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GDR

Giant Dipole Resonance Parameters for Gamma-Rays

A data file by

Samuel S. Dietrich and Barry L. Berman, USA,

compiled on PC diskette
by the Chinese Nuclear Data Center

Summary documentation
by
A.B. Pashchenko

Abstract: This document summarizes contents and format of a PC data file of properties of the giant dipole resonances derived from measurements made with monoenergetic photon beams. The IAEA Nuclear Data Section (NDS) received this file from Su Zongdi, Chinese Nuclear Data Centre in June 1992, based on integrated cross-sections and the parameters of Lorentz curves fitted to the giant-resonance data reported by Samuel S. Dietrich and Barry L. Berman in 1988.

The data file is available free of charge from the IAEA Nuclear Data Section upon request on PC diskette.

GDR

GIANT DIPOLE RESONANCE PARAMETERS FOR GAMMA-RAYS

A data file by S.S. Dietrich and B.L. Berman, USA, compiled on PC diskette by the Chinese Nuclear Data Center.

Description of contents and format:

The data library consists of the values of the integrated cross sections and the parameters of Lorentz curves fitted to the total photoneutron cross-section data for medium and heavy nuclei ($A > 50$) which were reported by Samuel S. Dietrich and Barry L. Berman in their article "Atlas of Photoneutron Cross Sections obtained with Monoenergetic Photons" published in the journal "Atomic Data and Nuclear Data Tables,38,199-338(1988)" [1]. It was stored in electronic format in Beijing by Liu Jianfeng, Zhang Xizhi from Department of Physics, Zhenzhou University and Ge Zhigang, Zhou Chunmei and Su Zongdi from the Chinese Nuclear Data Centre and received at NDS in June 1992 from Su Zongdi [2].

The PC diskette contains the following ASCII text files:

CENDL.GDR 16 kbytes With explanatory data and bibliographic references.

Copies of the diskette are available, costfree, from the IAEA Nuclear Data Section, upon request.

The data file consists of 102 nuclei ranging from ^{51}V to ^{239}Pu. This compilation is current as of June 1987. The data are presented in order of increasing nuclear charge number and for mass number. When two or more laboratories have measured the same nucleus, the data are listed in chronological order.

The data file has 13 columns; their headings are explained in the following table.

Columns	Heading	Explanation
1-3	Z	charge number
4-6	EL	element symbol
7-10	A	mass number ("Nat" = natural element)
11-13	NL	this number gives how many sets of data are given for the given Z and A nucleus
14-16	NG	NG=1, single peak; NG=2, double peaks
17-23	E1	the peak energy of the first peak
24-30	CS1	the peak cross section of the first peak
31-36	GW1	the peak full width of the first peak at half-maximum
37-43	E2	the peak energy of the second peak
44-50	CS2	the peak cross section of the second peak
51-56	GW2	the peak full width of the second peak at half-maximum
57-63	REF	the publication reference (bibliographic information is given in a chronological listing following the table)
64-68	No.	a sequence number

Units for the listed quantities are given with the respective subunits headings, if necessary.

History

The IAEA Nuclear Data Section, in cooperation with several national nuclear data centres and research laboratories, is creating a reference library of model input parameters with the purpose to assist the evaluators in their computational work and to encourage standardization of code input parameters. The present PC file has been made available following the recommendations of the IAEA Consultants' Meeting on "Reference Nuclear Parameter Library for Nuclear Data Computation" [3], held on 13-15 November 1991 in IAEA Headquarters at Vienna. Another data file which was made available on recommendation by this meeting, contains recommended values for nuclear masses, see document IAEA-NDS-147.

References:

[1] S.S. Dietrich, B.L. Berman, "Atlas of photoneutron cross sections obtained with monoenergetic photons", At. Nucl. Data Tables 38 (1988) 199.

[2] Su Zongdi, Private communication, June 1992.

[3] G.Reffo, et.al., Report INDC(NDS)-266, November 1992. A summary report of the IAEA Consultants' Meeting on "Reference Nuclear Parameter Library for Nuclear Data Computation" organized by the International Atomic Energy Agency and held in Vienna, Austria, 13-15 November 1991.

GIANT DIPOLE RESONANCE PARAMETERS FOR GAMMA-RAYS (RNPL-GDR)

Z	EL	A	NL	NG	E1 MeV	CS1 mb	GW1 MeV	E2 MeV	CS2 mb	GW2 MeV	REF	NO
23	V	51	2	2	17.86	58.8	4.42	21.22	28.8	5.10	62Ful	1
23	V	51	2	2	17.93	53.3	3.62	20.95	40.7	7.15	74Vel	2
25	Mn	55	1	2	16.82	51.4	4.33	20.09	45.2	4.09	79Al2	3
27	Co	59	1	2	16.43	28.3	2.73	18.66	58.4	7.38	79Al2	4
28	Ni	60	1	2	16.30	34.1	2.44	18.51	55.2	6.37	74Fu3	5
29	Cu	63	2	2	16.24	60.8	4.65	19.65	26.8	4.59	64Ful	6
29	Cu	63	2	2	16.72	66.1	4.19	19.10	30.1	3.56	68Sul	7
29	Cu	65	1	1	16.70	75.2	6.89				64Ful	8
30	Zn	64	1	2	16.23	41.4	3.27	19.19	56.1	5.98	76Cal	9
31	Ga	Nat	1	1	16.69	107.0	6.91				76Cal	10
32	Ge	70	1	1	16.79	89.4	7.66				76Cal	11
32	Ge	72	1	1	16.67	107.0	7.68				76Cal	12
32	Ge	74	1	2	14.52	23.9	1.92	17.02	102.3	8.18	76Cal	13
32	Ge	76	1	2	15.51	59.4	4.36	18.83	73.0	11.44	76Cal	14
33	As	75	2	2	14.98	41.1	3.64	17.61	76.9	7.26	69Bel	15
33	As	75	2	2	15.23	69.2	4.52	18.24	74.6	7.75	76Cal	16
34	Se	76	1	2	14.95	68.2	3.84	18.40	81.8	6.47	76Cal	17
34	Se	78	1	2	15.23	35.8	2.58	17.18	101.8	8.55	76Cal	18
34	Se	80	1	1	16.53	136.0	6.90				76Cal	19
34	Se	82	1	1	16.65	148.0	5.91				76Cal	20
37	Rb	Nat	1	1	16.80	190.0	4.47				71Lel	21
38	Sr	Nat	1	1	16.84	206.0	4.50				71Lel	22
39	Y	89	3	1	16.79	185.0	3.95				67Be2	23
39	Y	89	3	1	16.74	226.0	4.25				71Lel	24
39	Y	89	3	1	16.83	205.0	3.69				72Yo	25
40	Zr	Nat	1	1	16.52	174.0	4.41				86Bel	26
40	Zr	90	2	1	16.85	185.0	4.02				67Be2	27
40	Zr	90	2	1	16.74	211.0	4.16				71Lel	28
40	Zr	91	1	1	16.58	184.0	4.20				67Be2	29
40	Zr	92	1	1	16.26	166.0	4.68				67Be2	30
40	Zr	94	1	1	16.22	161.0	5.29				67Be2	31
41	Nb	93	1	1	16.59	200.0	5.05				71Lel	32
42	Mo	92	1	1	16.82	162.0	4.14				74Be3	33
42	Mo	94	1	1	16.36	185.0	5.50				74Be3	34
42	Mo	96	1	1	16.20	185.0	6.01				74Be3	35
42	Mo	98	1	1	15.80	189.0	5.94				74Be3	36
42	Mo	100	1	1	15.74	171.0	7.81				74Be3	37
45	Rh	103	1	1	16.16	191.0	7.26				74Lel	38
46	Pd	Nat	1	1	15.92	199.0	7.18				74Lel	39
47	Ag	Nat	1	1	16.07	199.0	7.38				74Lel	40
47	Ag	107	1	1	15.90	150.0	6.71				69Bel	41
48	Cd	Nat	1	1	15.81	227.0	6.22				74Lel	42

49	In	115	2	1	15.63	266.0	5.24				69Ful	43
49	In	115	2	1	15.72	247.0	5.60				74Lel	44
50	Sn	116	2	1	15.68	266.0	4.19				69Ful	45
50	Sn	116	2	1	15.56	271.0	5.08				74Lel	46
50	Sn	117	2	1	15.66	254.0	5.02				69Ful	47
50	Sn	117	2	1	15.64	259.0	5.04				74Lel	48
50	Sn	118	2	1	15.59	256.0	4.77				69Ful	49
50	Sn	118	2	1	15.44	279.0	4.86				74Lel	50
50	Sn	119	1	1	15.53	253.0	4.81				69Ful	51
50	Sn	120	2	1	15.40	280.0	4.89				69Ful	52
50	Sn	120	2	1	15.37	285.0	5.10				74Lel	53
50	Sn	124	2	1	15.19	283.0	4.81				69Ful	54
50	Sn	124	2	1	15.28	276.0	4.80				74Lel	55
51	Sb	Nat	1	1	15.48	277.0	5.05				74Lel	56
52	Te	Nat	1	1	15.46	297.0	5.32				74Lel	57
52	Te	124	1	1	15.24	281.0	5.56				76Le2	58
52	Te	126	1	1	15.17	296.0	5.44				76Le2	59
52	Te	128	1	1	15.13	305.0	5.36				76Le2	60
52	Te	130	1	1	15.12	320.0	5.03				76Le2	61
53	I	127	3	2	14.24	118.0	3.24	16.27	149.0	5.27	66Br1	62
53	I	127	3	2	14.57	239.0	4.08	16.69	118.0	4.92	69Be6	63
53	I	127	3	2	14.74	111.0	3.34	15.88	156.0	6.44	86Bel	64
55	Cs	133	2	1	15.25	287.0	5.01				69Bel	65
55	Cs	133	2	1	15.34	317.0	5.31				74Lel	66
56	Ba	Nat	1	1	15.29	356.0	4.89				71Be4	67
56	Ba	138	1	1	15.26	327.0	4.61				70Be8	68
57	La	139	1	1	15.24	336.0	4.47				71Be4	69
58	Ce	140	1	1	15.04	383.0	4.41				76Le2	70
58	Ce	142	1	1	14.86	332.0	5.10				76Le2	71
59	Pr	141	6	1	15.15	324.0	4.42				66Br1	72
59	Pr	141	6	1	15.23	341.0	4.00				70Sul	73
59	Pr	141	6	1	15.04	347.0	4.49				71Be4	74
59	Pr	141	6	1	15.36	332.0	4.07				72Yo	75
59	Pr	141	6	1	15.19	344.0	4.24				80Ca1	76
59	Pr	141	6	1	15.19	340.0	4.15				86Bel	77
60	Nd	Nat	1	1	14.92	315.0	4.70				71Be4	78
60	Nd	142	1	1	14.94	359.0	4.44				71Ca1	79
60	Nd	143	1	1	15.01	349.0	4.75				71Ca1	80
60	Nd	144	1	1	15.05	317.0	5.28				71Ca1	81
60	Nd	145	1	1	14.95	296.0	6.31				71Ca1	82
60	Nd	146	1	1	14.74	310.0	5.78				71Ca1	83
60	Nd	148	1	2	12.76	107.0	3.97	15.48	220.0	5.30	71Ca1	84
60	Nd	150	1	2	12.30	175.0	3.38	16.04	223.0	5.17	71Ca1	85
62	Sm	144	1	1	15.32	383.0	4.45				74Ca5	86
62	Sm	148	1	1	14.82	339.0	5.09				74Ca5	87
62	Sm	150	1	1	14.61	312.0	5.97				74Ca5	88
62	Sm	152	1	2	12.38	176.0	2.97	15.74	234.0	5.22	74Ca5	89
62	Sm	154	1	2	12.27	181.0	2.95	15.94	215.0	5.70	74Ca5	90
63	Eu	153	1	2	12.33	155.0	2.75	15.79	222.0	5.83	69Be8	91
64	Gd	160	1	2	12.23	215.0	2.77	15.96	233.0	5.28	69Be8	92
65	Tb	159	2	2	12.22	181.0	2.64	15.67	220.0	4.97	64Br1	93

65	Tb	159	2	2	12.07	196.0	2.98	15.88	248.0	5.10	68Be5	94
67	Ho	165	3	2	12.02	238.0	2.35	15.59	308.0	4.85	66Ax1	95
67	Ho	165	3	2	12.28	214.0	2.57	15.78	246.0	5.00	69Be8	96
67	Ho	165	3	2	12.01	239.0	2.52	15.59	291.0	5.12	68Be5	97
68	Er	Nat	1	2	12.12	242.0	2.76	15.58	259.0	4.74	69Be6	98
71	Lu	175	1	2	12.32	217.0	2.57	15.47	287.0	4.70	69Be6	99
73	Ta	181	2	2	12.54	154.0	1.67	14.95	273.0	5.23	63Br1	100
73	Ta	181	2	2	12.30	259.0	2.43	15.23	341.0	4.48	68Be5	101
74	W	Nat	1	2	12.56	268.0	2.66	15.17	328.0	4.69	75Ve5	102
74	W	186	1	2	12.59	211.0	2.29	14.88	334.0	5.18	69Be8	103
75	Re	Nat	1	2	12.63	279.0	2.77	15.24	375.0	4.69	75Ve5	104
76	Os	186	1	2	13.03	308.0	3.13	15.26	302.0	3.38	79Be4	105
76	Os	188	1	2	12.8i	260.0	2.76	14.88	390.0	4.19	79Be4	106
76	Os	189	1	2	12.68	268.0	2.71	14.68	395.0	3.62	79Be4	107
76	Os	190	1	2	12.68	206.0	2.60	14.40	401.0	4.16	79Be4	108
76	Os	192	1	2	12.68	206.0	2.49	14.35	389.0	4.41	79Be4	109
77	Ir	Nat	1	1	13.80	487.0	5.08				75Ve5	110
78	Pt	Nat	1	1	13.72	512.0	4.99				75Ve5	111
79	Au	197	3	1	13.82	560.0	3.84				62Fu2	112
79	Au	197	3	1	13.72	541.0	4.61				70Ve1	113
79	Au	197	3	1	13.73	502.0	4.76				86Be1	114
80	Hg	Nat	1	1	13.72	582.0	4.39				75Ve5	115
82	Pb	Nat	1	1	13.48	602.0	4.20				86Be1	116
82	Pb	206	1	1	13.59	514.0	3.85				64Ha2	117
82	Pb	207	1	1	13.56	481.0	3.96				64Ha2	118
82	Pb	208	3	1	13.46	491.0	3.90				64Ha2	119
82	Pb	208	3	1	13.43	639.0	4.07				70Ve1	120
82	Pb	208	3	1	13.63	645.0	3.94				72Yo	121
83	Bi	209	2	1	13.45	521.0	3.97				64Ha2	122
83	Bi	209	2	1	13.56	648.0	3.72				72Yo	123
90	Th	232	2	2	11.26	283.0	4.32	14.18	306.0	4.48	73Ve1	124
90	Th	232	2	2	11.03	302.0	2.71	13.87	449.0	4.77	80Ca1	125
92	U	233	1	2	11.08	221.0	1.94	13.86	433.0	5.47	86Be2	126
92	U	234	1	2	11.13	371.0	2.26	13.94	401.0	4.46	86Be2	127
92	U	235	2	2	10.58	380.0	1.77	13.84	531.0	4.55	64Bo3	128
92	U	235	2	2	10.90	328.0	2.30	13.96	459.0	4.75	80Ca1	129
92	U	236	1	2	10.92	271.0	2.55	13.78	415.0	4.88	80Ca1	130
92	U	238	2	2	10.94	296.0	2.65	14.00	381.0	4.59	73Ve1	131
92	U	238	2	2	10.77	311.0	2.37	13.80	459.0	5.13	80Ca1	132
93	Np	237	2	2	11.02	256.0	2.94	14.11	392.0	4.71	73Ve1	133
93	Np	237	2	2	10.98	311.0	2.17	14.08	540.0	4.66	66Be2	134
94	Pu	239	1	2	11.28	325.0	2.48	13.73	384.0	4.25	86Be2	135

2. REFERENCES FOR TABLE

62Fu1 S. C. Fultz, R. L. Bramblett, J. T. Caldwell, N. E. Hansen, C. P. Jupiter; Phys. Rev. 128, 2345(1962).

62Fu2 S. C. Fultz, R. L. Bramblett, J. T. Caldwell, N. A. Kerr;

Phys. Rev. 127, 1273(1962).
63Br1 R. L. Bramblett, J. T. Caldwell, G. F. Auchampaugh, S. C. Fultz; Phys. Rev. 129,2723(1963).
64Bo3 C. D. Bowman, G. F. Auchampaugh, S. C. Fultz; Phys. Rev. 133, B676(1964).
64Br1 R. L. Bramblett, J. T. Caldwell, R. R. Harvey, S. C. Fultz; Phys. Rev. 133, B869(1964).
64Ful S. C. Fultz, R. L. Bramblett, J. T. Caldwell, R. R. Harvey; Phys. Rev. 133, B1149(1964).
64Ha2 R. R. Harvey, J. T. Caldwell, R. L. Bramblett, S. C. Fultz; Phys. Rev. 136, B126(1964).
66Ax1 P. Axel, J. Miller, C. Schuhl, G. Tamas, C. Tzara; J. Physique 27,262(1966).
66Br1 R. L. Bramblett, J. T. Caldwell, B. L. Berman, R. R. Harvey, S. C. Fultz; Phys. Rev. 148, 1198(1966)
67Be2 B. L. Berman, J. T. Caldwell, R. R. Harvey, M. A. Kelly, R. L. Bramblett, S. C. Fultz; Phys. Rev. 162, 1098(1967).
68Be5 R.Bergere, R. Beil, A. Veyssiere; Nucl. Phys. A121, 463(1968).
68Su1 R. E. Sund, M. P. Baker, L. A. Kull, R. B. Walton; Phys. Rev. 176, 1366(1968).
69Be1 B. L. Berman, R. L. Bramblett, J. T. Caldwell, H. S. Davis, M. A. Kelly, S. C. Fultz; Phys. Rev. 177, 1745(1969).
69Be6 R. Bergere, H. Beil, P. Carlos, A. Veyssiere; Nucl. Phys. A133, 417(1969).
69Be8 B. L. Berman, M. A. Kelly, R. L. Bramblett, J. T. Caldwell, H. S. Davis, S. C. Fultz; Phys. Rev. 185, 1576(1969).
69Ful S. C. Fultz, B. L. Berman, J. T. Caldwell, R. L. Bramblett, M. A. Kelly; Phys. Rev. 186, 1255(1969).
70Be8 B. L. Berman, S. C. Fultz, J. T. Caldwell, M. A. Kelly, S. S. Dietrich; Phys. Rev. C2, 2318(1970).
70Su1 R.E.Sund,V.V.Verbinski, H.Weber, L.A.Kull; Phys. Rev. C2, 1129(1970).
70Ve1 A. Veyssiere, H. Beil, R. Bergere, P. Carlos, A. Lepretre; Nucl. Phys. A159, 561(1970).
71Be4 H. Beil, R. Bergere, P. Carlos, A. Lepretre, A. Veyssiere, A. Parlag; Nucl. Phys. A172, 426(1971).
71Ca1 P. Carlos, H. Beil, R. Bergere, A. Lepretre, A. Veyssiere; Nucl. Phys. A172, 437(1971).
71Le1 A. Lepretre, H. Beil, R. Bergere, P. Carlos, A. Veyssiere, M. Sugawara; Nucl. Phys. A175, 609(1971).
72Yo L. M. Young, Ph.D. Thesis, University of Illinois(1972), unpublished.
73Ve1 A. Veyssiere, H. Reil, R. Bergere, P. Carlos, A. Lepretre, k. kernbach; Nucl. Phys. A199, 45(1973).
74Be3 H. Beil, R. Bergere, P. Carlos, A. Lepretre, A. De Miniac, A. Veyssiere; Nucl. Phys. A227, 427(1974).
74Ca5 P. Carlos, H. Beil, R. Bergere, A. Lepretre, A. De Miniac, A. Veyssiere; Nucl. Phys. A225, 171(1974).
74Fu3 S. C. Fultz, R. A. Alvarez, B. L. Berman, P. Meyer; Phys. Rev. C10, 608(1974).
74Le1 A. Lepretre, H. Beil, R. Bergere, P. Carlos, A. De Miniac, A. Veyssiere, K. Kernbach; Nucl. Phys. A219, 39(1974).
74Ve1 A. Veyssiere, H. Beil, R. Bergere, P. Carlos, A. Lepretre, A. De Miniac; Nucl. Phys. A227, 513(1974).
75Ve5 A. Veyssiere, H. Beil, R. Bergere, P. Carlos, A. Lepretre, A. De Miniac; J. Physique 36, L-267(1975).
76Ca1 P. Carlos, H. Beil, R. Bergere, J. Fagot, A. Lepretre, A. Veyssiere, G. V. Solodukhov; Nucl. Phys. A258, 365(1976).
76Le2 A. Lepretre, H. Beil, R. Bergere, P. Carlos, J. Fagot, A. De Miniac, A. Veyssiere, H. Miyase; Nucl. Phys. A258, 350(1976).
79Al2 R. A. Alavarez, B. L. Berman, D. D. Faul, F. H. Lewis, Jr., P. Meyer; Phys. Rev. C20, 128(1979).
79Be4 B. L. Berman, D. D. Faul, R. A. Alvarez, P. Meyer, D. L. Olson; Phys. Rev. C19, 1205(1979).
80Ca1 J. T. Caldwell, E. J. Dowdy, B. L. Berman, R. A. Avarez,

P. Meyer; Phys. Rev. C21, 1215(1980).
86Be1 B. L. Berman, R. E. Pywell, M. N. Thompson, K. G. Mcneill, J. W. Jury, J. G. Woodworth; Bull. Am. Phys. Soc. 31, 855(1986).
86Be2 B. L. Berman, J. T. Caldwell, E. J. Dowdy, S. S. Dietrich, P. Meyer, R. A. Alvarez; Phys. Rev. C34, 2201(1986).