



Upton, Long Island, New York 11973

National Nuclear Data Center
Bldg. 197D

(516) 282-2901, 2902
FTS 666-2901, 2902

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Memo CP-C/198

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DATE: February 20, 1991
 TO: Distribution
 FROM: V.McLane, V.Varlamov
 SUBJECT: Area M Photonuclear Data File Update

1. Multipolarity
2. Treiman-Yang Angle
3. Secondary Particle Correlations
4. Asymmetry
5. Mass ratios
6. High- and low-energy components of cross section
7. Analysis
8. Incident source
9. Dictionary Update

We are in the process of updating the CDFE photonuclear data file. We will be sending a complete update for all entries previously transmitted shortly. These files will supersede all previous transmissions.

In order to complete this update, we will need to make some additions and changes to the EXFOR specifications as given below. We would like to hear any feedback immediately, so that we send the transmissions as soon as possible.

cc. Arcilla
 Ganesan
 Lammes
 Lemmel
 Pucir
 Osorio
 Pashchenko
 Schmidt
 Schworer
 Wang Dahai

ACTION

MAR 13 1991

ACTION OFFICER: J.J. Schmitt		
FORM OF ACTION	DATE OF ACTION	SENDER
REPLY:		
OTHER ACTION:		
NO ACTION:		
INTERNAL REPLY: (ATTACHED TO FILE)		
ID:	ENCLOSURES: 2	
DESCRIPTION: as attached		

1. Multipolarity

Definition: Angular momentum of gamma-quanta absorbed by the nucleus. These are given as electrical or magnetic monopoles, dipoles, quadrupoles, or octupoles.

REACTION Coding: Specifier in SF5 for electric or magnetic polarity with polarity given in coded form under the data heading POLAR: 0 = monopole, 1 = dipole, 2 = quadrupole, 3 = octupole.

Example:

- 1) REACTION (.....(G,N).....,EP,SIG,,,EXP) electric dipole component of photoneutron cross section

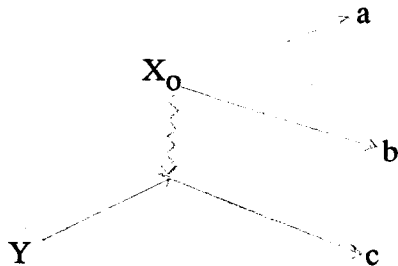
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.  
. COMMON  
POLAR  
NO-DIM  
1.  
ENDCOMMON
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- 2) REACTION (.....(G,ABS).....,MP,SIG,,,EXP) magnetic quadrupole component of photoabsorption cross section

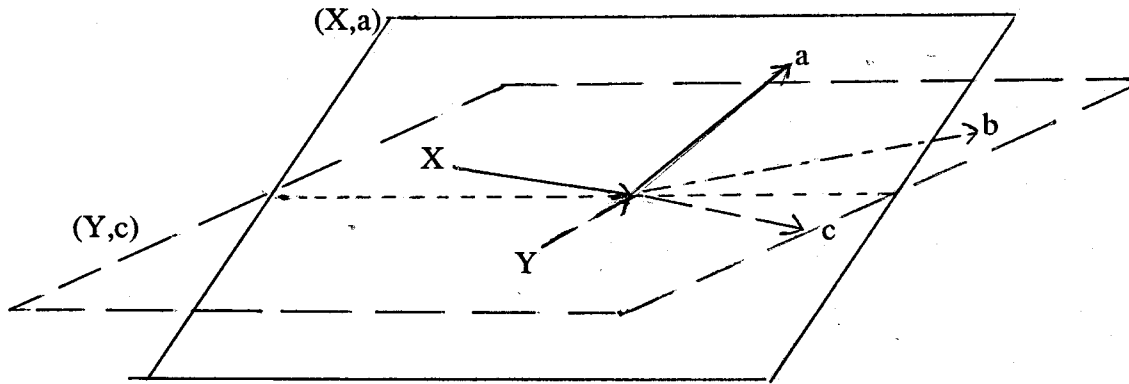
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POLAR  
NO-DIM  
2.  
ENDCOMMON
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2. Treiman-Yang Angular Distribution

Definition: The angular distribution measured as a function of the angle between two reaction planes for three-particle final states in the anti-laboratory system (*i.e.*; X is at rest) That is, for the reaction between particles X and Y producing particles a, b, c (see diagram below), the angle between the planes (X,a,b) and (Y,c).



For photonuclear reactions in the center-of-mass system it is the angle between the (X,a) and (Y,b) or (Y,c) planes, where X is the incident gamma, Y is the target nucleus.



Reference: I.S.Shapiro, *et al.*, *Nuclear Phys.* 61, 353 (1965)

REACTION Coding: Parameter code TYA in SF6.

Example: REACTION (2-HE-4(G,N+P)2-HE-2,,DA/TYA,P,,EXP) distribution over Treiman-Yang angle between (He4,He2) and (G,P) planes in c.m. system

3. Secondary Particle Correlations

We propose a modification to the coding for the Information-Identifier Keywords EN-SEC, MOM-SEC, AND EMS-SEC to allow for correlations between outgoing particles.

Particle Field. Contains one or more particles or nuclei to which the data-heading keyword refers.

either: a particle code from Dictionary 13

or: a nuclide coded in the standard format as described on page 8.3. Permitted nuclei are indicated in Dictionary 27 by a '3' in column 15.

For two or more codes, they are separated by a slash, and ordered "lightest" to "heaviest" as for REACTION subfield 3 (see page 8.R.4).

Examples: EN-SEC (E-LVL,3-LI-6)
EN-SEC (E1,N/P)

4. Asymmetry

We propose that the definition of the code 'ASY' in Dictionary 34 (Modifiers) be changed from "asymmetry of polarization of outgoing particles" to "Asymmetry".

5. Mass ratios

For photofission, the fission fragment yields may be presented as a function of the ratio of the masses of the fission fragments (see M0135). We propose to add the data heading MASS-RATIO to Dictionary 24 for these cases.

6. High- and Low-Energy Components of Cross Section

In the evaluation of photonuclear data the cross section is often presented for a "high-energy" and "low-energy" component of the secondary particle spectrum (see data set M0140). We propose the addition of the branch codes 'HEN' and 'LEN' to cover these cases.

7. Analysis

In addition to adding codes to Dictionary 23 to specify the type of analysis used to analyze the spectra measured, we would like to be able to code the energy step used in computer retrievable form. We suggest allowing a numeric field in the analysis code (similar to the correlation factor under ERR-ANALYS).

Example: ANALYSIS (PLA,0.5) Penfold-Leiss analysis using an energy step of 0.5 MeV.

8. Incident source

There are many reactions used as "monoenergetic" photon sources. We would like to be able to specify these reactions without having to increase the size of Dictionary 19 unnecessarily. Therefore, we propose the following change in the coding rules for INS-SOURCE.

For monoenergetic photons, the code MPH= will be followed by the source reaction, coded as for REACTION. The reaction code will be enclosed in parentheses.

Example: INC-SOURCE (MPH=(24-CR-52(N,G)24-CR-53))

9. Dictionary Update

Add to Dictionary 18 (Facility)

ESTRG ELECTRON STORAGE RING

Add to Dictionary 19 (Incident source)

ARAD ANNIHILATION RADIATION
COMPT COMPTON SCATTERING
HARD HARDENED
LASER LASER SCATTERING
MPH= MONOENERGETIC PHOTON REACTION =
TAGD TAGGED

Add to Dictionary 23 (Analysis)

DIFFR DIFFERENCE SPECTRUM
LEAST LEAST STRUCTURE METHOD
PHDIF PHOTON DIFFERENCE
PLA PENFOLD-LEISS METHOD
REDUC REDUCTION METHOD
REGUL REGULARIZATION METHOD
THIES THIES'S METHOD

Add to Dictionary 24 (Data Headings)

ANG1-CM	Angle in c.m. system, definition specified in BIB-section	G
ANG2-ERR	Angle error, definition specified in BIB section	H
E-MEAN	Mean energy of outgoing particle, lab system	E
E1-CM	Energy of outgoing particle, c.m.system, defined in BIB section	E
MASS-RATIO	Ratio of atomic masses of fission fragments	J
MASS1-MAX	Maximum atomic mass of first fission fragment	J
MASS2-MIN	Minimum atomic mass of second fission fragment	J
POLAR	Electric or magnetic polarity	E

Add to Dictionary 31 (Branch):

EP for a given electric polarity
HEN high-energy component
LEN low-energy component
MP for a given magnetic polarity

Add to Dictionary 32 (Parameter)

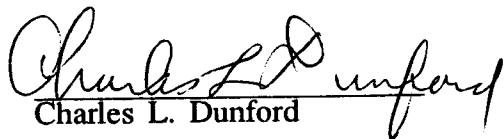
TYA Differential with respect to Treiman-Yang angle

Modify Dictionary 34 (Modifiers)

ASY Asymmetry

Add to Dictionary 36 (Quantity)

,COR,N/D	NO	angular correlation neutrons/deuterons
,COR,N/P	NO	angular correlation neutrons/protons
,COR,P/D	NO	angular correlation protons/deuterons
,DA,,ASY	NO	asymmetry of distribution of outgoing particles
,DA,RSD	DA	angular distribution of residual nucleus
,DA,P/4PI	B	angular distribution of protons * 4 pi
,DA/TYA,P	DA	Treiman-Yang angular distribution for plane defined by product nucleus and outgoing proton
,DE,A/RSD	DE	energy spectrum of alpha/residual nucleus pair
,DE,N/D	DE	energy spectrum of neutron/deuteron pair
,DE,N/P	DE	energy spectrum of neutron/proton pair
,DE,P/A	DE	energy spectrum of proton/alpha pair
,DE,P/D	DE	energy spectrum of proton/deuteron pair
,DE,P/RSD	DE	energy spectrum of proton/residual nucleus pair
,SIG,,ASY	NO	cross section asymmetry factor
DI/PAR,DA/DE	DAE	partial double diff.c/s D/DA/DE, direct interaction contribution
EP,SIG	B	cross section for electric polarity specified
HEN,SIG	B	cross section for "high-energy" component of cross section
LEN,SIG	B	cross section for "low-energy" component of cross section
MP,SIG	B	cross section for magnetic polarity specified
PAR,DA,N/P	DA	partial angular distribution of neutron/proton pair
PAR,MCO,N/P	DA	partial linear momentum correlation of neutron/proton pair


Charles L. Dunford

Distribution:

Cai Dunjiu	V. N. Manokhin
M. Chiba	J. J. Schmidt ✓
F. E. Chukreev	N. Tubbs
A. Hashizume	V. Varlamov
NNDC (5)	