Japan Charged-Particle Nuclear Reaction Data Group

Division of Physics, Graduate School of Science
Hokkaido University
060-0810 Sapporo, JAPAN

E-mail: nrdf@jcprg.org
Internet: http://www.jcprg.org/
Telephone +81(JPN)-11-706-2684
Facsimile +81(JPN)-11-706-4850

Memo CP-E/065

Date: February 24, 2005
To: Distribution
From: OTSUKA Naohiko and Victoria McLane
Subject: IPA as parameter code and short-hand nuclide code in SF7
Reference: CP-C/354

We have studied the procedure of C1118.003 (Fig. 5 a-c, p024609-5) and 006 (Fig. 9, 10, 13 and 14), because we found many theoretists from JCPRG in the citation list of this article.

1) We can find an example of the intermediate state before break up in LEXFOR "Partial Reaction - Reactions that lead by the same particle sequence to the same reaction products"

Examples:
a.) $^{12}C(n,n')^{12*}C \rightarrow \alpha + ^{8*}Be \rightarrow 2\alpha$
b.) $^{12}C(n,n')^{12*}C \rightarrow 3\ \alpha$

…

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REACTION    1(6-C-12(N,N+2A)2-HE-4,PAR,SIG)
            2(6-C-12(N,N+2A)2-HE-4,PAR,SIG)
EN-SEC      1(E-LVL,4-BE-8)
            2(E-LVL,6-C-12)
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So SF3="3A" (We can use INL in C1118.002, 004 and 005 because the degrees of freedom of ^{8}Be and α does not appear in these subentries).

2) We agree on the use of short-hand nuclide code BE8 in SF7. We may add this code in Dict. 33.

3) Use of IPA in SF6 looks to be good. We can link IPA and particle considered easily.

4) IPA refers angle between ^{12}C and beam axis (not two ^{12}C), so IPA is referred by RSD.

5) PAR is characterized by levels of ^{8}Be and ^{12}C in final state and ^{12}C before break up. So we must specify these three levels (LEVEL-PROP can specify these levels).

6) The 2nd angle given, between ^{8}Be and α is for the projection of the relative velocity if the 2 particles. Therefore, we recommend using MSC in SF8 until such time as we may encounter more such data.

We propose one heading in addition to two headings proposed in CP-C/354:

Dictionary 24 (Headings)

ANG1-CM-MN	Lower limit of 1st angle in c.m. system
ANG1-CM-MX	Upper limit of 1st angle in c.m. system
ANG2-RL-CM	2nd angle between 2 outgoing particles in c.m. system

Coding sample based on comments:

```
SUBENT        C1118003   20050111                                  C1118  3    1
BIB                 4          7                                  C1118  3    2
REACTION   (6-C-12(6-C-12,3A)6-C-12,PAR,IPA/DA,RSD/A+BE8,MSC)     C1118  3    3
           - ANG1-CM is angle between outgoing 12C and beam in     C1118  3    4
             the center of mass system between two 12C.            C1118  3    5
           - ANG2-RL-CM is angle between relative velocity of      C1118  3    6
             alpha-8Be and beam in the center of mass system       C1118  3    7
             between alpha and 8Be.                                C1118  3    8
EN-SEC     (E-LVL1,6-C-12) Intermediate state                      C1118  3    9
           (E-LVL2,4-BE-8)                                         C1118  3   10
           (E-LVL3,6-C-12)                                         C1118  3   11
LEVEL-PROP (6-C-12,E-LVL=0.00,SPIN=0,PARITY=+1.)                   C1118  3   12
           (6-C-12,E-LVL=9.64,SPIN=3,PARITY=-1.)                   C1118  3   13
ERR-ANALYS (DATA-ERR) No information given                         C1118  3   14
STATUS     Data taken from Fig. 5 of the journal article           C1118  3   15
ENDBIB              7          0                                  C1118  3   16
COMMON              2          3                                  C1118  3   17
E-LVL1     E-LVL2     E-LVL3     ANG1-CM-MN ANG1-CM-MX ANG2-RSL   C1118  3   18
MEV        MEV        MEV        ADEG       ADEG       ADEG       C1118  3   19
9.64       0.0        0.0        40.0       95.0       10.0       C1118  3   20
ENDCOMMON           3          0                                  C1118  3   21
DATA                5         39                                  C1118  3   22
ANG2-RL-CM EN-CM      DATA-CM    DATA-ERR                         C1118  3   23
ADEG       MEV        MU-B/SR    MU-B/SR                          C1118  3   24
 5.          2.540E+01  3.054E+03  2.181E+02                      C1118  3   25
 5.          2.579E+01  2.727E+03  1.818E+02                      C1118  3   26
 5.          2.698E+01  6.145E+03  5.090E+02                      C1118  3   27
…
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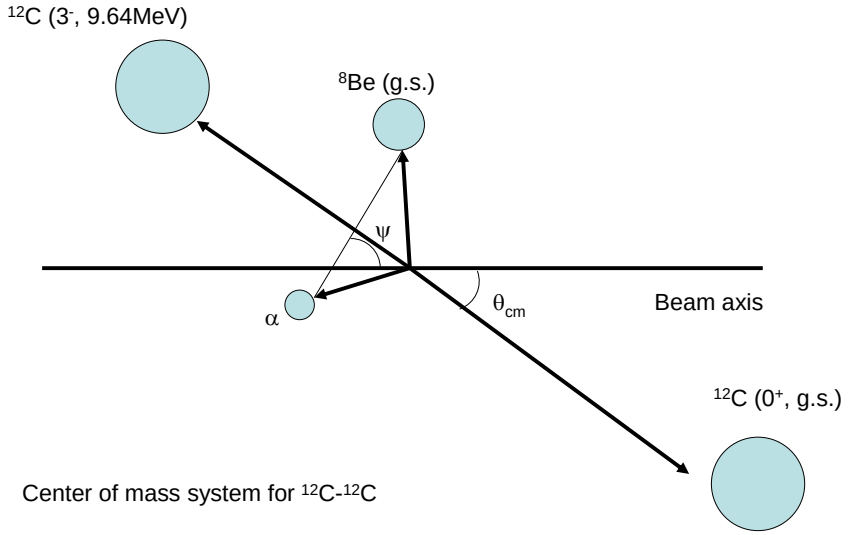
Geometry:

- θ_{cm} and ψ are given under headings ANG1-CM and ANG2-RL-CM, respectively.
- ^{12}C (3^-), ^{8}Be (g.s.), and ^{12}C (0^+) levels are given under E-LVL1, 2 and 3, respectively.



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