JADE - Computer Note No. 10 9.11.1978

F11BAR. SAGE PS
" PL

F11BAR. EVENTGEN

Monte Carlo Formats

I. Four Vector Generation

Library : F11BAR. EVENTGEN.S and F11BAR. EVENTGEN.L

1. Tape format

Monte-Carlo tapes containing four vectors for various types of event classes are written in the following format :

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NR, BEAM, DUMMY(4),
NP, NC, NN, ((PP(I4,N), I4 = 1, 4), XM(N), ICH(N), ITP(N).
(IP (N,I2), I2 = 1,2), N = 1, NP),
NF, NCF, NNF, ((PF(I4,N2), I4 = 1,4), XMF (N2), ICF (N2), ITF (N2),
(PSTRT (I3,N2), I3 = 1,3), N2 = 1, NF)
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NR	=	Event No.
BEAM	=	Beam energy in GeV
DUMMY	=	Not yet specified
NP	=	Total number of primary particles
NC	=	Number of charged primary particles
NN	=	Number of neutral primary particles
PP(4,30)	=	four vectors of primary particles
XM(30)	=	Mass of primary particles (in GeV)
ICH(30)	=	Charge of primary particles
ITP(30)	=	Type of primary particles
IP(30,2)	=	Pointer array to decay products
		IP(N,1) = points to first decay product in PF
		IP(N,2) = number of decay products
NF	=	total number of final state particles
NCF	=	number of charged final state particles
NNF	=	number of neutral final state particles
PF(4,60)	=	four vectors of final state particles
XMF(60)	=	mass of final state particles

ICF(60) = charge of final state particles
ITF(60) = type of final state particles
PSTRT(3,60) = x, y, z - coordinates of the origin of final state particles (in mm)

The particle types are defined as follows :

Type	Particle
1	Photon
2	Electron
3	Muon
4	Pion
5	K
6	Nukleon
7	Phi
8	Eta
9	Etaprime
10	Omega
11	K*(890)
12	Rho

2. Programs are available to generate various types of events.

a) Jet events

H.G. Sander's coding of Feynman and Field is used to produce the primary particles of a jet.
SAGE phase space routines are used to decay them.

TAPE : F11BAR. JETAT 30
contains 8000 jet events at 30 GeV.

DISK : the first 200 events are available on
F11BAR. JETAD 30

b) Phase space

Pion only phase space events generated by SAGE with a Poisson multiplicity distribution

TAPE : F11BAR. POISA 30
5000 events at 30 GeV

c) Beam gas

Use H.G. Sander's coding of FOWL generation

TAPE : F11BAR. BMGS A 30
10.000 beam gas events at 15 GeV beam energy.

d) Fast routines (not worth-while writing tapes) are available for generating QED events (ee, $\mu\mu$, $\gamma\gamma$) and a fair number of two body final states, e.g. $\omega\,\pi^0$, $\gamma\,\eta$, $\gamma\,\eta'$, $\phi\,\eta$, $K\,K^*$, $\pi^+\pi^-$, etc.

II. Tracking

Library : F11BAR. JADE, SOURCE and F11BAR. JADE, LOAD

The particles stored on the four vector tapes are traced through the detector and corresponding output tapes are written.

These tapes however do not have the final event format. The ϕ-resolution of the jet chambers is set to 20μ, z-coordinates are given in mm and z-amplitudes are normalized. The tapes have to be read by the routine READMC, which inserts experimental resolutions, takes into account inefficiencies and inserts random hits. The default values may be changed by the user. After the call to READMC, the event is available in /CDATA/Length, ID(4000).

Tape Format :

1. record	geometrical const. and chamber const.	
2. record	μ - chamber const.	
3. record	4-vectors)	repeated
4. record	event banks)	

a) The content of the constants records are described by comment cards in BLDAT and READMC.

b) Four vector record : BOS - format

0 word	total length	
1 word	'VECT'	
2 word	1	
3 word	0	
4 word	length	
5 word	event number	
6 word	NF total No. of final state particles	
7 word	NCF total No. of charged particles	
8 word	NNF total number of neutral particles	
9 -ff-	P(7,60) repeated NF times	
	P(1,N) ... P(4,N) 4-vector components	
	P(5,N) Mass	
	P(6,N) Charge)	Integer
	P(7,N) Type)	

After a call to READMC the 4-vector data are stored in /C4VECT/VECT(424).

c) Data record :

1. HEAD

Header bank with fixed pointer table as described in JADE-Note No. 24 with one change. Now there is only one μ-filter bank instead of 6 as originally proposed.

BANK 1	HEAD	
BANK 2	TRIG	Pointer on LOC 55 in Head Bank
BANK 3	SCAL	Pointer on LOC 56 in Head Bank
BANK 4	LATC	Pointer on LOC 57 in Head Bank
BANK 5	ATST	Pointer on LOC 58 in Head Bank
BANK 6	ATOF	Pointer on LOC 59 in Head Bank
BANK 7	ALGL	Pointer on LOC 60 in Head Bank
BANK 8	JETC	Pointer on LOC 61 in Head Bank
BANK 9	CONC	Pointer on LOC 62 in Head Bank
BANK 10	MUEV	Pointer on LOC 63 in Head Bank

The first data word in the header bank, i.e. ID(5) now contains the event number.

2. TRIG

The organization of the trigger bank is not yet fixed. At present we work on the following scheme :

I*4	Word 1				
	2	BOS			
	3				
	4				
I*2	4 + 1				
	+ 2	T1 information			
	+ 3				
	+ 4				
	:	T2 information			
	+ 10				
	+ 11	bit 0 - 7	BP cntr.	1 - 8	
	+ 12	bit 0 - 7		9 -16	
	+ 13	bit 0 - 7		17 -24	
	+ 14		TOF	1 - 7	
	+ 15			8 -14	latches
	+ 16	bit 0 - 6		15 -21	
	+ 17			22 -28	
	+ 18			29 -35	
	+ 19			36 -42	
	+ 20		LGRow	1 - 7	
	+ 21			8 -14	lead glass row latches
	+ 22	bit 0 - 6		15 -21	
	+ 23			22 -28	
	+ 24			29 -35	
	+ 25			36 -42	

I*2	word 4 + 26	bit 0 - 7	LGQ	1 - 8	lead glass end cap quadrant latches
	+ 27	bit 0 - 3	LGEsum	1 - 4	total lg energy latches
	+ 28	bit 0,1	TAG		tagging latches
	+ 29	bit 0,15	JTRKA	1 -16	Jet Ch. Tracks all (p > 0.2 GeV)
	⋮				
	+ 34	bit 0,15	JTRKA	81-96	
	+ 35	bit 0,15	JTRKF	1 -16	Jet Ch. Tracks fast (p > 1 GeV)
	⋮				
	+ 40	bit 0,15	JTRKF	81-96	

3. SCAL

empty

4. LATC

I*4	word 1	BOS
	2	
	3	
	4	
I*2	4 + 1	Pointer to first TOF counter
	+ 2	Pointer to first beam pipe cntr
	+ 3	Pointer to first free position
	+ 4	empty
	+ 6	counter numbers
	⋮	

5. ATST

empty

6. ATOF

empty

7. ALGL

I*4	word 1	BOS
	2	
	3	
	4	
I*2	4 + 1	Pointer to first barrel hit
	+ 2	Pointer to first -z end cap hit
	+ 3	Pointer to first +z end cap hit
	+ 4	Pointer to first free location
	+ 5	Block number) repeated
	+ 6	Amplitude (in MeV))
	⋮	

8. JETC - see JADE Computer Note No. 5

I*4 ↓	word 1	)	
	2	)	BOS
	3	)	
	4	)	
I*2 ↓	4 + 1	)	
	⋮	)	Pointers
	+98	)	
	+ 99	wire no.	)
	+100	amplitude -z	)
	+101	amplitude +z	) repeated
	+102	drift time	)

9. CONC

empty

10. MUEV

I*4 ↓	word 1	)	
	2	)	BOS
	3	)	
	4	)	
I*2 ↓	4 + 1	Pointer to face 1	
	+ 2	Pointer to face 2	
	+ 3	Pointer to face 3	
	+ 4	Pointer to face 4	
	+ 5	Pointer to face 5	
	+ 6	Pointer to face 6	
	+ 7	Pointer to first free position.	
	+ 8	empty	
	+ 9	wire No. (4+ CHAMB + Hit No. -1)	)
	+ 10	drift time	) repeated
	+ 11	Δt longitud.	)
	⋮		

In case of trouble with programs or libraries contact :

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