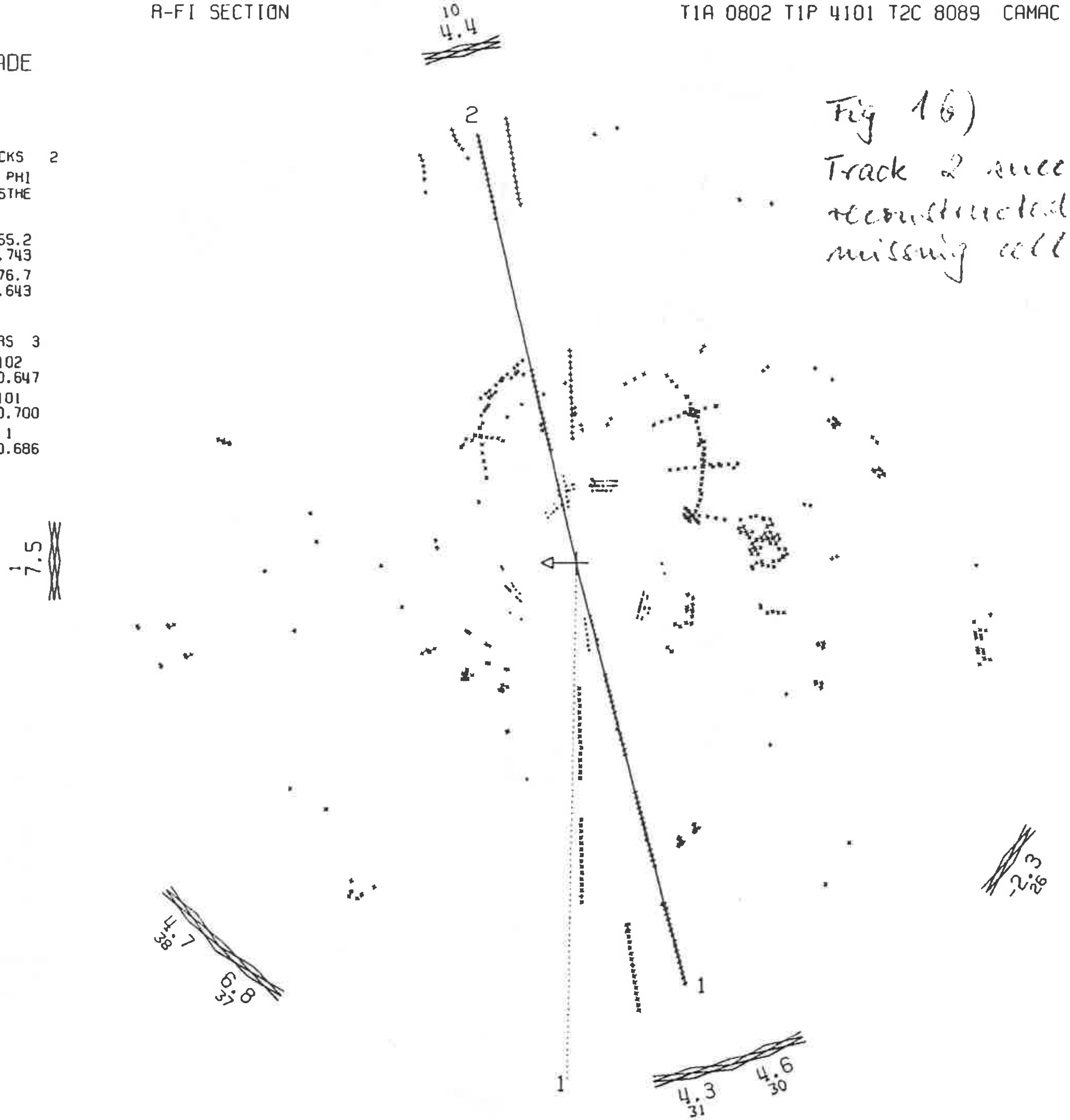
BEAM 17.500 GEV FIELD -4.842 KG TALC C879 DATE 12/01/87 TIME 12.25.00
T1A 0802 T1P 4101 T2C 8089 CAMAC TIME 45.40.19 19/ 2/1986

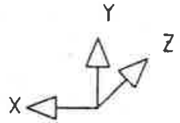
BANK PATR 10 NR OF TRACKS 2
NR +- RMSRFI RMSRZ/HIT PHI
PTOT PLONG PTRANS COSTHE

1 + 0.59/47 39.1/32 255.2
72.785 -54.112 48.677 -0.743
2 + 0.29/30 38.1/26 76.7
13.034 8.385 9.979 0.643

BANK LGCL 1 NR OF CLUSTERS 3
NR 1 BARREL CHARGE 102
E 17.682 FI 76.7 COST 0.647
NR 2 BARREL CHARGE 101
E 18.207 FI 255.0 COST-0.700
NR 3 BARREL PHOTON 1
E 0.928 FI 270.9 COST-0.686

Fig 1(b)
Track 2 successfully reconstructed across missing cell in ring 2.





SUMS (GEV) *** PTOT 85.819 PTRANS 58.656 PLONG 2.497 CHARGE 2
TOTAL CLUSTER ENERGY 36.818 PHOTON ENERGY 0.928 NR OF PHOTONS 1