

# Japan Charged-Particle Nuclear Reaction Data Group

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## Memo CP-E/018

**Date:** April 19, 2003  
**To:** Distribution  
**From:** OTUKA Naohiko and KATŌ Kiyoshi  
**Subject:** Particle multiplicity from thick target experiment

We have received data sets in which differential and partially integrated particle multiplicity in thick-target experiments were given (T. Kurosawa *et al.*, Phys. Rev. C. **62** (2000) 044615 and T. Kurosawa *et al.*, J. Nucl. Sci. Technol. **36** (1999) 41). In these references,

- 1) Double diff. yield with respect to energy and angle in a unit of (1/MeV/sr/inc. projectile),
- 2) Diff. yield with respect to angle in a unit of (1/sr/inc. projectile), and
- 3) Diff. yield partially integrated over an angular range in a unit of (1/inc. projectile)

were shown. We propose the following codes for 2) and 3):

### Dictionary 36 (Quantities)

,MLT/DA, , TT	1/A	Diff. particle multiplicity for thick target d/dA
,MLT/DA, , TT/IPA	YLD	Diff. particle multiplicity integrated over partial angular range

We also compiled 1) using “,MLT/DA/DE, , TT” with “P/IN/MEVSR”. However CHEX reported errors for this connection because this quantity code now should be connected with unit codes “YAE”, while “P/IN/MEVSR” has the dimension of “1/AE”.

“P/IN/MEVSR” and “P/MEVMUCSR” have the same dimension, and the only difference is normalization of incident current. The former one means “per one incident projectile” and the latter one means “per 1μC (micro-Coulomb) of incident projectile”, and these are related by

$$1 \text{ incident projectile} = eZ \mu\text{C},$$

where  $e$  and  $Z$  denote the elementary electric charge (in μC) and atomic number of incident projectile, respectively. We propose to give the same dimension to “P/IN/MEV/SR” and “P/MEVMUCSR”. (Now the latter unit is given as

P/MEVMUCSR particles/(MeV μC sr)	1/AE	30000 25 139C
= particles / (MeV * μC * sr)		30000 25 140

in our dictionary. But one may regard μC as “micro-Curie”. Clarification may be necessary. )

I attach a coding sample for “,MLT/DA/DE, , TT”.

### Sample of coded entry (E1756.002):

T. Kurosawa et al., Phys. Rev. C **62** (2000) 044615 Fig.1 (left-top)

SUBENT	E1756002	20030311	E175600200001
BIB	6	12	E175600200002
REACTION	(6-C-0(18-AR-40,X)0-NN-1,,MLT/DA/DE,,TT)		E175600200003
	DATA: Neutron energy spectrum from Thick Target [n /sr		E175600200004
	/MeV /particle]		E175600200005
PART-DET	(N)		E175600200006
SAMPLE	Target-thickness is 12390mg/cm**2.		E175600200007
ADD-RES	(COMP)1. Monte-Carlo method		E175600200008
	2.Phenomenological hybrid analysis by the moving		E175600200009
	source model.		E175600200010
EN-SEC	(E,N)		E175600200011
	ANG is polar angle between beam and neutron		E175600200012
STATUS	(TABLE)Data (Fig. 1 left-top, p044615-3 in reference)		E175600200013
	received from web site of T. Kurosawa.		E175600200014
ENDBIB	12	0	E175600200015
COMMON	1	3	E175600200016
EN			E175600200017
MEV/A			E175600200018
400.0			E175600200019
ENDCOMMON	3	0	E175600200020
DATA	3	285	E175600200021
ANG	E	DATA	E175600200022
ADEG	MEV	P/IN/MEVSR	E175600200023
0.0	10.762	0.009697	E175600200024
0.0	11.902	0.0089775	E175600200025
0.0	13.1585	0.0087695	E175600200026
0.0	14.5535	0.010493	E175600200027
0.0	16.097	0.012418	E175600200028
0.0	17.8035	0.012389	E175600200029
0.0	19.705	0.013436	E175600200030
0.0	21.823	0.015657	E175600200031
...			
90.0	186.56	3.065E-05	E175600200306
90.0	207.67	1.777E-05	E175600200307
90.0	233.04	1.235E-05	E175600200308
ENDDATA	287	0	E175600200309
ENDSUBENT	308	0	E175600299999

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