

Japan Charged-Particle Nuclear Reaction Data Group

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Memo CP-E/028

Date: December 10, 2003
To: Distribution
From: OTSUKA Naohiko and KATŌ Kiyoshi
Subject: Mott scattering cross section

We are compiling $^{16}\text{O}+^{16}\text{O}$ elastic scattering at 125 and 145 MeV (Y. Sugiyama *et al.*, Phys. Lett. **B312**(1993)35 and Y. Kondo *et al.*, Phys. Lett. **B365**(1996)17). In these papers, angular distributions are given in the ratios to Mott scattering cross section. Mott scattering cross section is the relativistic extension of Rutherford scattering cross section and expressed as

$$(d\sigma/d\Omega)_{\text{Mott}} = Z_1^2 Z_2^2 e^4 / 4m^2 v^4 \sin^4(\theta/2) [1 - \beta^2 \sin^2(\theta/2)] = (d\sigma/d\Omega)_{\text{Ruth}} [1 - \beta^2 \sin^2(\theta/2)],$$

where $Z_1 e$ and $Z_2 e$ are electric charges of projectile and target, m and v are mass and initial velocity of projectile. β is Lorentz factor v/c . Namely the last term $[1 - \beta^2 \sin^2(\theta/2)]$ is the relativistic correction to Rutherford cross section. We propose modifier and quantity codes for Mott scattering cross section.

Dictionary 34 (Modifiers)

MOT relative to Mott scattering

Dictionary 36 (Quantities)

, DA, , MOT Angular distribution, relative relativistic scattering by point nucleus
(Mott scattering)

Distribution:

J.H. Chang, KAERI	M. Chiba, JCPRG	F.E. Chukreev, CAJaD	S. Dunaeva, NDS
O. Gritzay, KINR	J. Hasegawa, JAERI	A. Kaltchenko, KINR	K. Kato, JCPRG
M. Kellett, NEADB	M. Lammer, NDS	S. Maev, CJD	V.N. Manokhin, CJD
V. McLane, NNDC	C. Nordborg, NEADB	P. Oblozinsky, NNDC	Y. Ohbayasi, JCPRG
N. Otsuka, JCPRG	V. Pronyaev, NDS	O. Schwerer, NDS	S. Takacs, ATOMKI.
S. Taova, VNIIEF	T. Tárkányi, ATOMKI	V. Varlamov, CDFE	M. Vlasov, KINR
M. Wirtz, NDS	V. Zerkín, NDS	Zhuang Y.X., CNDC	

Sample of coded entry (E1521.002):

SUBENT	E1521002	20031210	E152100200001
BIB	5	11	E152100200002
REL-REF	(A,E1613003,Y.Kondo+,J,PL/B,365,17,1996)		E152100200003
	Similar experiment has been done for wider angular		E152100200004
	range at 124 MeV and 145 MeV.		E152100200005
REACTION	(8-0-16(8-0-16,EL)8-0-16,,DA,,MOT)		E152100200006
	DATA-CM: Cross section ratio to Mott scattering		E152100200007
PART-DET	(8-0-16)		E152100200008
EN-SEC	ANG-CM is polar angle between beam and 160 in center		E152100200009
	of mass system		E152100200010
STATUS	(TABLE)Data received by e-mail from Y. Kondo		E152100200011
	(2003.08.27). Corresponding figure is Fig.1(a),		E152100200012
	p36 in reference		E152100200013
ENDBIB	11	0	E152100200014
NOCOMMON	0	0	E152100200015
DATA	3	46	E152100200016
ANG-CM	DATA-CM	DATA-ERR	E152100200017
ADEG	NO-DIM	NO-DIM	E152100200018
11.0	0.20001	0.002463	E152100200019
12.0	0.14697	0.0021941	E152100200020
13.0	0.18224	0.0026361	E152100200021
14.0	0.17818	0.0029193	E152100200022
15.0	0.12471	0.002621	E152100200023
16.0	0.052972	0.0011228	E152100200024
17.0	0.04185	0.0014141	E152100200025
18.0	0.08273	0.0020745	E152100200026
19.0	0.09801	0.0023579	E152100200027
...			
58.0	0.0020124	0.00017328	E152100200058
60.0	0.0033684	0.00028464	E152100200059
62.0	0.00752	0.00092608	E152100200060
64.0	0.0067375	0.0008339	E152100200061
66.0	0.0037779	0.00087853	E152100200062
68.0	0.0043006	0.00065011	E152100200063
69.6	0.0030698	0.00058014	E152100200064
ENDDATA	48	0	E152100200065
ENDSUBENT	64	0	E152100299999
NOSUBENT	E1521003	20031210	E152100300001