Preliminary JADE Computer Note No. 54

24.11.81
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Detector Monte Carlo

A. Tracking

The 4-vector input format is described in JADE Computer Note 10. Different from JADE Computer Note 26 the main libraries used are

F22ELS. JMC.S (source)
F22ELS. JMC.L (load)

An example including full JCL is given in member #PRODUCT on the main library. The constants used in this step are given and explained in member BLDAT. Notice that the magnetic field is now negative as in data.

B. Reading

Tracked data are not yet in the final format. Special reading routines have to be called to take account of finite resolutions, broken I.D. cells, trigger conditions etc. This is automatically done when the supervisor - or TP-program is called (refer to J.C.N. 25 for other cases). The constants used in this step are held in member RDSTAT, which describes the detector status in 1981.

For other running periods different conditions apply. They are described in the following members, which have to be specially included in the reading program in the linkage step.

RDST0179	for	1979
RDST0180	"	1980
RDST0280	"	
RDST0181	"	1981

C. Radiative photons

A new tracking program is available that propagates photons radiated off electrons in the beam pipe, pressure vessel etc.. Together with a format extension of the VECT-bank (see below) it involves program changes affecting several routines including subroutine MCJADE, the steering routine. To minimize confusion and to allow for a gradual change-over this new feature is not yet made a standard. However, the new routines are called if the library

F22ELS.MCDEN.L

is linked in front of JMC.L. The new routines will be copied to JMC.L in the near future.

D. Format of banks VECT

VECT, 0: 4-vectors and origins of the particles supplied to the tracking program

I * 4	1	length of header LØ ($\leq$ 13)
"	2	length of particle data L1 (= 10)
"	3	event no.
"	4	no. of final state particles = nf_1
"	5	no. of charged particles in the final state
"	6	" neutral "
R * 4	7	PHI } angles of jet axis
R * 4	8	cos (THETA) } angles of jet axis
I * 4	9	primary quark flavour (1,2,3,4,5) for (u,d,s,c,b)
I * 4	10	} if not zero, jet pointers:
"	11	} particles in jet 1, jet 1 + 2, jet 1 + 2 + 3
"	12	} in the following list.
I * 4	13	beam energy in MeV

LØ+1 ⋮ LØ+L1 } data of 1. track

LØ+L1+1 ⋮ LØ+2*L1 } data of 2. track

etc.

- data for a track:

R * 4	1	p_x
"	2	p_y
"	3	p_z
"	4	E
"	5	m
I * 4	6	q
I * 4	7	type
R * 4	8	x } of origin
"	9	y } of origin
"	10	z } of origin

VECT, 1: 4-vectors and origins of particles produced in the detector (except for decays of K^0).

```
I * 4   1   length of header  LØ' (=4)
  "     2   length of particle data L1' (=12)
  "     3   event no.
  "     4   no. of particles following  = nf2

      LØ'+1   ┐
        .     │
        .     │  data of 1. track
        .     │
      LØ'+L1' ┘
      LØ'+L1'+1 ┐
          .     │
          .     │  data of 2. track
          .     │
      LØ'+2*L1' ┘
        etc.
```

- data for a track:

```
R * 4    1   px
  "      2   py
  "      3   pz
  "      4   E
  "      5   m
I * 4    6   q
I * 4    7   type
R * 4    8   x  ┐
  "      9   y  │ of origin
  "     10   z  ┘
I * 2   21   VECT bank no. ┐  of mother particle
I * 2   22   particle no.  ┘
R * 4   12   path length of mother particle before decay/interaction
```

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Detector Monte Carlo

A. Tracking

The 4-vector input format is described in JADE Computer Note 10. Different from JADE Computer Note 26 the main libraries used are

F22ELS.JMC.S (source
F22ELS.JMC.L (load)

An example including full JCL is given in member #PRODUCT on the main library. The constants used in this step are given and explained in member BLDAT. Notice that the magnetic field is now negative in data.

#PRODUCT will create Monte Carlo Data without muon hits. Data including μ-chamber tracking are generated with the JCL stored in member #PRODMU (refer to J.C.N. 55 for further details of the μ-tracking).

B. Reading

Tracked data are not yet in the final format. Special reading routines have to be called to take account of finite resolutions, broken I.D. cells, trigger conditions etc. This is automatically done when the supervisor - or TP-program is called (refer to J.C.N. 25 for other cases). The constants used in this step are held in member RDTRG. RDTRG will look at the date as specified in the bank 'HEAD' and select the trigger conditions accordingly. The status of the inner detector (dead cells) is changed through this routine, too.

If the user wished to alter the detector status of the data he or she has to overwrite the time information in bank "HEAD" before RDTRG is called. This can be done most conveniently by supplying an own version of the routine RDDATE which is a dummy routine on JMC.L.

C. Radiative Photons

The tracking program propagates also photons radiated off electrons in the beam pipe, pressure vessel etc.. This addition initiated a format extension of the VECT-bank (see below).

D. Format of banks VECT

VECT, 0: 4-vectors and origins of the particles supplied to the tracking program

I * 4	1	length of header LØ (≤ 13)
"	2	length of particle data L1 (= 10)
"	3	event no.
"	4	no. of final state particles = nf_1
"	5	no. of charged particles in the final state
"	6	" neutral "
R * 4	7	PHI } angles of jet axis
R * 4	8	cos (THETA) }
I * 4	9	primary quark flavour (1,2,3,4,5) for (u,d,s,c,b)
I * 4	10	} if not zero, jet pointers:
"	11	} particles in jet 1, jet 1 + 2, jet 1 + 2 + 3
"	12	} in the following list.
I * 4	13	beam energy in MeV

LØ+1 ⋮ LØ+L1 } data of 1. track

LØ+L1+1 ⋮ LØ+2*L1 } data of 2. track

repeated nf_1 times.

- data for a track:

R * 4	1	p_x
"	2	p_y
"	3	p_z
"	4	E
"	5	m
I * 4	6	q
I * 4	7	type
R * 4	8	x }
"	9	y } of origin
"	10	z }

VECT, 1: 4-vectors and origins of particles produced in the detector (except for decays of long-lived neutrals, where the decay products have to be provided).

I * 4	1	length of header LØ' (=4)
"	2	length of particle data L1' (=12)
"	3	event no.
"	4	no. of particles following = nf_2

LØ'+1 ⎫
  . ⎬ data of 1. track
  . ⎪
LØ'+L1' ⎭
LØ'+L1'+1 ⎫
  . ⎬ data of 2. track
  . ⎪
LØ'+2*L1' ⎭

repeated nf_2 times.

- data for a track:

R * 4	1	px
"	2	py
"	3	pz
"	4	E
"	5	m
I * 4	6	q
I * 4	7	type
R * 4	8	x ⎫
"	9	y ⎬ of origin
"	10	z ⎭
I * 2	21	VECT bank no. ⎫
I * 2	22	particle no. ⎭ of mother particle
R * 4	12	path length of mother particle before decay/interaction