

BROOKHAVEN NATIONAL LABORATORY

MEMORANDUM

CP-C/150

DATE: September 4, 1985
TO: Distribution
FROM: V. McLane *vm*
SUBJECT: Decay Properties

Reference: Memo CP-C/143, CP-D/137

As I stated in Memo CP-C/143, the coding of delayed-neutron emission probabilities, as agreed to at the 1984 meeting, is inadequate because it requires a new subentry for each neutron-emitting nuclide. Therefore, I suggested the addition of a new keyword DECAY-PROP.

An alternate solution would be to allow a variable target, but it seems that the first solution would be less confusing to a user, rather than finding decay properties under the label REACTION.

By using DECAY-PROP and equating subfields to REACTION subfields 4-9, it would also make it very simple to implement program changes.

A coding example follows.

Charles L. Dunford
Charles L. Dunford

VMcL:anl
Enclosure

Distribution

| | |
|-----------------|-----------------|
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d/f:10.3.1/CP-C/CP-150

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| | | | | | | |
|------------|--|---------------------|---|----------|-------|----|
| TRANS | | 840529 | | 10000 | 0 | 0 |
| ENTRY | 12856 | 840229 | 2 | 12856000 | | 1 |
| SUBENT | 12856001 | 840229 | | 12856001 | | 1 |
| BIB | 11 | 14 | | 12856001 | | 2 |
| INSTITUTE | (1USABNW) | | | 12856001 | | 3 |
| REFERENCE | (J,PR/C,28,1740,8310) | | | 12856001 | | 4 |
| AUTHOR | (P. L. REEDER, R. A. WARNER) | | | 12856001 | | 5 |
| TITLE | DELAYED NEUTRON PRECURSORS AT MASSES 97-99 AND 146-148 | | | 12856001 | | 6 |
| INC-SOURCE | (REAC) BNL HIGH-FLUX BEAM REACTOR-THERMAL NEUTRON BEAM | | | 12856001 | | 7 |
| FACILITY | (SPECM) BNL TRISTAN ISOTOPE FACILITY. | | | 12856001 | | 8 |
| METHOD | BETA AND NEUTRON GROWTH AND DECAY CURVES WERE | | | 12856001 | | 9 |
| | MEASURED BY USE OF PULSED ION BEAM TECHNIQUES. | | | 12856001 | | 10 |
| DETECTOR | SOLAR NEUTRON COUNTER, SEE PHYS. REV. C15, 2098, 1977. | | | 12856001 | | 11 |
| | EFFICIENCY IS ABOUT 50 PERCENT. | | | 12856001 | | 12 |
| SAMPLE | 92-U-235 TARGET WAS EMBEDDED IN A GRAPHITE CYLINDER | | | 12856001 | | 13 |
| | WITHIN A SURFACE IONIZATION SOURCE. | | | 12856001 | | 14 |
| STATUS | (APRVD) P. L. REEDER, 84/5/23. | | | 12856001 | | 15 |
| HISTORY | (840215C) | | | 12856001 | | 16 |
| ENDBIB | 14 | 0 | | 12856001 | | 17 |
| NOCOMMON | 0 | 0 | | 12856001 | | 18 |
| ENDSUBENT | 17 | 0 | | 12856001 | 99999 | |
| SUBENT | 12856003 | 840229 | | 12856003 | | 1 |
| BIB | 8 | 47 | | 12856003 | | 2 |
| DECAY-PROP | (ELEM/MASS,,PN) | | | 12856003 | | 3 |
| MONIT-PROP | ((MONIT1)37-RB-97,,PN) | | | 12856003 | | 4 |
| | ((MOINT2)37-RB-98,,PN) | | | 12856003 | | 5 |
| | ((MONIT3)37-RB-99,,PN) | | | 12856003 | | 6 |
| | ((MONIT4)55-CS-146,,PN) | | | 12856003 | | 7 |
| | ((MONIT5)55-CS-147,,PN) | | | 12856003 | | 8 |
| | THE RECOMMENDED DELAYED NEUTRON PROBABILITIES- | | | 12856003 | | 9 |
| | (MANN,1982 ANTWERP CONF.,P.272.) FOR RB AND CS | | | 12856003 | | 10 |
| | PRECURSORS WERE USED TO DETERMINE THE RATIO OF | | | 12856003 | | 11 |
| | NEUTRON AND BETA COUNTING EFFICIENCIES. | | | 12856003 | | 12 |
| DECAY-MON | (37-RB-97,0.1690SEC) | | | 12856003 | | 13 |
| | (37-RB-98,0.108SEC) | | | 12856003 | | 14 |
| | (37-RB-99,0.055SEC) | | | 12856003 | | 15 |
| | (55-CS-146,0.322SEC) | | | 12856003 | | 16 |
| | (55-CS-147,0.220SEC) | | | 12856003 | | 17 |
| ANALYSIS | GROWTH AND DECAY CURVES WERE ANALYZED BY LEAST- | | | 12856003 | | 18 |
| | SQUARES PROCEDURE. | | | 12856003 | | 19 |
| | LEAST-SQUARES ANALYSIS WAS PERFORMED TO DETERMINE THE | | | 12856003 | | 20 |
| | PRECURSOR HALF-LIVES FROM NEUTRON AND BETA DECAY | | | 12856003 | | 21 |
| | CURVES. | | | 12856003 | | 22 |
| | TOTAL DELAYED NEUTRON YIELDS WERE CALCULATED WITH | | | 12856003 | | 23 |
| | THE MEASURED DELAYED NEUTRON PROBABILITY AND THE | | | 12856003 | | 24 |
| | CUMULATIVE YIELD OF THE PRECURSOR AND SUMMING | | | 12856003 | | 25 |
| | OVER ALL PRECURSORS. | | | 12856003 | | 26 |
| CORRECTION | BACKGROUND COMPONENT WAS INCLUDED IN THE LEAST-SQUARES | | | 12856003 | | 27 |
| | ANALYSIS. | | | 12856003 | | 28 |
| DECAY-DATA | ((1.)38-SR-97,0.403SEC) | EXTRACTED FROM DATA | | 12856003 | | 29 |
| | ((2.)38-SR-98,0.66SEC) | ASSUMED | | 12856003 | | 30 |
| | ((3.)38-SR-99,0.274SEC) | EXTRACTED FROM DATA | | 12856003 | | 31 |
| | ((4.)39-Y-97-G,3.72SEC) | EXTRACTED FROM DATA | | 12856003 | | 32 |
| | ((5.)39-Y-97-M,1.19SEC) | EXTRACTED FROM DATA | | 12856003 | | 33 |
| | ((6.)39-Y-98-G,0.51SEC) | EXTRACTED FROM DATA | | 12856003 | | 34 |
| | ((7.)39-Y-99,1.47SEC) | EXTRACTED FROM DATA | | 12856003 | | 35 |
| | ((8.)56-BA-146,2.18SEC) | ASSUMED | | 12856003 | | 36 |
| | ((9.)56-BA-147,0.91SEC) | EXTRACTED FROM DATA | | 12856003 | | 37 |
| | ((10.)56-BA-148,0.607SEC) | ASSUMED | | 12856003 | | 38 |
| | ((11.)57-LA-146,6.0SEC) | ASSUMED | | 12856003 | | 39 |
| | ((12.)57-LA-147,4.48SEC) | ASSUMED | | 12856003 | | 40 |
| | ((13.)57-LA-148,1.42SEC) | EXTRACTED FROM DATA | | 12856003 | | 41 |
| ERR-ANALYS | (ERR-T) | | | 12856003 | | 42 |
| | QUOTED ERRORS FOR PN VALUES ARE BASED ON UNCERTAINTIES | | | 12856003 | | 43 |
| | ON SATURATION ACTIVITIES DERIVED FROM LEAST-SQUARES | | | 12856003 | | 44 |

| | | | | | | | |
|-----------|---|----------|------------|----------|------------|----------------|----|
| | FIT TO GROWTH-DECAY CURVES. | | | | | 12856003 | 45 |
| | (ERR-1) SYSTEMATIC ERROR. | | | | | 12856003 | 46 |
| | SYSTEMATIC ERROR IS BASED ON UNCERTAINTY OF REFERENCE | | | | | 12856003 | 47 |
| | PN VALUE USED TO NORMALIZE FOR COUNTER EFFICIENCIES. | | | | | 12856003 | 48 |
| STATUS | DATA TAKEN FROM TABLE II OF THE JOURNAL ARTICLE. | | | | | 12856003 | 49 |
| ENDBIB | 47 | 0 | | | | 12856003 | 50 |
| COMMON | 10 | 6 | | | | 12856003 | 51 |
| MONIT1 | MONIT1-ERR | MONIT2 | MONIT2-ERR | MONIT3 | MONIT3-ERR | 12856003 | 52 |
| MONIT4 | MONIT4-ERR | MONIT5 | MONIT5-ERR | | | 12856003 | 53 |
| PC/DECAY | PC/DECAY | PC/DECAY | PC/DECAY | PC/DECAY | PC/DECAY | 12856003 | 54 |
| PC/DECAY | PC/DECAY | PC/DECAY | PC/DECAY | | | 12856003 | 55 |
| 26.9 | 1.9 | 13.4 | 1.1 | 13.4 | 1.9 | 12856003 | 56 |
| 13.4 | 1.2 | 26.2 | 3.7 | | | 12856003 | 57 |
| ENDCOMMON | | 6 | 0 | | | 12856003 | 58 |
| DATA | | 8 | 13 | | | 12856003 | 59 |
| ELEMENT | MASS | ISOMER | DATA | DATA-MAX | ERR-T | 12856003 | 60 |
| ERR-1 | DECAY-FLAG | | | | | 12856003 | 61 |
| NO-DIM | NO-DIM | NO-DIM | PC/DECAY | PC/DECAY | PC/DECAY | 12856003 | 62 |
| PER-CENT | NO-DIM | | | | | 12856003 | 63 |
| 38. | 97. | | | 0.02 | | 12856003 | 64 |
| 7. | 1. | | | | | 12856003 | 65 |
| 38. | 98. | | 0.18 | | 0.02 | 12856003 | 66 |
| 8. | 2. | | | | | 12856003 | 67 |
| 38. | 99. | | 0.31 | | 0.11 | 12856003 | 68 |
| 14. | 3. | | | | | 12856003 | 69 |
| 39. | 97. | 0. | 0.061 | | 0.007 | 12856003 | 70 |
| 7. | 4. | | | | | 12856003 | 71 |
| 39. | 97. | 1. | 0.11 | | 0.03 | 12856003 | 72 |
| 7. | 5. | | | | | 12856003 | 73 |
| 39. | 98. | 0. | 0.21 | | 0.04 | 12856003 | 74 |
| 8. | 6. | | | | | 12856003 | 75 |
| 39. | 99. | | 0.96 | | 0.15 | 12856003 | 76 |
| 14. | 7. | | | | | 12856003 | 77 |
| 56. | 146. | | | 0.02 | | 12856003 | 78 |
| 10. | 8. | | | | | 12856003 | 79 |
| 56. | 147. | | 0.030 | | 0.016 | 12856003 | 80 |
| 14. | 9. | | | | | 12856003 | 81 |
| 56. | 148. | | | 0.03 | | 12856003 | 82 |
| 8. | 10. | | | | | 12856003 | 83 |
| 57. | 146. | | | 0.007 | | 12856003 | 84 |
| 10. | 11. | | | | | 12856003 | 85 |
| 57. | 147. | | 0.033 | | 0.006 | 12856003 | 86 |
| 14. | 12. | | | | | 12856003 | 87 |
| 57. | 148. | | 0.13 | | 0.01 | 12856003 | 88 |
| 8. | 13. | | | | | 12856003 | 89 |
| ENDDATA | 30 | 0 | | | | 12856003 | 90 |
| ENDSUBENT | 89 | 0 | | | | 12856003999999 | |
| ENDEENTRY | 3 | 0 | | | | 12856999999999 | |
| ENDTRANS | 1 | 0 | | | | 19999999999999 | |