Nuclear Data Section
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Memo CP-D/378

Date: 16 January 2004
To: Distribution
From: O. Schwerer

Subject: Quasi-metastable states (Reply to memo CP-C/331)

I agree to the proposal of CP-C/331 provided that a few more clarifications are introduced as follows.

1. The LEXFOR page on **Isomeric States** presently gives 3 different criteria for what is a "short" half-life:

"**Isomeric** states" must have a half-life **> 0.1 seconds,** except for spontaneous fission, α or p decay, where it is **> 1 milli-second**. The next paragraph says that "for practical applications, a ***metastable*** state in EXFOR is defined as having a half-life of **0.1 milliseconds** or longer".

With the new formalism, we can do away with this confusing situation. I propose to define that metastable states with half-lives of **0.1 seconds** or longer are coded with **-M, M1** etc while all states with shorter half-lives are coded with -L, L1 etc.

2. With these new codes we come close to the area of "ordinary partial cross sections" which are coded not with isomeric extension in SF4 but with PAR in SF5. Therefore, the LEXFOR page on **Partial Reactions** should say

"Partial cross sections leading to an **isomeric state** (with a half-life >0.1 sec) are coded with an isomer extension in REACTION SF4. Partial cross sections for **quasi-metastable** states, which are characterized by a half-life below 0.1 sec, are coded with isomer extension -L, L1, L2 etc. which link the levels with DECAY-DATA and are valid only for this particular data set.
Partial cross sections leading to individual levels for which **no half-life** is given but which are characterized by the level energy or level number, are coded without an isomer extension in SF4 but with PAR in SF5, and the level identification is given under the data headings E-LVL or LVL-NUMB (or equivalent)."

3. What if **both** the half-life and the level energy of a quasi-metastable state are given?
I think we should have the possibility to give them both, either by

- Allowing to give the level energy under LEVEL-PROP, **even if neither spin nor parity are given (this would be new)**; or

- Giving the level energies under new data headings such as LVL-L1, LVL-L2. (It would be LVL-L1 rather than E-LVL-L1 because it's not a required independent variable but rather "additional information" much like LVL-INI and LVL-FIN.)

I prefer the first possibility:

LEVEL-PROP (39-Y-88-L1,E-LVL=0.674)

because if necessary spin and parity can be added without having too much redundance.

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