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Memo CP-E/085

Date: January 12, 2006
To: Distribution
From: OTSUKA Naohiko
Subject: Quantity code for data in arbitrary unit and chain yield (Entry 14044)
Reference: CP-D/449, CP-C/368

I am interested in the compilation of entry 14044 (Fig. 2 and 3 of L. Muga and A. Clem, Phys. Rev. C**11** (1975) 1287) discussed in Memo CP-D/449. I can see some general open questions.

14044.002:

(92-U-235(N,F),,**DE/DE**,LF/HF,REL/MXW) in TRANS.1337

(92-U-235(N,F),**PAR,FY/DE**,LF/HF,REL/MXW) in CP-D/449

1) *Differential* (DE) or *partial* (PAR) for light fragment kinetic energy?

I prefer the version of TRANS.1337. I understand DE means "number of particles in an energy bin (with normalization to cross section, yield etc.)", while PAR means "DE integrated over a partial energy range (e.g. integrated over a level peak)". In the case of this subentry, authors counted heavy fragments by ΔE_H=1 MeV bins and light fragments by ΔE_L=2 MeV bins. Integration is not done for ΔE_H bin. Therefore I think this can be regarded as double differential cross section (,DE/DE) or fission yield (,FY/DE/DE ?) in arbitrary unit. Note that we use ,DE/DE when double differential cross section for two outgoing particle energies are given as a function of energies of one particle for fixed energies of the other particle.

2) *Cross section* or *fission yield* (FY)?

I think there is probably no difference between cross section and fission yield when authors give yield of fission fragment in arbitrary unit, because two quantities, "isotopic fission fragment production cross section σ_{fis} (Z, A)" and "isotopic fission fragment production yield Y (Z, A)", are related by σ_{fis} (Z, A) = σ_{fis} Y (Z, A), where σ_{fis} is fission cross section for a given projectile and target at an incident energy and Y(Z, A) is normalized to 2 for binary fission. We often meat similar ambiguity when compilation of data given under arbitrary unit (SIG or PY? SIG or FY? DE or SPC? ...). Clarification of coding rule may be necessary.

14044.003:

(92-U-235(N,F)MASS,,**DE**,LF,REL/MXW) in TRANS.1337

(92-U-235(N,F)MASS,**PAR/MAS,FY**,LF,REL/MXW) in CP-D/449

In addition to same question 1) and 2) for subentry 2, I have one additional question:

Branch code MAS (Total mass for yields of fission fragments)

There are various codes for fission yield $Y(A)$, for example,

A (92-U-235(N,F)MASS,**PRE**,FY)

B (92-U-235(N,F)MASS,**SEC**,FY)

C (92-U-235(N,F)MASS,**CHN**,FY)

D (92-U-235(N,F)MASS,**MAS**,FY)

It looks like that A and B are used for chain yield when information of fission stage (primary or secondary) is available from literatures while C is used for chain yield when fission stage is uncertain. But I do not see right answer in our manual. I do not understand the difference between C and D. Branch code MAS is used in two subentries (A0108.245 and 13981.002). I think difference among these codes should be clarified.

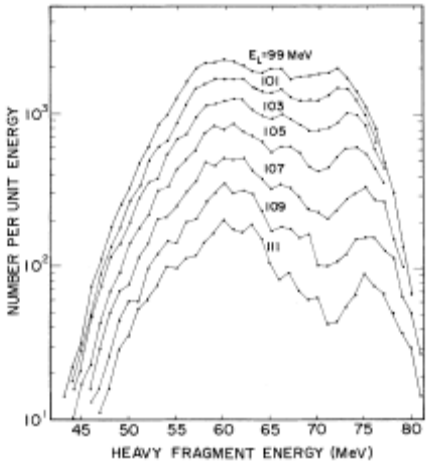

FIG. 2. Fine structure in *measured residual* kinetic energy spectra of heavy fission fragments at *calculated*, fixed light fragment *incident* kinetic energies for the system ^{235}U + thermal neutrons. Add 6 MeV to values on energy axis to get approximate energies before transmission through thin film.

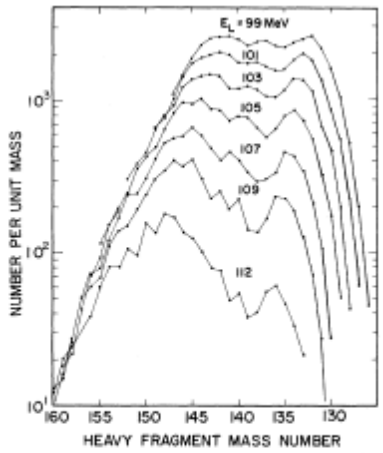

FIG. 3. Fine structure in heavy fragment mass spectra at *calculated* constant light fragment *incident* kinetic energies.

Fig. 2 (002) and 3 (003) of L. Muga and A. Clem, Phys. Rev. C**11** (1975) 1287

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