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A User Guide to PPDS

The Particle Physics Data System
under CERN VAX/VMS

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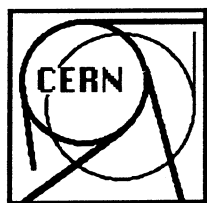


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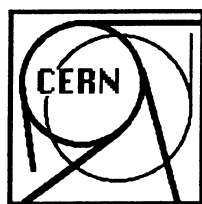
**A User Guide to PPDS -
the Particle Physics Data System
under CERN VAX/VMS**

A User Guide to

PPDS

The Particle Physics Data System
under CERN VAX/VMS

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Preamble

The PPDS system under VAX/VMS is presented.

Any questions and suggestions can be sent by MAIL to system managers at VXCRNB::OPYCD or VXCRNB::YGSCD. The internal BDMS-MAIL service is also available.

PPDS is also accessible as a remote system by any user outside CERN who has a DECNET link to the CERN VAX cluster. Please contact the PPDS-system managers in order to install the resident part of the system at the remote computer.

PPDS is still under development and new data bases may be added. Use "PPDS?" at the VMS level to see a list of the current data bases.

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Chapter 1

INTRODUCTION

The Particle Physics Data System (PPDS) originated in the Particle Data Group (USA) in the early 70's as a medium for the storage and retrieval of numerical experimental data in particle physics [1,2].

At the present time there are three rather similar versions of PPDS in existence:

- the LBL - SLAC version of PPDS under the SLAC - SPIRITS system [3,7];
- the Durham - RAL version of PPDS under BDMS/Durham [4,12];
- the IHEP - CERN version of PPDS under BDMS/Scrpukhov [5,8].

As a result of cooperative development all these versions are compatible in their data structures and data description language.

This document is an introduction to the third version and is aimed to give an inexperienced user the ability to retrieve the data of interest with a minimum of wasted effort.

In principle, to start using any PPDS data base it is sufficient to know only one page of acronyms and instructions (see next page). More advanced possibilities can be learned via the IHEP facility.

Examples of how to use the various data bases are presented in the respective sections of this manual.

PARTICLE PHYSICS DATA SYSTEM ABBREVIATIONS

PPDS	Particle Physics Data System [1]
PPDL	Particle Physics Data Language
BDMS	Berkeley Database Management System [2,8]
DB	Data Base

PARTICLE PHYSICS DATA BASES CATALOGUE

DB name **DB contents**

VOCABULARY

PPDL – vocabularies

EXPERIMENTS

Current and approved experiments

DOCUMENTS

Preprints, publications, reviews of experiments

REACTIONS Data tables from papers compiled in DOCUMENTS

PP Particle Properties compilation

CS Total cross section and multiplicity data

HOW TO USE PPDS AT CERN

PPDS ? to see a list of released databases.

PPDS <DBname> ?
to see the scope of the data base <DBname>.

PPDS <DBname>
to enter database <DBname>, then:

? or ?? to see a full list of BDMS commands;

?<COMMAND>
to see a particular <COMMAND> description;

HELPBASE online handbook on the data base;

FDT,... to see the data structure;

FIND ... search command;

INDEX, <KDE>
index of Key Data Elements;

DOCUMENT ...

to output the data

STOP

to exit from BDMS.

Note: The symbol PPDS must be defined at the DCL level. If it is not defined, give the command

```
@DISK$CD: [VFLCD.COMPAS.BDMS.COM]BDMSINI
```

Chapter 2

BDMS overview.

2.1 General concepts.

BDMS is a database management system in which a data base is viewed as a collection of hierarchical records with inverted file access.

The minimum logical unit of information in BDMS is the data element (DE). A record consists of data elements connected in a tree-like structure. Some of the DE or all of them may be declared as key data elements (KDE). The system maintains indices of all KDE's to allow efficient searching.

Retrieved records form a current set (SET). Different SETs are memorized by the system via an accession number. A new SET can be formed by Boolean operations on SETs previously defined.

From a programmer's point of view, BDMS is composed of two functional parts: BDMS core and applied PROCESSORS. Applied PROCESSORS are used to tune BDMS for a given type of data and to perform input/output control of data stream.

To learn more about BDMS see descriptions [2,8].

2.2 BDMS search facilities.

Retrieving information from any BDMS data base is achieved by the command:

```
FIND <search formula>**
```

The search formula is constructed from elementary retrieval conditions

```
FIND <KDE name> <R> <KDE value>;**
```

where KDE is the Key Data Element, R is the Relational connecting the KDE name and its value.

A record will be an found by elementary query condition provided it contains the specified KDE satisfying the relational R. The admissible values of R for an elementary retrieval query are the following:

=	-equal,	<>	-not equal,
>	-greater,	<=	-less or equal,
<	-less,	>=	-greater or equal.

Conditions of the form:

$x = A$; to $x = B$;	meaning x is from	$[A, B]$
$x > A$; to $x < B$;	meaning x is from	$]A, B[$

can also be used as a simple condition for data elements of numeric types.

To find records which contain a KDE having any value, one should form a simple retrieval query as follows:

```
FIND <KDE name>;**
```

Elementary retrieval conditions can be combined in the searching formula by the Booleans:

```
OR   -union,
AND  -intersection,
NOT  -complement,
```

with nested parentheses if necessary.

The command:

```
FIND (1) AND (2)**
```

will create a new current set which is the intersection of those (1) and (2) made earlier. This may be considered as a realization of the substitution rule when writing complicated (long) search formulas.

2.3 BDMS output facilities.

Current set of records can be output onto the terminal with the help of the command

```
LIST
```

with the parameters enabling to reduce the amount of the output information:

```
LIST,<N:M> -print out from N-th up to M-th record of the
           current set;
```

```
LIST,<N>,<DE name>, ..., <DE name>. -print out the specified
           data elements in the N-th record of the current set.
```

The command

```
PRINT
```

with similar parameters puts the information from the current set into the system file named $\langle \text{DBname} \rangle .\text{PRN}$ in format of the command LIST. The amount of the output information can also be controlled in another way, with the help of command:

SUPP,<DE name>, ... ,<DE name>. -suppress output of specified
data elements
SUPP,ALL-DE. -suppress output of all data elements;
DISP,<DE name>, ... ,<DE name>.
DISP,ALL-DE. -inverted SUPPRESS commands.

The command

DOCUMENT

prints data from the current set into the system file named <DBname>.DOC in the format specified by the applied processors. The problem-oriented command DOCUMENT has a few operation modes which should be set before DOCU with the help of the command

MODD,<N>

where N is the operation mode number. The command DOCUMENT may have parameters controlling the format of output into the system file. These features of the command DOCUMENT differ for various data bases. To get more detail description use:

HELPBASE

To finish work with BDMS, type:

STOP

Chapter 3

VOCABULARY data base.

3.1 General description.

VOCABULARY data base contains all terms of PPDL—language. One record of VOCABULARY data base contains information about one term of PPDL. Maintained by PDG(US), PRG(UK) and COMPAS groups[3,4,5]

Updated regularly by suggestions of encoders, managers and users.

Used by COMPAS group to produce PPDL Thesaurus for users and encoders (see VOCBOOK facility description).

VOCABULARY data base: user's key data elements.

DName	Contents
USAGE	— name of the vocabulary section
ABBREVIATION	— term abbreviation
NAME	-- term description
COMMENT	— comment

To see complete VOCABULARY record structure use BDMS commands FDT or HELPBASE.

This data base is a collection of vocabularies which compose the lexicon of PPDS. Data record structures, syntax of composite values of some special data elements (REACTION, R, ...), and vocabularies are principal components of the Particle Physics Data Language used in PPDS.

The best way to become familiar with PPDL is to scan printed version of PPDL Thesaurus which one can produce by VOCBOOK program. (Please consult with VOCABULARY data base manager).

Another way to learn more about PPDL is interactive work with VOCABULARY data base.

3.2 VOCABULARY: EXAMPLES:

To initiate interactive search, type;

PPDS VOCABULARY

System invites user to type BDMS commands by:

VOC:READ:EXEC>

To see possible values of key data element USAGE, type:

INDEX,USAGE

System answer:

"KDE" list for Key Data Element.

,U		
26	A	(Arguments in the observable descriptors)
132	AC	(ACcelerators)
29	DD	(Data Descriptors)
398	DE	(Detectors)
819	I	(Institutions)
13	M	(Modes - reaction classes)
92	O	(Observables - dependent and independent va- riables)
2325	P	(Particles)
7	PP	(Particle Properties)
199	R	(References)
16	RR	(Related References)
17	S	(Scales)
11	TY	(TYpe of documents)
11	U	(Units)
Total		number of "KDE" values: 4095 for 14 names

To find possible data descriptors, type:

FIND USAGE=DD; ** INDEX/SET, ABBREVIATION

System will print on the screen all data descriptors. To see first term explanation, type:

LIST, 1

To exit from BDMS, type

STOP

Chapter 4

DOCUMENTS data base.

4.1 General description.

DOCUMENTS contains the indexing of particle physics papers that contain experimental data or data analyses. Maintained by COMPAS group in collaboration with Berkeley Particle Data Group (PDG). Updated regularly by the data compiled by COMPAS group and with data from DATAGUIDE data base [7].

COVERS 1936 TO THE PRESENT

Searchable by reaction, lab momentum, c.m. energy, particle studied, accelerator, detector, data descriptor, author, affiliation, reference, and other items.

Used as guide to compile REACTIONS data base and CS data base. Index of database published as "A Guide to Data in Elementary Particle Physics"[7]

DOCUMENTS data base: user's key data elements:
--

DName	Contents
SC	- short code
R	- document reference
TY	- document type
D	- document year
A	- author's name
I	- author's institution
PR	- proposal short code (see EXPERIMENTS, next section)
RR	- related reference code
AC	- accelerator
DE	- detector

PL	— initial state polarization
ES	— experiment status (see EXPERIMENTS, next section)
RE	— reaction studied
FSP	— final state particle
BP	— beam particle
TP	— target particle
PLAB	— beam momentum in the lab frame
DD	— data descriptor
P	— particle studied
PP	— particle property

To see complete DOCUMENTS record structure use BDMS commands FDF or HELPBASE.

4.2 DOCUMENTS: EXAMPLES:

To initiate interactive work with DOCUMENTS data base type:

```
PPDS DOCUMENTS
```

System invites user to type BDMS commands by:

```
DOC:READ:EXEC>
```

To see how to type reactions on PPDI, use INDEX command:

```
INDEX,RE
```

System will print on screen available reactions.

To see possible accelerator abbreviations type:

```
INDEX,AC
```

Analogously one can see possible values of any controlled data elements. Explanation of terms and abbreviations see in the PPDI Thesaurus or in the VOCABULARY data base.

To find data on angular distributions and cross sections of pion charge exchange reaction published after 1980, type:

```
FIND RE=PI- P --> PION; AND (DD=ANGP; OR DD=SIG;) AND D>1980;***
```

System answer:

11 RECORD(S) IN SET 1

```
SET  N.REC  COMMAND:
* 1    11 :  FIND RE=PI- P --> P10 N;  AND  (DD=ANGP;  OR
              DD=SIG;) AND D>1980;  **
```

To scan lab momenta in the current set by INDEX command, type:

```
INDEX/SET,PLAB
```

To find publications on inclusive η -meson production, type:

```
FIND RE > ETA X;**
```

To find publications on inclusive η productions on proton target, type:

```
FIND (2) AND RE < UNSPEC P;**
```

To find publications on inclusive η productions in pion proton collisions, type:

```
FIND RE=PI- P --> ETA X; OR RE=PI+ P --> ETA X;**
```

To print current set into compact readable format, type:

```
DOCU
```

Result will be transferred into external system file DOC.DOC

To exit from BDMS, type:

```
STOP
```

Chapter 5

EXPERIMENTS data base.

5.1 General description.

Contains summaries of approved experiments at the major particle physics labs. Data structure is the same as in the DOCUMENTS data base.

Maintained by the Berkeley PDG, in collaboration with correspondents at the various labs. Updated periodically.

COVERS 1968 TO THE PRESENT

Searchable by experiment code, author, accelerator, detector, reaction, beam momentum, reference, and other items.

EXPERIMENTS is the database for the publication "Current Experiments in Elementary Particle Physics," LBL-91.[10,11]

To see the record structure of the data base use BDMS commands FDT or HELPBASE.

5.2 EXPERIMENTS: EXAMPLES:

To initiate interactive work with EXPERIMENTS data base type:

```
PPDS EXPERIMENTS
```

System invites user to type BDMS commands by:

```
PROP:READ:EXEC>
```

To see how to type reactions on PPDI, use INDEX command:

```
INDEX,RE
```

System will print on screen available reactions.

To see possible accelerator abbreviations type:

```
INDEX,AC
```

Analogously one can see possible values of any controlled data elements. Explanation of terms and abbreviations see in the PPDI Thesaurus or in the VOCABULARY data base.

To find current experiments on CERN antiproton proton collider, type:

```
FIND (AC=CERN-PBARP; AND ES=STARTED/;) AND NOT ES=NISHED/**
```

To find experiments on proton decay, type:

```
FIND P=P; AND (PP=W; OR PP=PW;)**
```

To find experiments which investigate reactions with, for example, ϕ -meson in the final state, type;

```
FIND FSP=PHI;**
```

To find experiments which investigate reactions which contain ϕ -meson and pion in the final state type:

```
FIND RE > PHI PI+; OR RE > PHI P10; OR RE > PHI PI+; OR  
RE > PHI PI+-; OR RE > PHI PION;**
```

To exit from BDMS, type:

```
STOP
```

Chapter 6

REACTIONS data base.

6.1 General description.

Contains numerical data tables on reactions from documents catalogued in DOCUMENTS data base:

- cross sections (differential, integrated and total),
- structure functions, form-factors,
- polarization measurements,
- $e^+ e^-$ experimental data,

and many other items from most current aspects of experimental particle physics. Updated regularly.

COVERS 1952 TO THE PRESENT

Compiled by the United Kingdom Particle Data Group[4,12] (University of Durham and Rutherford Appleton Lab), in collaboration with Serpukhov COMPAS group.

Searchable by first author, reference, reaction, lab momentum, quantity measured, beam, target and final-state particle.

REACTIONS data base: user's key data elements

DName	Contents
SC	- short code
R	- document reference
TY	- document type
D	- document date
RE	- reaction studied

FSP - final state particle
 BP - beam particle
 TP - target particle
 OBS - tabulated observable
 PLAB - projectile momentum

To see the record structure of the data base use BDMS commands FDT or HELPBASE.

6.2 REACTIONS: EXAMPLES:

To initiate interactive work with REACTIONS data base type:

```
PPDS REACTIONS
```

System invites user to type BDMS commands by:

```
RD:READ:EXEC>
```

To see how to type reactions on PPDL use INDEX command:

```
INDEX,RE
```

System will print on screen available reactions.

To see possible observable abbreviations type:

```
INDEX,OBS
```

Analogously one can see possible values of any controlled data elements. Explanation of terms and abbreviations see in the PPDL Thesaurus or in the VOCABULARY data base.

To find data on inclusive γ production in traditional collisions, type:

```
FIND (RE=PI- P --> GAMMA X; OR RE=PI+ P --> GAMMA X; OR  

  RE= P P --> GAMMA X; OR RE= AP P --> GAMMA X; OR  

  RE= K+ P --> GAMMA X; OR RE= K- P --> GAMMA X;) AND  

  OBS=D(SIG)/D(YRAP);**
```

To print all data from this sample into standard PPDS file RD.DOC, type:

```
DOCU
```

There is another type of output more suitable to work with programs of data analysis. To switch REACTIONS processor to second output format, type:

MODD,2

To replace file assigned to BDMS DOCUMENT output channel, type:

RELEASE,DOC,RD2.DOC

Command

DOCU

will print now all data from the current set into RD2.DOC file in the MODD,2 format.

If you need not all data from the retrieved records and you want to put them into another file, type:

RELEASE,DOC,RD3.DOC

DOCU :RE=PBAR P --> GAMMA X;:YN=D(SIG)/D(YRAP);\$GEV;\$MB;#

Command DOCU in this case has four parameters which mean that data must be outputted only for indicated reaction and observable and that data from different records must be transformed to unique scales in energy and cross section. More detailed description of data transformation possibilities are described in online handbook HELPBASE.

To return to the first document format, type:

MODD,1

To exit from BDMS, type:

STOP

Chapter 7

PARTICLE PROPERTIES COMPILATION.

7.1 General description.

Contains evaluated particle properties data from Review of Particle Properties [13] and some model dependent parameters of particle spectrum.

Maintained by the COMPAS group on the basis of the PDG Review.

Updated regularly after new editions of the Review.

Searchable by particle name, any quantum number, decay mode, quark contents (for hadrons), classification label.

Used as source of computerized evaluated particle properties data. Used to prepare branching vocabulary to correct cross sections in CS data base.

This data base is the developing data base. Please contact with data base manager in the case of any problems.

PP data compilation: user's key data-elements:

DName	Contents	DName	Contents
NAME	- particle name	MNAME	- multiplet name
CNAME	- C- class name;	RELY	- reliability number
I	- isospin	G	- G-parity;
J	- SPIN	P	- P - parity;
C	- C-PARITY ;		
B	- baryon number	LE	- e lepton number
LMU	- MU lepton number	LTAU	- TAU lepton number
S	- strangeness	CH	- charm
BY	- beauty	TOP	- top
Q	- electric charge	I3	- third isospin projection
M	- mass	W	- width
LT	- life time	MG	- magnetic moment
MODE	- decay mode	BR	- branching ratio
TY	- decay type	QC	- quark content, for hadrons
QW	- quark component weight		
REG	- REGGE trajectory	ALO	- REGGE intersept
DALO	- REGGE slope		

To see complete record structure of the data base use BDMS commands FDT or HELPBASE.

7.2 PP: EXAMPLES:

To initiate interactive work with PP data base type:

```
PPDS PP
```

System invites user to type BDMS commands by:

```
PP:READ:EXEC>
```

To see how to type decay modes on PPDL use INDEX command:

```
INDEX,MODE
```

System will print on screen available reactions.

To see possible particle names type:

```
INDEX,NAME
```

Analogously one can see possible values of any controlled data elements. Explanation of terms and abbreviations see in the PPDL Thesaurus or in the VOCABULARY data base.

To retrieve data on, for example, nonstrange hadrons without antibaryons, type:

```
FIND S <> 0.; AND B >= 0.;
```

To order current set by baryon number and spin, type:

```
SORT,B,J.
```

In addition to standard BDMS output possibilities there are two modes of DOCUMENT operation.

To see the first 10 records from the current set by DOCU in the second mode, type:

```
MODD,2 DOCU,1:10 LOOK,DOC
```

To exit from BDMS, type:

```
STOP
```

Chapter 8

INTEGRATED CROSS SECTIONS DATA COMPILATION.

8.1 General description.

Contains published data on integrated cross sections and hadron multiplicities collected and doubly checked by HERA and COMPAS groups. Maintained on the basis of DOCUMENTS and REACTIONS data bases. Updated regularly.

COVERS 1951 TO THE PRESENT

Searchable by reaction, beam, target, observable, classification label, any group of particles in the final state, beam energy, particle properties.

Used to produce HERA-COMPAS[14] compilations and data atlases (see CSBOOK description).

INTEGRATED CROSS SECTIONS DATA COMPILATION: user's key DE

DName	Contents
SC	- short code
R	- reference code
RR	- related reference
RE	- reaction: decays specified
REC	- reaction: decays unspecified
FSP	- final state particles
TP	- target particle
label	
MULT	- final state multiplicity
YN	- observable
ECM	- c.m. energy
COND	- experimental conditions
D	- year
TY	- reference type
BP	- projectile particle
MODE	- reaction classification
PIAB	- laboratory momentum
KIN	- comment on data

8.2 CS: EXAMPLES:

To initiate interactive work with CS data base type:

```
PPDS CS
```

System invites user to type BDMS commands by:

```
CS:READ:EXEC>
```

To see how to type reactions on PPDI, use INDEX command:

```
INDEX,RE
```

System will print on screen available reactions.

To see possible names of dependent observables, type:

```
INDEX,YN
```

Analogously one can see possible values of any controlled data elements. Explanation of terms and abbreviations see in the PPDI Thesaurus or in the VOCABULARY data base.

To find data on cross sections of $PI^- P \rightarrow N PI^+ PI^-$ reaction, type:

```
FIND RE=PI- P --> N PI+ PI-; AND YN=SIG;**
```

This data base has several modes of DOCUMENT operations. Please use HELPBASE to learn about meaning of each of them.

The main DOCUMENT mode is MODD,2 that prepares uniform data compilations from all records from the current set.

To exit from BDMS, type:

```
STOP
```

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