Format of bank ZEHD
can be found in zlib/ze4vpk.for
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A new compact Data-Format
Description of Bank ZE4V

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Introduction A new compact Data-Format was developed in order to allow a fast access to all JADE-Multihadrons. For several analyses the complete event-record in all its details is not needed, and so it is often cumbersome to look through all JADE Data tapes to pick out only a few numbers. Although the new format was originally developed for electron analyses, it is general and detailed enough, that it can be used also for other applications.

The structure of the BOS - Bank ZE4V The event information is stored in a BOS Bank named ZE4V. Thus, the bank can be written out easily with the full event record. In the standard application, however, one creates a pure ZE4V dataset. The structure of the bank is as follows :
A global header part, which contains information about general event properties, is followed by the track section, where for all charged particles and photons details about momentum, energy, leadglass-clusters, dE/dx etc. are given. The track section is divided into two parts. The *general track section* (first 9 words), which contains mainly the fourvector and charge, is identical for charged particles and photons, while the following words (12 for charged particles and 5 for photons) are specific (*specific track section*). This format was chosen to accomodate even the minimal information of pure MC-fourvectors alone, where one can fill only the general track section and omit the additional words. To distinguish between the different filling modes (fourvector or photon or charged) the last halfword in the general track section is used (see example of a simple unpack routine).

RW(...+1)
...
RW(...+LH) } *header section*

RW(...+LH + 1)
...
RW(...+LH + LT) } *general track section*

RW(...+LH + LT + 1)
...
RW(...+LH + LT + Lch (Lph)) } *specific track section*
length for charged = Lch
length for photons = Lph

} *track section* repeated for all particles

Contents of the ZE4V-Bank The header section contains information about the structure of the bank and quantities, which refer to the whole event. The first words give the sizes of the different sections of the bank. This is followed by run and eventnumber and basic event-quantities like thrust, sphericity and acoplanarity. The next words contain the coordinates of the main eventvertex from Bhabha calibration. In addition secondary vertices can be stored for analyses with reconstructed particles. The last section of the header is only filled for MC - events and holds the flavour and the fourvectors of the generated partons. The header is followed by the track section. For charged

particles most of the information is taken from the PATR-bank with lowest number, dE/dx and leadglass information stems from corresponding TPTR and LGCL banks. Each track is required to fulfill the following quality criterions :

≥ 20 hits in $r - \phi$

≥ 12 hits in $r - z$

$R_{min} \leq 50$ mm

$|Z_{max}| \leq 350$ mm

$P_{min} \geq 50$ MeV

A leadglass-cluster is accepted as a photon, if after subtracting the minimum-ionizing-energy for each connected track(corrected for tracklength), the remaining cluster energy is more than 150 MeV. For all particles the corresponding track numbers in PATR , LGCL and TPTR banks are provided. For MC - Events a traceback to the PALL bank is performed (for details see JCN 69). A detailed description of the bank is given in the appendix.
The routines and jobs, which create and unpack the ZE4V bank are all contained in the libraries :

F11ZIM.ZLIB.S (source)

F11ZIM.ZLIB.L (load)

To create the ZE4V bank from TP'ed events the job #ZE4VPK can be used. The subroutine ZE4VDP produces a printout of the ZE4V-bank in a readable format. For use together with the VECSUB routine package (DESYLIB), the subroutine ZE4VUN unpacks the fourvectors and some additional information for all particles into the VECSUB COMMON.
This library also contains subroutines (like THRUST or SPHRCY) which are copied from other JADE libraries, so it is useful to check for interferences.

Example of a Simple Unpack Routine (FORTRAN 77)

```
      IMPLICIT INTEGER*2 (H)
      COMMON / BCS / IW(10000)
      DIMENSION HW(20000) RW(10000)
      EQUIVALENCE ( HW(1),RW(1),IW(1) )
      INTEGER LENGTH ( -1:2 )
      NPZE4V = IW(IBLN('ZE4V'))
      LH = HW( 2*NPZE4V + 1 )
      LENGTH (-1) = HW( 2*NPZE4V + 5 )
      LENGTH (1) = HW( 2*NPZE4V + 7 ) + LENGTH( -1 )
      LENGTH (0) = HW( 2*NPZE4V + 9 ) + LENGTH( -1 )
      LENGTH (2) = HW( 2*NPZE4V +11 ) + LENGTH( -1 )
      NPART = HW( 2*NPZE4V + 6 )
      ...
      NPTR = NPZE4V + LH
      DO 10 I = 1,NPART
         ...
         IFLAG = HW ( 2*NPTR + 18 )
         IF (IFLAG .EQ. 1) DEDX = RW( NPTR + LENGTH(-1) + 9 )
         NPTR = NPTR + LENGTH ( IFLAG )
10    CONTINUE
      END
```

Available ZE4V Datasets

All JADE Multihadrons are available in this data-format on two tapes. One tape contains the Multihadrons of the years 1979 - 1985, the other the 1986 data. The DS names are :

F22ELS.ZE4VPK.V987.DATA7985

F22ELS.ZE4VPK.V987.DATA86

The same events are presently also available on the following MSS datasets ordered in terms of energy. These datasets will be kept up to date, in order to have always the newest version available on MSS. The DS names give the version (V987 = version Sep. 87) , the energy range (E3237 = 32 to 37 GeV), and the year of data taking (DAT7985A = 79 to 85 Data / set A).

F11ECK.ZE4V.V987.E1020.DAT7985A	with	3781	events
F11ECK.ZE4V.V987.E2026.DAT7985A	with	3119	events
F11ECK.ZE4V.V987.E2632.DAT7985A	with	1383	events
F11ECK.ZE4V.V987.E3237.DAT7985A	with	6604	events
F11ECK.ZE4V.V987.E3237.DAT7985B	with	6468	events
F11ECK.ZE4V.V987.E3237.DAT7985C	with	6341	events
F11ECK.ZE4V.V987.E3237.DAT7985D	with	6264	events
F11ECK.ZE4V.V987.E3237.DAT7985E	with	6195	events
F11ECK.ZE4V.V987.E3237.DAT7985F	with	6238	events
F11ECK.ZE4V.V987.E3237.DAT7985G	with	4890	events
F11ECK.ZE4V.V987.E3739.DAT7985A	with	3856	events
F11ECK.ZE4V.V987.E3739.DAT7985B	with	1939	events
F11ECK.ZE4V.V987.E3947.DAT7985A	with	3965	events
F11ECK.ZE4V.V987.E3947.DAT7985B	with	3751	events
F11ECK.ZE4V.V987.E3947.DAT7985C	with	3995	events
F11ECK.ZE4V.V987.E3947.DAT7985D	with	4006	events
F11ECK.ZE4V.V987.E3947.DAT7985E	with	3952	events
F11ECK.ZE4V.V987.E3947.DAT7985F	with	3125	events
F22ELS.ZE4V.V987.E35.DAT86A	with	16040	events
F22ELS.ZE4V.V987.E35.DAT86B	with	13393	events

APPENDIX : Detailed Description of the ZE4V-Bank

Header Section

NPZE4V = IW(IBLN('ZE4V'))

HW	(2NPZE4V+ 1)	Length of header (LH)
HW	(2NPZE4V+ 2)	Words per vertex (Lv)
HW	(2NPZE4V+ 3)	Number of vertices (Nv)
HW	(2NPZE4V+ 4)	Length of MC-Information part (=0 for data) (LMC)
HW	(2NPZE4V+ 5)	Length of general track section (LT)
HW	(2NPZE4V+ 6)	Total number of particles (charged + photons)
HW	(2NPZE4V+ 7)	Length of specific track section for charged (Lch)
HW	(2NPZE4V+ 8)	Number of charged particles (Nch)
HW	(2NPZE4V+ 9)	Length of specific track section for photons (Lph)
HW	(2NPZE4V+10)	Number of photons (Nph)
HW	(2NPZE4V+11)	Length of 'private' track section (Lpr)
HW	(2NPZE4V+12)	Number of 'private' particles (Npr)
HW	(2NPZE4V+13)	Run number
HW	(2NPZE4V+14)	Event number
RW	(NPZE4V+ 8)	Beam energy (GeV)
RW	(NPZE4V+ 9..12)	Sphericity axis (3 values) + Sphericity (TP convention)
RW	(NPZE4V+13..16)	2nd axis and value
RW	(NPZE4V+17..20)	3rd axis and value
RW	(NPZE4V+21..24)	Thrust axis and Thrust
RW	(NPZE4V+25..28)	Acoplanarity axis and value
RW	(NPZE4V+29)	not used
RW	(NPZE4V+30)	not used
IW	(NPZE4V+31)	MCREDU-Flag (1=accepted -1=not accepted 0=not tested)
RW	(NPZE4V+31+1)	x_1
RW	(NPZE4V+31+2)	y_1 coordinates of vertex 1
RW	(NPZE4V+31+3)	z_1
...		...
RW	(NPZE4V+31+Nv*Lv-2)	x_{Nv}
RW	(NPZE4V+31+Nv*Lv-1)	y_{Nv} coordinates of vertex Nv
RW	(NPZE4V+31+Nv*Lv)	z_{Nv}
	Following words are filled only for Monte Carlo	
HW	(2NPZE4V+62+2Nv*Lv +1)	Number of created jets (partons) (N_j)
HW	(2NPZE4V+62+2Nv*Lv +2)	Original quark flavour (1=u, 2=d, 3=s, 4=c, 5=b)
RW	(NPZE4V+32+Nv*Lv+1)	p_x
RW	(NPZE4V+32+Nv*Lv+2)	p_y of parton 1 (GeV)
RW	(NPZE4V+32+Nv*Lv+3)	p_z
RW	(NPZE4V+32+Nv*Lv+4)	E
...		...
RW	(NPZE4V+32+Nv*Lv+4N_j-3)	p_x
RW	(NPZE4V+32+Nv*Lv+4N_j-2)	p_y of parton N_j (GeV)
RW	(NPZE4V+32+Nv*Lv+4N_j-1)	p_z
RW	(NPZE4V+32+Nv*Lv+4N_j)	E

Track Section

NPTR : *see unpack routine for definition*

General Track Section	
RW (NPTR+ 1)	e_x
RW (NPTR+ 2)	e_y Direction cosines of track at closest point to (x_v, y_v, z_v)
RW (NPTR+ 3)	e_z
HW (2NPTR+ 7)	0 or PATR number of PHOT partner (conversion)
HW (2NPTR+ 8)	Particle code (JADE MC convention)*100 + identified type
HW (2NPTR+ 9)	0 or Vertex number of particle origin
HW (2NPTR+10)	0 or number of secondary vertex (if any)
RW (NPTR+ 6)	P_{tot}
RW (NPTR+ 7)	Charge
HW (2NPTR+15)	0 or particle number in PALL Bank (MC only)
HW (2NPTR+16)	Traceback code (MC only)
HW (2NPTR+17)	0 or number of TPTR bank
HW (2NPTR+18)	Filling mode flag for this track : -1 = LT words filled (4-vectors); 0 = LT+Lph words filled (photons); 1 = LT+Lch words filled (charged); 2 = LT+Lpr words filled (private)

Specific Track Section for Charged Particles (additional for charged particles)	
RW (NPTR+ LT + 1)	Cluster-energy of connected LG-cluster (GeV)
RW (NPTR+ LT + 2)	Error of cluster-energy
RW (NPTR+ LT + 3)	0 or corrected cluster energy (K.H.Meier)
HW (2NPTR+2LT + 7)	Detector flag (TP convention)
HW (2NPTR+2LT + 8)	No. of 1. connected LG-cluster + 100*(No. of 2. LG-cluster)
HW (2NPTR+2LT + 9)	Track number in PATR - Bank
HW (2NPTR+2LT +10)	Number of hits in $(r-\phi)$ * 100 + hits in $r-z$
RW (NPTR+ LT + 6)	x_{track}
RW (NPTR+ LT + 7)	y_{track} closest point to (x_v, y_v, z_v)
RW (NPTR+ LT + 8)	z_{track}
RW (NPTR+ LT + 9)	dE/dx
RW (NPTR+ LT +10)	$\sigma_{dE/dx}$
RW (NPTR+ LT +11)	R_{min}
IW (NPTR+ LT +12)	Muon Quality or unused (= 0)

Specific Track Section for Photons (additional for Photons)	
RW (NPTR+ LT + 1)	Cluster-energy in GeV
RW (NPTR+ LT + 2)	Error of cluster-energy
RW (NPTR+ LT + 3)	0 or corrected cluster energy (in future)
HW (2NPTR+2LT + 7)	Lg-detector part 0=barrel or +/- 1 = +/- z endcap
HW (2NPTR+2LT + 8)	No. of LG-cluster
HW (2NPTR+2LT + 9)	Number of (LG-blocks - connected tracks)
HW (2NPTR+2LT + 10)	Number of LG-blocks