

JADE Computer Note No. 12

1. version 21.11.1978

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Track Bank from Pattern Recognition Program

- name of bank : 'PATR'

- pointer to the bank : IDATA(70) in COMMON/BCS/

- contents of bank 'PATR':

(1) : LO = length of event data (including this word): (=8)

(2) : number of tracks

(3) : LTR = 48 or 62

→ (4) : PATREC history word (LOR of all track history words)

(5) : number of hits in ID

(6) : " " uncorrelated hits in ID

(7) : " " " line elements in ID

(8) : not yet used

(LO + 1) }  
  .        }  
  .        : data of 1. track  
  .        }

(LO + LTR) }  
  .        }  
  .        : data of 2. track  
  .        }  
(LO + 2LTR) }

- data for a track:

- (1) : track number
- (2) : program identifier. Using IBM notation this word is coded as follows:
  - Bit 31 set → fast pattern recognition
  - Bit 30 set → medium " "
  - Bits 30 and 31 set → slow pattern recognition
  - Bit 29 set → TP momentum fit
  - Bit 28 set → manually edited
- For PATR bank 12 (Monte Carlo created bank)
  - hdata (3) = no. of track generating four vectors stored in bank VECT 0
  - hdata (4) = type of particle as in VECT bank
- (3) : data at which pattern recognition run
- (4) : type (e.g.: conversion point, decay point, ...)
- (5) : x
- (6) : y
- (7) : z
- (8) : dx
- (9) : dy (direction of flight) (unit vector)
- (10) : dz
- (11) : type, x,y,z dx, dy, dz of last measured point of the track
- (17) : type (e.g.: parabola, circle)
- (18) : parameters
- (19) :  $\sqrt{\chi^2/D.O.F.}$  (mm)
- (20) : No. of hits used in the fit
- (21) : curvature
- (22) :  $\delta(\text{curvature})$
- (23) : curvature at 1. measured point
- (24) : " " last " "
- (25) : type
- (26) : parameters
- (27) :  $\sqrt{\chi^2/D.O.F.}$  (mm)
- (28) : No. of hits used in the fit

of 1. measured point of the track

1 circle  
2 parab.

of fit in the x-y plane

signed quantity!

of fit in the r-z plane

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(34) } : cell numbers that contain hits of the track
(35) : (in the same order as passed by the track)
(36) :
(37) :
(38) :
(39) :
(40) : pointer to corresponding lead glass cluster
(41) : " " "  $\mu$ -chamber hits
(42) : " " " track bank in TP-bank
(43) : " " " TOF-bank
(44) : flag for additional information
      > 0, if following 2 z-coordinates are filled.
      = 2, if covariance matrix of helix fit is filled.
(45) : first valid z-coordinate
(46) : last valid z-coordinate
(47) : no. of hits associated with track
(48) : track history word (mainly for specialists - see appendix)
      if idata (44), eq. 2
(49) :  $\chi^2$  of r- $\phi$ -fit (normalised to  $\sigma_0 = 115\mu$ )
(50) : cov ( $\phi^2$ )
(51) : cov ( $\phi r_{\min}$ )
(52) : cov ( $r_{\min}^2$ )
(53) : cov ( $\phi k$ )
(54) : cov ( $r_{\min} k$ )
(55) : cov ( $k^2$ )
(56) :  $\chi^2$  of r-z-fit (normalised to 20 mm)
(57) : cov ( $z_0^2$ )
(58) : cov ( $z_0 dz/dr$ )
(59) : cov ( $(dz/dr)^2$ )
(60) : date at which TP track fit was made
(61) : free for other use
(62) : "

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Since the errors are not gaussian the variances are normalised to the ideal  $\chi^2$ .

$$\text{cov} (r-\phi) = \text{cov} (r-\phi\text{-fit}) \times \chi^2/n-3$$

$$\text{cov}(r-z) = \text{cov}(r-z\text{-fit}) \times \chi^2/n-2$$

The original values for  $\chi^2$  are however given.

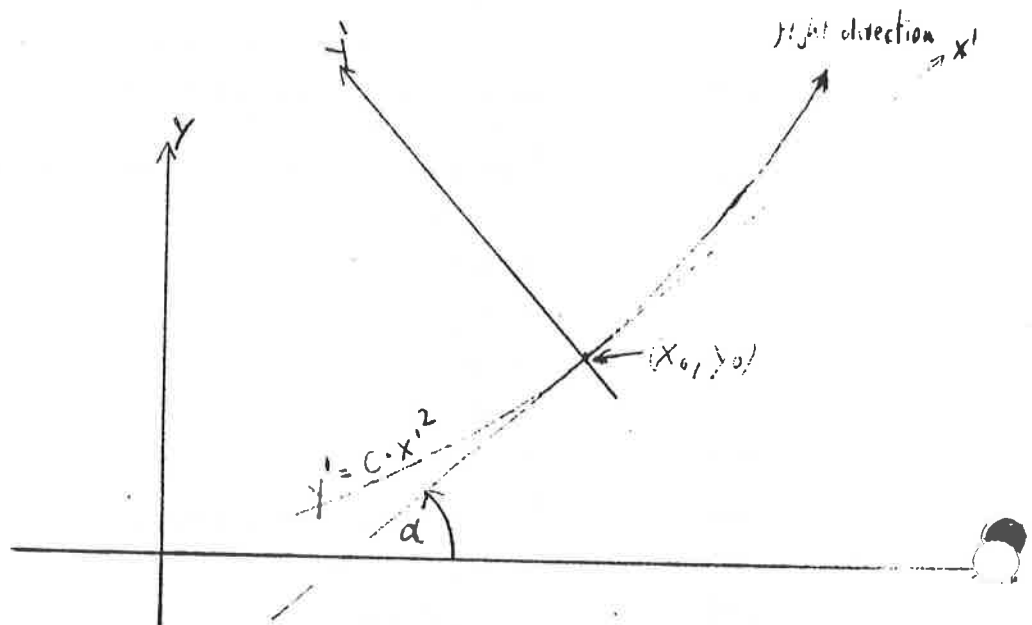
### Fit Parameters

- circle fit in xy-plane (type = 1)

- 19 P1 = curvature =  $R^{-1}$  [ $\text{mm}^{-1}$ ]  
 20 P2 =  $D_0 - R$  [ $\text{mm}$ ]  $D_0$  = distance (coordinate origin-centre of circle)  
 21 P3 = angle of direction (coordinate origin-centre of circle)  
 $\in [-\pi, +\pi]$

- parabola fit in xy-plane (type = 2):  $y' = c \cdot x'^2$

- 19 P1 =  $\alpha \in [-\pi, +\pi]$   
 20 P2 =  $x_0$   
 21 P3 =  $y_0$   
 22 P4 =  $c$



$\alpha$  = angle between y-axis and y'-axis

- straight line fit in rz-plane (type = 1)

$$z = P1 \cdot r + P2 \quad r = \sqrt{x^2 + y^2}$$

30 P1

31 P2

### Track History Word

Using IBM notation (bit 31 = lowest order bit) this word is coded as follows:

- Bit 31 set → Final PATREC fit in XY plane was bad.
- " 30 " → It is still not certain on which side of the wire plane the track lies, even after the final fit in XY.
- " 29 " → PATREC XY-FIT entered the single track element deleting mode in order to recover from an initially bad track fit.
- " 28 " → PATREC XY-FIT entered the multiple track element deleting mode in order to recover from an initially bad track fit.
- " 27 " →  $\geq 3$  hits which also belong to another track were attached to this track by the PATREC 'fit and fetch' program (PATROL).
- " 26 " → A re-fit of the track called by the PATREC 'fit and fetch' program (PATROL) failed with a large  $\chi^2$ . The last good fit to the track was restored.
- " 25 " → Low transverse momentum ( $< 65$  MeV/c).
- " 24 " → Final PATREC fit in ZR plane was bad.
- " 23 " → PATREC ZR-FIT rejected  $\geq 3$  of the hits from the track in order to obtain an acceptable fit.
- " 22 " → No connection was made into ring 1 by the BACKTRACE program for this track (note that if such hits exist, they will not have been lost but will have been found by the PATROL program at a later stage in the pattern recognition).
- " 21 " → No connection was made into ring 2 by the BACKTRACE program for this track even though both rings 1 and 3 were present. Again, if such hits exist, the PATROL program will have collected them.
- " 20 " → The left/right ambiguity solution for this track determined by the BACKTRACE program did not agree with that determined from the wire staggering by the track element routine.
- Bits 19 - 1 Not used.
- Bit 0 set → Track was marked as bad by an 'event' editor'.

