KARLSRUHE
CHARGED
PARTICLE
GROUP

Information

KERNFORSCHUNGSZENTRUM · D-7500 KARLSRUHE · POSTFACH 3640 · TELEX 7826-484

Memo CP-B/17

22.12.1977

Subject: Reaction Mechanisms. Process Code for Spallation
Re: CP-C/8, CP-B/14, CP-C/21, CP-D/47, letters from
Vienna and Brookhaven, CP-D/36, CP-C/15

1. We want to repeat our opinion regarding the definition of reaction mechanisms given in Memo CP-B/14.

2. From the definitions given in the Lexfor-entry of CP-C/21 the following questions arise:

   a) There could be defined more than these four mechanisms. Why this seletion?

   b) Spallation is a direct interaction, too. Why is this one case treated different than many others?

   c) In most experiments reaction products are measured, not reaction mechanisms. At higher energies there will be nearly almost a superposition of several reaction paths e.g. precompound emission (a thing between direct and compound reactions) for $(p, xn+yp+z\alpha+...)$-reactions or breakup of projectiles like ^6Li with subsequent capture of one fragment to a highly excited compound nucleus. How will such superpositions be distinguished, if only final products have been measured in an experiment? In many publications the authors try to make more or less intelligent guesses to what extent singular processes contribute to the measured cross sections. But all these calculations are widely model dependent and subject to more or less severe changes due to increasing knowledge about nuclear theory. Shall we change the content of the Kachapag-file all times the theory changes?

Furthermore, we agree with the arguments given in CP-D/47 (item 1., item 2d. etc) and especially with the statement that most center-staff is not familiar with details of spallation data and (we want to continue) of other mechanisms and the borderlines between them. Therefore, only a clear statement of the author

that and what kind of special reaction types have been investigated (hopefully the author knows <u>what</u> he has measured!) should give rise to coding of a process or branch.

3. From the arguments above we draw the following conclusions which are meant to be our proposal for the present subject:

a) Our first preference is not to code reaction mechanisms at all (neither in REACTION SF3 nor SF5), except of the somewhat clearer and well established case of fission.

b) If a coding is unavoidable, we propose to accept the definitions and applications as given in CP-D/47 and the correlated letter from H. Lemmel of Nov. 17 with the following restrictions (which should be included into the manual and the respective LEXFOR-entry):

   1.) Giving a process code in REACTION SF3 (or a branch code in SF5) is only permitted, if the paper shows clearly that this process is really present and strongly dominating.

   2.) The use of process - or branch codes is optional and any dictionary expansion should clearly state that this information may be not absolute.

   3.) In all cases where any information is given about outgoing particles (also part of them), they <u>must</u> be coded prior to a process code.

   4.) Since spallation scarcely can be identified as a definite branch where contributions from other reaction branches can be excluded it must be coded as a process in REACTION SF3. Hereby we withdraw our corresponding proposal of CP-B/14.

   5.) The LEXFOR-entry "Reaction mechanisms" should contain at least a short justification, why just compound-nucleus and direct interactions and fission and spallation are included but no others and why from the various types of direct interactions spallation is treated separately.

   6.) High-energy fission should not be treated separately as proposed by NDS.

Distribution:

A. F.E. Chukreev, CAJaD
B. H. Münzel, KaChaPaG
C. S. Pearlstein, NNCSN
D. J. Schmidt, NDS
E. H. Tanaka, Study Group

F. G. Dearnaley, AERE
G. H. Behrens, ZAED
H. A. Marcinkowski, IBJ
I. H. Derrien, NDCC
K. D.C. Agrawal, Varanasi
4. V.N. Manokhin, CJD

cc/ Attree
Lammer
Lemmel
Lorenz
Maria Guzman
Okamoto
Schmidt
Schuster
Smith