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Memo CP-D/600 (Rev.)

Date: 31 December 2009
To: Distribution
From: N. Otsuka
Subject: Ternary to binary light charged particle yield ratio
Reference: CP-N/44, 4C-4/114, CP-D/599

Ternary alpha and triton emission probabilities in neutron-induced and spontaneous fission have measured by C. Wagemans and their colleagues. In EXFOR, 5 articles [1-6] are considered as the sources of numerical data. They have denoted ternary (long-range) alpha and triton emission probabilities in fission by LRA/*B* and t/*B*, and they has been coded as

--- (-, F), TER/BIN, FY/RAT, A
--- (-, F), TER/BIN, FY/RAT, T

. However, Dr. O. Serot (CEA Cadarache) explains the definition of the probability as

“Counting rate of Ternary alphas particles (or tritons) emitted during fission, LRA (or t), divided by counting rate of all fission events (Binary + Ternary fissions, *B*)”

, even though *B* in their notation denotes “Binary fission”. Therefore their data should be coded with

--- (-, F) 2-HE-4, TER, FY
--- (-, F) 1-H-3, TER, FY

for LRA/*B* and t/*B*, respectively.

Because there is no other subentry coded with TER/BIN, FY/RAT the following update of dictionary is also proposed:

Dictionary 236 (Quantities)

TER/BIN, FY/RAT, T (Obsolete)
TER/BIN, FY/RAT, A (Obsolete)

Reference

- [1] P. D'Hondt *et al.*, Nucl. Phys. **A346** (1980) 461 (EXFOR 21705)
- [2] S. Pommee *et al.*, Nucl. Phys. **A587** (1995)1 (EXFOR 22308)
- [3] C. Wagemans *et al.*, Nucl. Phys. **A742**(2004)291 (EXFOR 22896)
- [4] O. Serot *et al.*, Proc. Int. Nat. Conf. Nucl. Data for Sci. and Technol. p857 (2004) (EXFOR 22900)
- [5] S. Vermote *et al.*, Nucl. Phys. **A806** (2008)1 (EXFOR 23026)
- [6] O. Serot *et al.*, Proc. Int. Nat. Conf. Nucl. Data for Sci. and Technol. P479 (2007) (EXFOR 23048)

List of data compiled with “TER/BIN,FY/RAT” in EXFOR

(10^{-3} and 10^{-4} should be multiplied to alpha and triton emission data, respectively).

- Bold font means we need additional correction.

- 22896: ^{257}Fm (SF) data in Table 2 of [3] is missing and should be added.

- 22900: 007-018, 028-044 are not from experiments, but from empirical formula.

Subentry	SF1	SF2-3	SF4-SF9 (proposed)	Data
21705 (Data source [1])				
21705.013	92-U-235	N,F	2-HE-4,TER,FY,,MXW	1.696+-0.027
22308 (Data source [2])				
22308.002	92-U-235	N,F	2-HE-4,TER,FY	(60 points)
22896 (Data source [3])				
22896.008	1 90-TH-229	N,F	2-HE-4,TER,FY,,MXW	2.05+-0.09
22896.008	2 90-TH-229	N,F	2-HE-4,TER,FY,,MXW	2.17+-0.10
22896.009	1 91-PA-231	N,F	2-HE-4,TER,FY,,MXW	1.67+-0.11
22896.009	2 91-PA-231	N,F	2-HE-4,TER,FY,,MXW	1.77+-0.12
22896.010	1 92-U-233	N,F	2-HE-4,TER,FY,,MXW	1.99+-0.07
22896.010	2 92-U-233	N,F	2-HE-4,TER,FY,,MXW	2.11+-0.07
22896.011	1 92-U-235	N,F	2-HE-4,TER,FY,,MXW	1.60+-0.05
22896.011	2 92-U-235	N,F	2-HE-4,TER,FY,,MXW	1.70+-0.05
22896.012	1 93-NP-237	N,F	2-HE-4,TER,FY,,MXW	1.94+-0.17
22896.012	2 93-NP-237	N,F	2-HE-4,TER,FY,,MXW	2.06+-0.18
22896.013	1 94-PU-239	N,F	2-HE-4,TER,FY,,MXW	2.07+-0.08
22896.013	2 94-PU-239	N,F	2-HE-4,TER,FY,,MXW	2.19+-0.09
22896.014	1 94-PU-241	N,F	2-HE-4,TER,FY,,MXW	1.75+-0.06
22896.014	2 94-PU-241	N,F	2-HE-4,TER,FY,,MXW	1.86+-0.07
22896.015	1 95-AM-241	N,F	2-HE-4,TER,FY,,MXW	2.24+-0.09
22896.015	2 95-AM-241	N,F	2-HE-4,TER,FY,,MXW	2.37+-0.09
22896.016	1 95-AM-243	N,F	2-HE-4,TER,FY,,MXW	1.72+-0.10
22896.016	2 95-AM-243	N,F	2-HE-4,TER,FY,,MXW	1.82+-0.10
22896.017	1 96-CM-245	N,F	2-HE-4,TER,FY,,MXW	2.15+-0.15
22896.017	2 96-CM-245	N,F	2-HE-4,TER,FY,,MXW	2.28+-0.16
22896.018	1 96-CM-247	N,F	2-HE-4,TER,FY,,MXW	1.85+-0.10
22896.018	2 96-CM-247	N,F	2-HE-4,TER,FY,,MXW	1.96+-0.11
22896.019	1 94-PU-238	0,F	2-HE-4,TER,FY	2.76+-0.13
22896.019	2 94-PU-238	0,F	2-HE-4,TER,FY	2.93+-0.14
22896.020	1 94-PU-240	0,F	2-HE-4,TER,FY	2.51+-0.14
22896.020	2 94-PU-240	0,F	2-HE-4,TER,FY	2.66+-0.15
22896.021	1 94-PU-242	0,F	2-HE-4,TER,FY	2.17+-0.07
22896.021	2 94-PU-242	0,F	2-HE-4,TER,FY	2.30+-0.08
22896.022	1 94-PU-244	0,F	2-HE-4,TER,FY	1.71+-0.09
22896.022	2 94-PU-244	0,F	2-HE-4,TER,FY	1.81+-0.10
22896.023	1 96-CM-242	0,F	2-HE-4,TER,FY	3.34+-0.26
22896.023	2 96-CM-242	0,F	2-HE-4,TER,FY	3.54+-0.28
22896.024	1 96-CM-244	0,F	2-HE-4,TER,FY	2.73+-0.20
22896.024	2 96-CM-244	0,F	2-HE-4,TER,FY	2.89+-0.21
22896.025	1 96-CM-246	0,F	2-HE-4,TER,FY	2.49+-0.12
22896.025	2 96-CM-246	0,F	2-HE-4,TER,FY	2.64+-0.13
22896.026	1 96-CM-248	0,F	2-HE-4,TER,FY	2.30+-0.10
22896.026	2 96-CM-248	0,F	2-HE-4,TER,FY	2.44+-0.11

22896.027	1	98-CF-250	0,F	2-HE-4,TER,FY	3.65+-0.28
22896.027	2	98-CF-250	0,F	2-HE-4,TER,FY	3.87+-0.30
22896.028	1	98-CF-252	0,F	2-HE-4,TER,FY	3.06+-0.11
22896.028	2	98-CF-252	0,F	2-HE-4,TER,FY	3.24+-0.12
22896.029	1	100-FM-256	0,F	2-HE-4,TER,FY	4.24+-0.59
22896.029	2	100-FM-256	0,F	2-HE-4,TER,FY	4.49+-0.63

22900 (Data source [4])

22900.002		96-CM-246	0,F	1-H-3,TER,FY	1.72+-0.24
22900.003		96-CM-248	0,F	1-H-3,TER,FY	1.79+-0.07
22900.004		98-CF-250	0,F	1-H-3,TER,FY	2.70+-0.50
22900.005		98-CF-252	0,F	1-H-3,TER,FY	2.43+-0.17
22900.006		100-FM-256	0,F	1-H-3,TER,FY	3.90+-0.50
22900.007		94-PU-238	0,F	Delete?	1.37+-0.08
22900.008		94-PU-240	0,F	Delete?	1.34+-0.08
22900.009		94-PU-242	0,F	Delete?	1.31+-0.08
22900.010		94-PU-244	0,F	Delete?	1.29+-0.08
22900.011		96-CM-242	0,F	Delete?	1.92+-0.12
22900.012		96-CM-244	0,F	Delete ?	1.86+-0.11
22900.013		96-CM-246	0,F	Delete ?	1.8+-0.11
22900.014		96-CM-248	0,F	Delete ?	1.74+-0.10
22900.015		98-CF-250	0,F	Delete ?	2.60+-0.16
22900.016		98-CF-252	0,F	Delete ?	2.54+-0.15
22900.017		100-FM-256	0,F	Delete ?	3.36+-0.20
22900.018		100-FM-257	0,F	Delete ?	3.33+-0.20
22900.019		90-TH-229	N,F	1-H-3,TER,FY,,MXW	0.85+-0.15
22900.020		92-U-233	N,F	1-H-3,TER,FY,,MXW	1.14+-0.05
22900.021		92-U-235	N,F	1-H-3,TER,FY,,MXW	1.08+-0.04
22900.022		94-PU-239	N,F	1-H-3,TER,FY,,MXW	1.42+-0.07
22900.023		94-PU-241	N,F	1-H-3,TER,FY,,MXW	1.41+-0.06
22900.024		95-AM-241	N,F	1-H-3,TER,FY,,MXW	1.65+-0.10
22900.025		96-CM-245	N,F	1-H-3,TER,FY,,MXW	1.85+-0.10
22900.026		96-CM-247	N,F	1-H-3,TER,FY,,MXW	1.84+-0.11
22900.027		98-CF-251	N,F	1-H-3,TER,FY,,MXW	2.35+-0.40
22900.028		90-TH-229	N,F	Delete ?	0.78+-0.07
22900.029		91-PA-231	N,F	Delete ?	0.93+-0.08
22900.030		92-U-233	N,F	Delete ?	1.12+-0.10
22900.031		92-U-235	N,F	Delete ?	1.09+-0.10
22900.032		93-NP-237	N,F	Delete ?	1.25+-0.11
22900.033		93-NP-238	N,F	Delete ?	1.25+-0.11
22900.034		94-PU-238	N,F	Delete ?	1.44+-0.13
22900.035		94-PU-239	N,F	Delete ?	1.44+-0.13
22900.036		94-PU-241	N,F	Delete ?	1.41+-0.13
22900.037		95-AM-241	N,F	Delete ?	1.60+-0.14
22900.038		95-AM-242-M	N,F	Delete ?	1.60+-0.14
22900.039		95-AM-243	N,F	Delete ?	1.57+-0.14
22900.040		96-CM-243	N,F	Delete ?	1.96+-0.18
22900.041		96-CM-244	N,F	Delete ?	1.91+-0.17
22900.042		96-CM-245	N,F	Delete ?	1.89+-0.17
22900.043		96-CM-247	N,F	Delete ?	1.83+-0.16
22900.044		98-CF-251	N,F	Delete ?	2.63+-0.24

22900.045	93-NP-238	N,F	2-HE-4,TER,FY,,MXW	1.86+-0.19
22900.046	94-PU-238	N,F	2-HE-4,TER,FY,,MXW	2.42+-0.24
22900.047	95-AM-242-M	N,F	2-HE-4,TER,FY,,MXW	2.10+-0.21
22900.048	96-CM-243	N,F	2-HE-4,TER,FY,,MXW	2.58+-0.26
22900.049	96-CM-244	N,F	2-HE-4,TER,FY,,MXW	2.42+-0.24
22900.050	98-CF-251	N,F	2-HE-4,TER,FY,,MXW	2.88+-0.14

23026 (Data source [5])

23026.013	1 96-CM-243	N,F	2-HE-4,TER,FY,,SPA	2.43+-0.08
23026.013	2 96-CM-243	N,F	1-H-3,TER,FY,SPA	1.96+-0.25
23026.014	1 96-CM-245	N,F	2-HE-4,TER,FY,,SPA	2.15+-0.12
23026.014	2 96-CM-245	N,F	1-H-3,TER,FY,SPA	1.85+-0.21
23026.015	1 96-CM-247	N,F	2-HE-4,TER,FY,,SPA	1.85+-0.10
23026.015	2 96-CM-247	N,F	1-H-3,TER,FY,SPA	1.85+-0.20
23026.016	1 96-CM-244	0,F	2-HE-4,TER,FY	3.16+-0.09
23026.016	2 96-CM-244	0,F	1-H-3,TER,FY	1.98+-0.24
23026.017	1 96-CM-246	0,F	2-HE-4,TER,FY	2.49+-0.12
23026.017	2 96-CM-246	0,F	1-H-3,TER,FY	1.72+-0.24
23026.018	1 96-CM-248	0,F	2-HE-4,TER,FY	2.30+-0.10
23026.018	2 96-CM-248	0,F	1-H-3,TER,FY	1.79+-0.21

23048 (Data source [6])

23048.002	1 96-CM-244	0,F	1-H-3,TER,FY	1.91+-0.41
23048.003	1 96-CM-243	N,F	1-H-3,TER,FY,SPA	1.77+-0.39
23048.004	1 98-CF-251	N,F	1-H-3,TER,FY,,SPA	2.37+-0.58
23048.005	1 98-CF-249	N,F	1-H-3,TER,FY,SPA	2.20+-0.35

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