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JADE COMPUTER NOTE NO. 63

z-Recalibration

It is known that the z-calibration based on pulser data is not sufficient to obtain a good z-coordinate. This is essentially due to systematic effects which have been studied by T. Nozaki and P. Dittmann. They found e.g. that the correction for the z-coordinate depends on the φ angle of a track element.

To correct for the systematic effects a method was developed by P. Dittmann described in a note dated Oct. 81. This first version however changes the amplitudes in the jetchamber bank and influences therefore the dE/dx - de-determination. To avoid this, P. Dittmann afterwards set up a slightly different version which improves the z-coordinate

$$z = \frac{L_{eff}}{2} \quad \frac{A_L - A_R}{A_L + A_R}$$

by correcting the amplitudes in the following way :

$$A_{L,R} \rightarrow A_{L,R} \pm C$$

Now the correction C (which depends on the orientation and position of a track element in drift space) drops out in the sum $A_L + A_R$ used for dE/dx calculation. P. Dittmann started to create new calibration files for 1979 - beginning of 1981. This was now continued up to the end of 1982. The method also determines new pedestals and gaines using a combined set of multihadron and Bhabha events for the first hit and a larger set of multihadron events for the second hit. The constants have been obtained by an iterative least squares fit. The calibration constants are slightly time dependent and were computed for the following run periods :

79A:	0-1400	79B:	1400-2600		
80A:	2600-3730	80B:	3730-4900	80C:	4900-6000
81A:	6000-7600	81B:	7600-10000		
82A:	10000-11800	82B:	11800-13000		

A measure for the improvement of recalibration and refit is

$$\sigma_z = [\Sigma(z_i^{meas} - z_i^{fit})^2/(n-2)]^{1/2}$$

In Fig. 1 the σ_z distributions before and after recalibration, refit and hit-cleaning are given. As an example, how the mass resolution of the JADE detector can be improved, the K^0 mass spectrum for 1981 data is shown in Fig. 2 - without and with z-recalibration. (Note however that Komamiya with a special hit cleaning program has obtained a nearly as good mass resolution for the K^0).

Programs for z-Calibration

A set of programs together with a calibration data file has been established for common usage.

The programs are on the library

F11LHO.JADEGS (Source)
F11LHO.JADEGL (Load)

and the calibration file name is

DSN = F11DIT.ZCAL8305

The user has to make two calls for each event :

1. CALL ZSREAD(NRUN,LUN)
 or CALL ZSSPEC (NRUN,LUN) if the supervisor is not used.

2. CALL ZSFIT(IJETC,IJETU, IJHTL, IPATR, MODE)
note update!

with the following parameters :

NRUN	=	current run #
LUN	=	FORTRAN unit of calibration file
IJETC	=	pointer to calibrated jet chamber bank
IJETU	=	pointer to uncalibrated jet chamber bank (= IDATA(IJETC-1))

IJHTL = pointer to hit label bank

IPATR = Pointer to PATR bank

MODE = 0 : does everything (z-calibration, hit cleaning, track fit)

= 1 : z calibration only

= 2 : z calibration and track fit (no hit cleaning)

MODE 0,1,2 overwrites the amplitudes in JETC bank

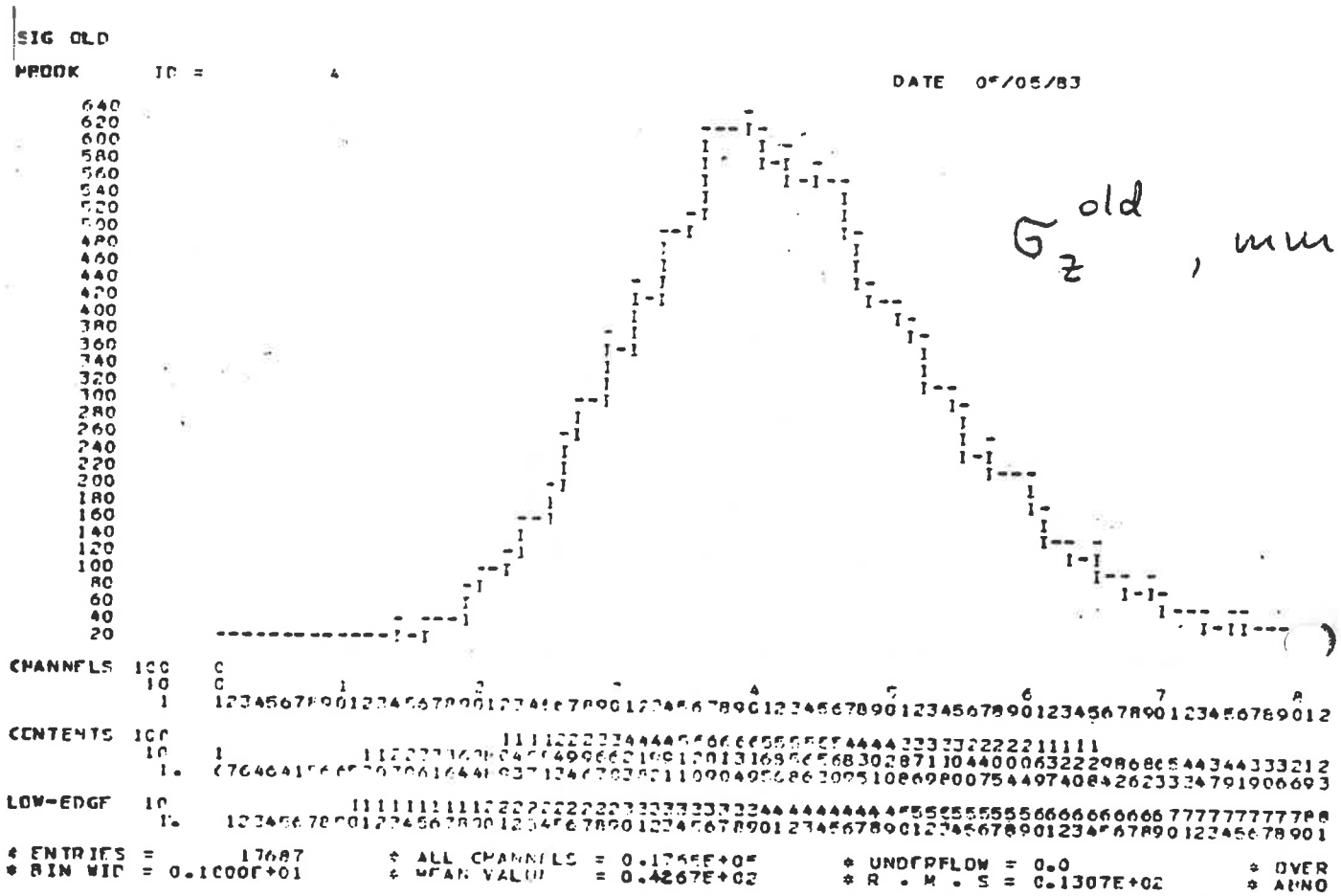
MODE 0,2 overwrites all z correlated information in PATR and JHTL bank (z-bit)

If problems occur, please contact L. Becker or G. Heinzelmann.

FIGURE CAPTIONS

Fig. 1 : Distribution of $\sigma_z = [\Sigma(z_i^{meas} - z_i^{fit})^2/(n-2)]^{1/2}$ before and after z recalibration, refit and hit cleaning.

Fig. 2 : K^0 mass spectrum before and after z recalibraiton, refit and hit cleaning.


SIG OLD
HBOOK ID = 4
DATE 05/05/83
σ_z^{old}, mm
CHANNELS
CONTENTS
LOW-EDGE
* ENTRIES = 17687
* BIN WID = 0.1000E+01
* ALL CHANNELS = 0.1766E+05
* MEAN VALUE = 0.4267E+02
* UNDERFLOW = 0.0
* R . M . S = 0.1307E+02

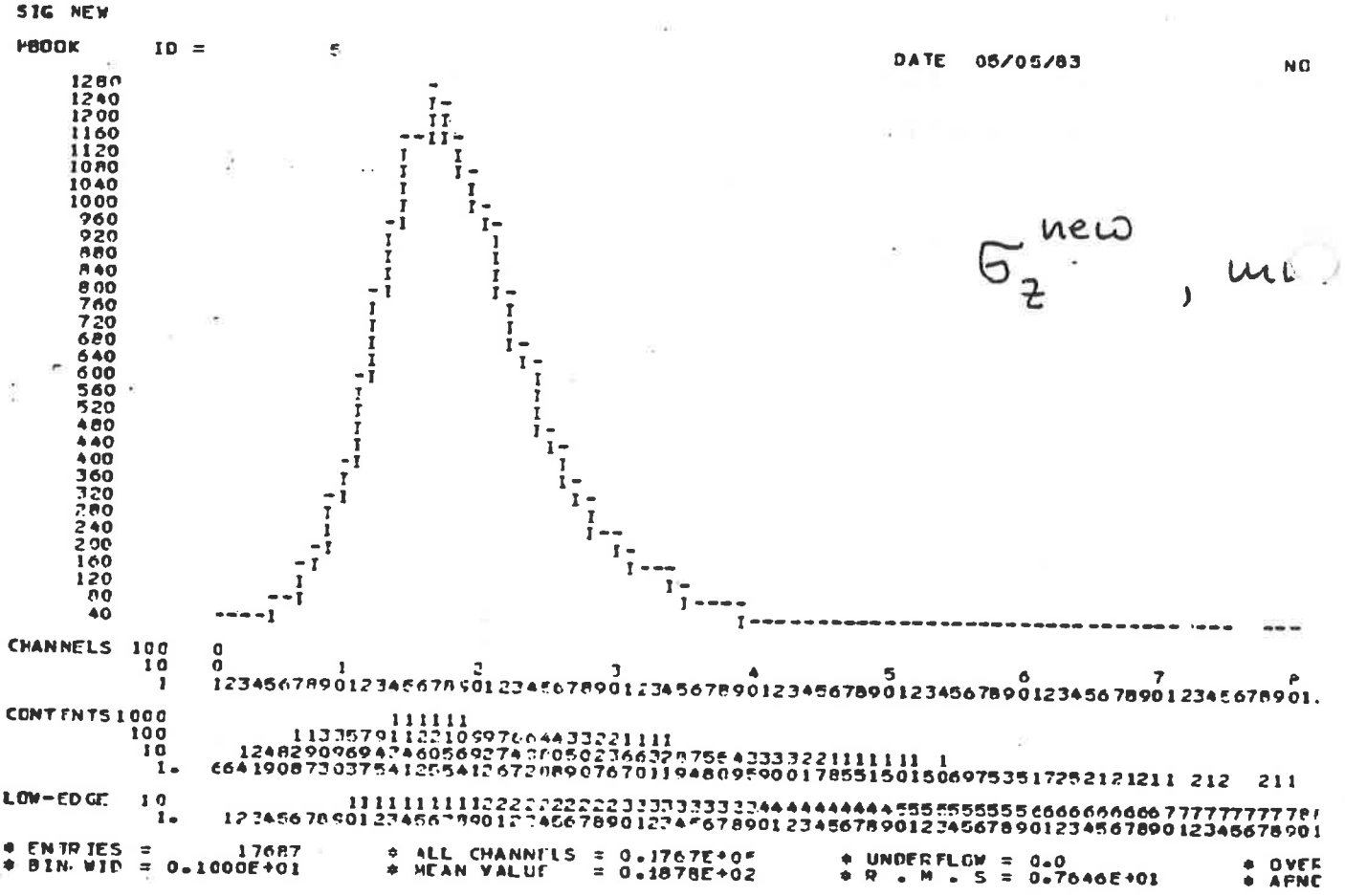
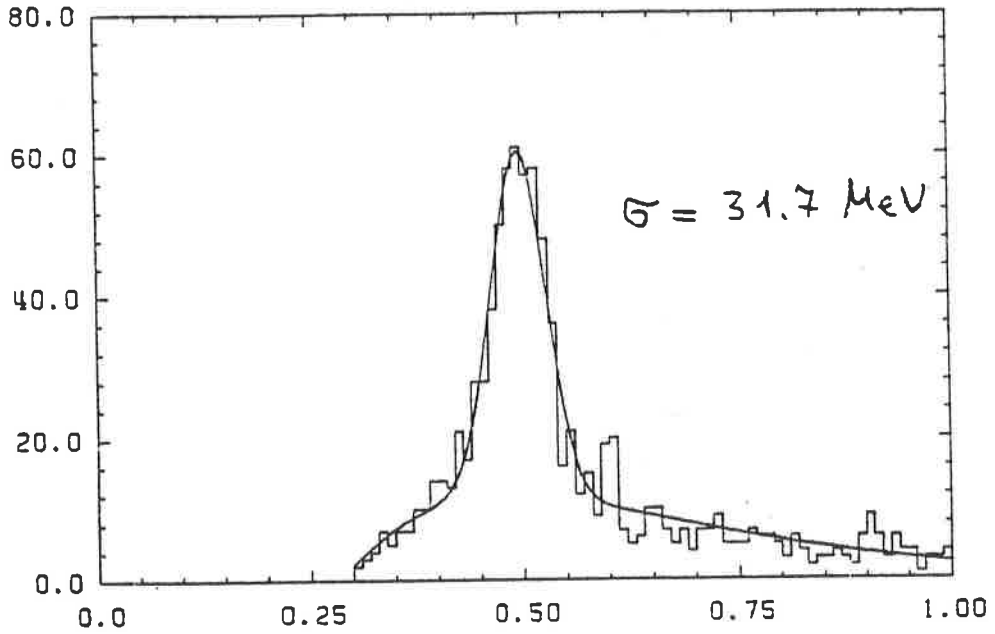

SIG NEW
HBOOK ID = 5
DATE 05/05/83
σ_z^{new}, mm
CHANNELS
CONTENTS
LOW-EDGE
* ENTRIES = 17687
* BIN WID = 0.1000E+01
* ALL CHANNELS = 0.1767E+05
* MEAN VALUE = 0.1878E+02
* UNDERFLOW = 0.0
* R . M . S = 0.7646E+01

Fig. 1


80.0
60.0
40.0
20.0
0.0
0.0
0.25
0.50
0.75
1.00
σ = 31.7 MeV
M(K°s), GeV

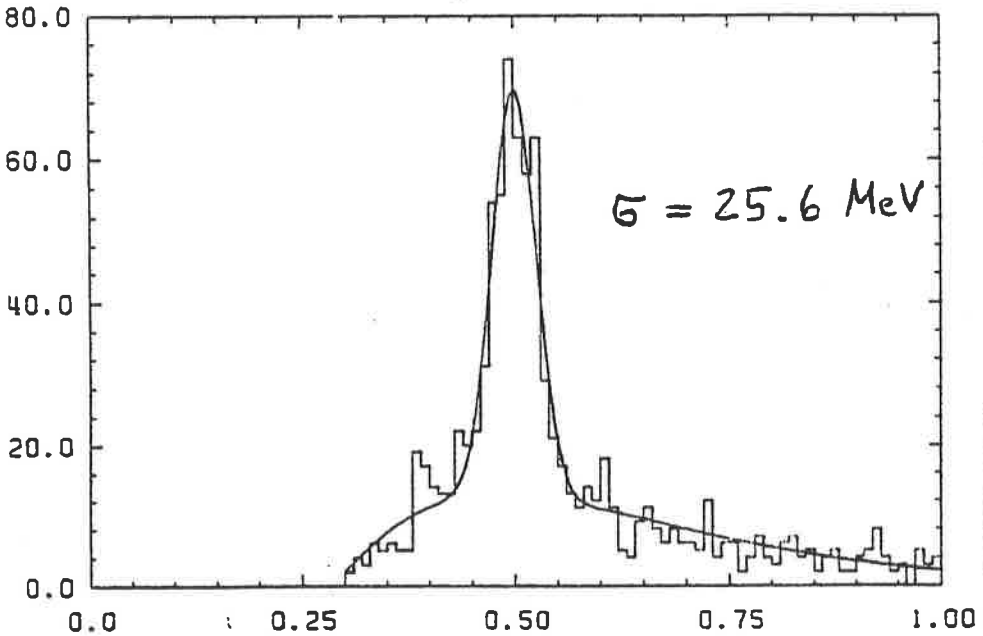

80.0
60.0
40.0
20.0
0.0
0.0
0.25
0.50
0.75
1.00
σ = 25.6 MeV
M(K°s), GeV

Fig. 2