1 Introduction

1.1 General remarks

This report is the third part, Volume I/19B3, of the compilation of parameters of nuclear bound states excited in reactions with charged particles – Volume I/19B (consisting of 3 subvolums covering different ranges of Z). The data were collected in a Combined charged particle Reaction File (CRF), which contains also data on very unstable nuclei (in volume I/19C). Properties of low-lying levels of many nuclei were considered in LB volumes I/18A [01Sc0A], I/18B [02Sc0A], I/18C [03Sc0A]. Data on unbound states derived from neutron and charged particle resonances were published in LB volumes I/16 [98Sc0A, 04BrZU] and I/19A [04Sc0B, 05Sc0A].

Existing high-quality information on excited bound states situated above the low-lying levels but below the states seen as resonances is essential for understanding of general properties of nuclei and is important for many applications. The compilation Vol. I/19B contains information on parameters of bound excited states which were obtained in high-resolution measurements with charged particle spectrometers. Frequently these data are combined with data obtained in measurements of γ-ray spectra after neutron capture, in β-decay study, etc. We have collected existing information on parameters of nucleon transfer reactions: total and differential cross sections, spectroscopic factors, parameters of few-nucleon transfer, etc. These parameters were not considered (with very few exceptions) in the recent compilation LB I/18ABC. We include also data for many neighbour nuclei not presented in LB I/18ABC. As a result, information on all nuclei with exception of proton-rich and neutron-rich nuclei situated very far from the valley of stability (for which data will be published in LB I/19C) is presented in both compilations I/18ABC and I/19B.

Data on nuclear excitations are contained in four Volumes, respectively: for nuclei with $Z \leq 36$, $37 \leq Z \leq 62$, $Z \geq 63$, and for very unstable nuclei (LB I/19C). These regions of Z are the same as in the compilations LB I/18ABC, where theoretical parametertization of properties of nuclear low-lying levels are presented. We give data for the broader range of nuclei and pay attention to the parameters of nucleon transfer reactions. To avoid duplication with the material in compilations LB I/18, LB I/16 and LB I/19A (resonance parameters) we present in the book data obtained mainly from transfer reactions with charged particles. Other information, branching ratios of radiative transitions from bound excited states, is given mainly in the Supplement (on CD).

Numbers of excited states in Volume 19B (in the book and in the Supplement) are given in Tables 1.1, 1.2 and 1.3 (for the three Volumes 19B3, 19B1 and 19B2, respectively) as a "ratio" in the first column. The asterisk marks the number of levels in very unstable isotopes which are considered in volume I/19C. These Tables also contain the numbers of excited states presented in all the LB-compilations I/18ABC, I/19A, I/16BC, I/19BC mentioned above.

We have collected the original data on different reactions with charged-particles from papers published during the last 25-35 years. Data on energies of excited states and $T_{1/2}$ were taken from publications in Nuclear Data Sheets (NDS) [04Nu0A]. We give references on NDS in the headings of isotope-tables, usually before other references. Data in NDS evaluations (ENSDF – Evaluated Nuclear Structure Data File) were used to facilitate the presentation of the experimental material on cross sections and spectroscopic factors of reactions with charged particles. All data were grouped according to the common Z and A of the compound nuclei formed in different reactions.

The international Nuclear Science Reference system (NSR) was widely used during the collection of data. Modern PC-capacities and the NSR-file permitted to collect and represent in a common format all data scattered in the literature. We have selected data from the original works mentioned in NSR and used the corresponding identification number of each paper in NSR. In some cases we have tried to find so-called "best values" from the most recent original works, in other cases we give several sets of data from different original works for comparison.

Table 1.1. Numbers of bound states in compound nuclei ^{A}Z with $63 \le Z \le 99$ contained in the third part of this compilation (I/19B3). The ratio shows the number of states in Volume I/19B3 and its Supplement. Asterisks mark isotopes included in volume I/19C.
The number of bound states in the compilation LB I/18C, the number of resonances in reactions with charged particles in the compilation LB I/19A2 and the number of neutron resonances in the compilation LB I/16C are given in the same line for comparison.

^{A}Z	19B3	18C	19A	16C
^{136}Eu	1*			
^{137}Eu	7*			
^{138}Eu	49*			
^{139}Eu	62*			
^{140}Eu	28*			
^{141}Eu	61*			
^{144}Eu	127*			
^{143}Eu	202*			
^{144}Eu	144*			
^{145}Eu	14/204		19	
^{146}Eu	4/35			
^{147}Eu	17/157			
^{148}Eu	3/104			
^{149}Eu	48/130		2	
^{150}Eu	3/84			
^{151}Eu	78/176	16	2	
^{152}Eu	91/195	38		106
^{153}Eu	85/167	12		22
^{154}Eu	113/159	42		77
^{155}Eu	59/80	19		19
^{156}Eu	6/32			7
^{157}Eu	3/40			
^{159}Eu	22/31			
^{138}Gd	34*			
^{139}Gd	57*			
^{140}Gd	23*			
^{141}Gd	65*			
^{142}Gd	111*			
^{143}Gd	105*			
^{144}Gd	158*			
^{145}Gd	151*			
^{146}Gd	60/196	43		
^{147}Gd	3/199			
^{148}Gd	19/304	43		
^{149}Gd	2/393			
^{150}Gd	5/393			
^{151}Gd	27/107	18		
^{152}Gd	19/158	45		
^{153}Gd	89/221	40		131
^{154}Gd	53/227	24		9
^{155}Gd	175/217	27		162
^{156}Gd	148/272	26		95
^{157}Gd	185/325	22		87

^{A}Z	19B3	18C	19A	16C
^{158}Gd	53/217	25		88
^{159}Gd	228/298	12		96
^{160}Gd	46/103	24		
^{161}Gd	33/51			58
^{162}Gd	15/20			
^{141}Tb	5*			
^{142}Tb	12*			
^{143}Tb	103*			
^{144}Tb	31*			
^{145}Tb	19*			
^{146}Tb	46*			
^{147}Tb	94*			
^{148}Tb	82*			
^{149}Tb	9/178			
^{150}Tb	2/115			
^{151}Tb	2/266			
^{152}Tb	2/100			
^{153}Tb	32/138	26		
^{154}Tb	4/37			
^{155}Tb	47/86	36		
^{156}Tb	21/68			
^{157}Tb	38/152	13		
^{158}Tb	96/96	18		
^{159}Tb	100/116	15	2	
^{160}Tb	86/174	14		443
^{161}Tb	52/69	8		3
^{162}Tb	8/8			
^{163}Tb	34/36			
^{140}Dy	5*			
^{142}Dy	6*			
^{143}Dy	79*			
^{144}Dy	14*			
^{145}Dy	12*			
^{146}Dy	21*			
^{147}Dy	20*			
^{148}Dy	56*			
^{149}Dy	58*			
^{150}Dy	85*			
^{151}Dy	130*			
^{152}Dy	249*			
^{153}Dy	132*			
^{154}Dy	19/145	39		
^{155}Dy	30/171			

^{A}Z	19B3	18C	16C
^{156}Dy	40/314	62	
^{157}Dy	87/113		20
^{158}Dy	16/96	40	
^{159}Dy	61/124	32	7
^{160}Dy	33/245	44	
^{161}Dy	109/141	39	114
^{162}Dy	196/246	31	256
^{163}Dy	267/292	44	142
^{164}Dy	115/167	25	131
^{165}Dy	105/178	8	117
^{166}Dy	29/31		
^{167}Dy	3*		
^{168}Dy	4*		
^{141}Ho	15*		
^{145}Ho	4*		
^{147}Ho	5*		
^{148}Ho	16*		
^{149}Ho	81*		
^{150}Ho	16*		
^{151}Ho	65*		
^{152}Ho	31*		
^{153}Ho	105*		
^{154}Ho	37*		
^{155}Ho	67*		
^{156}Ho	150*		
^{157}Ho	64/247		
^{158}Ho	2/117		
^{159}Ho	62/125		
^{160}Ho	2/71		
^{161}Ho	56/109	18	
^{162}Ho	5/16		
^{163}Ho	70/78	12	
^{164}Ho	32/34		
^{165}Ho	140/276	19	
^{166}Ho	162/330	9	374
^{167}Ho	29/31		3
^{168}Ho	2/5		
^{169}Ho	32/32		
^{170}Ho	1/1		
^{145}Er	4*		
^{147}Er	1*		
^{148}Er	8*		
^{149}Er	14*		

Table 1.1. (continued) Numbers of bound states in compound nuclei ^{A}Z with $63 \le Z \le 99$ contained in the third part of this compilation (I/19B3). The ratio shows the number of states in Volume I/19B3 and its Supplement. Asterisks mark isotopes included in volume I/19C.
The number of bound states in the compilation LB I/18C, the number of resonances in reactions with charged particles in the compilation LB I/19A2 and the number of neutron resonances in the compilation LB I/16C are given in the same line for comparison.

^{A}Z	19B3	18C	16C
^{150}Er	28*		
^{151}Er	57*		
^{152}Er	53*		
^{153}Er	41*		
^{154}Er	83*		
^{155}Er	97*		
^{156}Er	113*		
^{157}Er	114*		
^{158}Er	129*		
^{159}Er	186*		
^{160}Er	116*		
^{161}Er	26/122	23	
^{162}Er	13/110	32	
^{163}Er	74/383	41	18
^{164}Er	23/204	28	
^{165}Er	99/105	26	19
^{166}Er	144/172	27	
^{167}Er	77/200	17	174
^{168}Er	423/427	55	276
^{169}Er	118/143	5	130
^{170}Er	89/161	12	
^{171}Er	55/73		125
^{172}Er	26/41		
^{145}Tm	5*		
^{146}Tm	2*		
^{147}Tm	12*		
^{150}Tm	5*		
^{151}Tm	19*		
^{152}Tm	19*		
^{153}Tm	63*		
^{154}Tm	2*		
^{155}Tm	6*		
^{156}Tm	14*		
^{157}Tm	72*		
^{158}Tm	44*		
^{159}Tm	73*		
^{160}Tm	68*		
^{161}Tm	95*		
^{162}Tm	212*		
^{163}Tm	97*		
^{164}Tm	175*		
^{165}Tm	23/201	22	
^{166}Tm	1/1		

^{A}Z	19B3	18C	19A	16C
^{167}Tm	18/137	12	1	
^{168}Tm	76/142			
^{169}Tm	26/151	12	1	
^{170}Tm	116/258			432
^{171}Tm	19/49	11		13
^{172}Tm	4/13			4
^{173}Tm	5/33			
^{174}Tm	2/4			
^{175}Tm	21/31			
^{151}Yb	10*			
^{152}Yb	6*			
^{153}Yb	14*			
^{154}Yb	28*			
^{155}Yb	5*			
^{156}Yb	20*			
^{157}Yb	2*			
^{158}Yb	55*			
^{159}Yb	45*			
^{160}Yb	88*			
^{161}Yb	74*			
^{162}Yb	72*			
^{163}Yb	62*			
^{164}Yb	134*			
^{165}Yb	97*			
^{166}Yb	16/114	22		
^{167}Yb	21/176	25		
^{168}Yb	59/164	14		
^{169}Yb	76/173	31		7
^{170}Yb	95/198	51		22
^{171}Yb	100/176	17		24
^{172}Yb	204/308	41		170
^{173}Yb	96/112	18		101
^{174}Yb	157/375	23		167
^{175}Yb	60/183	8		79
^{176}Yb	40/69	6		
^{177}Yb	47/156			69
^{178}Yb	25/31			
^{153}Lu	9*			
^{154}Lu	15*			
^{155}Lu	14*			
^{156}Lu	16*			
^{157}Lu	1*			
^{159}Lu	32*			

^{A}Z	19B3	18C	19A	16C
^{160}Lu	26*			
^{161}Lu	73*			
^{162}Lu	104*			
^{163}Lu	219*			
^{164}Lu	193*			
^{165}Lu	152*			
^{166}Lu	9*			
^{167}Lu	169*			
^{168}Lu	38*			
^{169}Lu	56*			
^{170}Lu	203*			
^{171}Lu	25/202	11	7	
^{172}Lu	23/39			
^{173}Lu	38/81	12	6	
^{174}Lu	143/168			
^{175}Lu	105/125	13	13	
^{176}Lu	9/166	24		449
^{177}Lu	135/203	19	10	59
^{178}Lu	23/41			
^{179}Lu	14/34			
^{180}Lu	2/12			
^{154}Hf	6*			
^{156}Hf	7*			
^{157}Hf	24*			
^{158}Hf	32*			
^{159}Hf	15*			
^{160}Hf	26*			
^{161}Hf	16*			
^{162}Hf	52*			
^{163}Hf	21*			
^{164}Hf	57*			
^{165}Hf	75*			
^{166}Hf	64*			
^{167}Hf	83*			
^{168}Hf	119*			
^{169}Hf	39*			
^{170}Hf	100*			
^{171}Hf	154*			
^{172}Hf	109*			
^{173}Hf	2/129	11		
^{174}Hf	7/189	10		
^{175}Hf	10/117	6		11
^{176}Hf	56/217	21		

Table 1.1. (continued) Numbers of bound states in compound nuclei ^{A}Z with $63 \le Z \le 99$ contained in the third part of this compilation (I/19B3). The ratio shows the number of states in Volume I/19B3 and its Supplement. Asterisks mark isotopes included in volume I/19C.
The number of bound states in the compilation LB I/18C, the number of resonances in reactions with charged particles in the compilation LB I/19A2 and the number of neutron resonances in the compilation LB I/16C are given in the same line for comparison.

^{A}Z	19B3	18C	19A	16C
^{177}Hf	3/145	25		128
^{178}Hf	119/161	38		197
^{179}Hf	121/186	32		215
^{180}Hf	121/246	23		154
^{181}Hf	137/179			150
^{182}Hf	9/19			
^{183}Hf	2/7			
^{184}Hf	0/4			
^{157}Ta	2*			
^{158}Ta	1*			
^{159}Ta	4*			
^{164}Ta	1*			
^{165}Ta	24*			
^{166}Ta	4*			
^{167}Ta	70*			
^{168}Ta	29*			
^{169}Ta	10*			
^{170}Ta	52*			
^{171}Ta	77*			
^{172}Ta	57*			
^{173}Ta	64*			
^{174}Ta	127*			
^{175}Ta	126*			
^{176}Ta	128*			
^{177}Ta	184*			
^{178}Ta	20*			
^{179}Ta	49/135	9	2	
^{180}Ta	53/246	22		
^{181}Ta	57/116	12		61
^{182}Ta	1/154			772
^{183}Ta	3/19			24
^{184}Ta	2/6			
^{185}Ta	19/24			
^{158}W	1*			
^{160}W	12*			
^{162}W	1*			
^{164}W	15*			
^{165}W	33*			
^{166}W	41*			
^{167}W	51*			
^{168}W	67*			
^{169}W	37*			
^{170}W	66*			
^{171}W	82*			

^{A}Z	19B3	18C	19A	16C
^{172}W	49*			
^{173}W	41*			
^{174}W	29*			
^{175}W	43*			
^{176}W	127*			
^{177}W	157*			
^{178}W	37/76			
^{179}W	17/184			
^{180}W	45/119	17		
^{181}W	38/91	23		6
^{182}W	92/122	27		1
^{183}W	123/145	21		250
^{184}W	83/191	32		313
^{185}W	322/367			197
^{186}W	69/76	9		7
^{187}W	94/192			175
^{188}W	23/23			
^{190}W	6*			
^{161}Re	5*			
^{162}Re	1*			
^{163}Re	1*			
^{165}Re	1*			
^{167}Re	2*			
^{168}Re	2*			
^{169}Re	1*			
^{170}Re	8*			
^{171}Re	95*			
^{172}Re	10*			
^{173}Re	74*			
^{174}Re	35*			
^{175}Re	113*			
^{176}Re	114*			
^{177}Re	251*			
^{178}Re	68*			
^{179}Re	103*			
^{180}Re	101*			
^{181}Re	120/162			
^{182}Re	4/48			
^{183}Re	170/181	18		
^{184}Re	29/113			
^{185}Re	54/66	6		
^{186}Re	39/167			503
^{187}Re	47/78	8		3
^{188}Re	48/81			399

^{A}Z	19B3	18C	16C
^{189}Re	11/22	4	
^{190}Re	1/4		
^{191}Re	15/39		
^{193}Re	2*		
^{164}Os	5*		
^{166}Os	12*		
^{167}Os	8*		
^{168}Os	23*		
^{169}Os	14*		
^{170}Os	28*		
^{171}Os	71*		
^{172}Os	78*		
^{173}Os	66*		
^{174}Os	70*		
^{175}Os	71*		
^{176}Os	56*		
^{177}Os	57*		
^{178}Os	59*		
^{179}Os	134*		
^{180}Os	143*		
^{181}Os	249*		
^{182}Os	148*		
^{183}Os	91*		
^{184}Os	16/49	17	
^{185}Os	172/191		
^{186}Os	29/164	23	
^{187}Os	45/65	17	129
^{188}Os	53/125	15	177
^{189}Os	53/90	12	101
^{190}Os	95/145	13	22
^{191}Os	64/77		24
^{192}Os	82/106	14	
^{193}Os	13/262		20
^{194}Os	17/18		
^{196}Os	2*		
^{165}Ir	1*		
^{166}Ir	1*		
^{167}Ir	1*		
^{172}Ir	3*		
^{173}Ir	47*		
^{174}Ir	1*		
^{175}Ir	54*		
^{176}Ir	128*		
^{177}Ir	122*		

Table 1.1. (continued) Numbers of bound states in compound nuclei ^{A}Z with $63 \leq Z \leq 99$ contained in the third part of this compilation (I/19B3). The ratio shows the number of states in Volume I/19B3 and its Supplement. Asterisks mark isotopes included in volume I/19C.
The number of bound states in the compilation LB I/18C, the number of resonances in reactions with charged particles in the compilation LB I/19A2 and the number of neutron resonances in the compilation LB I/16C are given in the same line for comparison.

^{A}Z	19B3	18C	19A	16C
^{178}Ir	2*			
^{179}Ir	89*			
^{180}Ir	84*			
^{181}Ir	181*			
^{182}Ir	41*			
^{183}Ir	3/52	31		
^{184}Ir	5/71			
^{185}Ir	5/90	4		
^{186}Ir	8/95	6		
^{187}Ir	4/68	21		
^{188}Ir	3/19			
^{189}Ir	17/85	28		
^{190}Ir	108/157			
^{191}Ir	33/71	11		
^{192}Ir	82/231			62
^{193}Ir	53/77	17		11
^{194}Ir	51/166			54
^{195}Ir	38/44	16		
^{196}Ir	5*			
^{197}Ir	23*			
^{199}Ir	2*			
^{168}Pt	3*			
^{170}Pt	6*			
^{171}Pt	6*			
^{172}Pt	10*			
^{173}Pt	8*			
^{174}Pt	11*			
^{175}Pt	17*			
^{176}Pt	28*			
^{177}Pt	51*			
^{178}Pt	26*			
^{179}Pt	59*			
^{180}Pt	4/92			
^{181}Pt	128/138			
^{182}Pt	85/93			
^{183}Pt	4/103	4		
^{184}Pt	87/87			
^{185}Pt	181/191	17		
^{186}Pt	5/95	17		
^{187}Pt	5/73			
^{188}Pt	4/72			
^{189}Pt	18/47			
^{190}Pt	20/55	21		

^{A}Z	19B3	18C	19A	16C
^{191}Pt	100/100			2
^{192}Pt	73/133	15		
^{193}Pt	82/89	12		12
^{194}Pt	70/150	27		
^{195}Pt	97/114	19		8
^{196}Pt	111/141	53		44
^{197}Pt	76/104			6
^{198}Pt	56/64	10		
^{199}Pt	21/61			5
^{200}Pt	35/38			
^{170}Au	1*			
^{171}Au	1*			
^{173}Au	5*			
^{175}Au	12*			
^{176}Au	28*			
^{177}Au	34*			
^{179}Au	3*			
^{181}Au	69*			
^{182}Au	13*			
^{183}Au	70*			
^{184}Au	59*			
^{185}Au	92*			
^{186}Au	4/84	12		
^{187}Au	5/91			
^{188}Au	5/49			
^{189}Au	4/275	31		
^{190}Au	5/46			
^{191}Au	3/97			
^{192}Au	2/33			
^{193}Au	51/89	8		
^{194}Au	3/24			
^{195}Au	29/45	21		
^{196}Au	132/215			
^{197}Au	45/76	10		
^{198}Au	155/158	52		270
^{199}Au	52/69	10		
^{200}Au	11*			
^{201}Au	20*			
^{203}Au	12*			
^{176}Hg	7*			
^{177}Hg	3*			
^{178}Hg	6*			
^{179}Hg	6*			

^{A}Z	19B3	18C	19A	16C
^{180}Hg	36*			
^{181}Hg	35*			
^{182}Hg	43*			
^{183}Hg	55*			
^{184}Hg	4/18	12		
^{185}Hg	50/50			
^{186}Hg	5/89	18		
^{187}Hg	4/34			
^{188}Hg	4/81			
^{189}Hg	3/74			
^{190}Hg	3/196			
^{191}Hg	3/218			
^{192}Hg	3/156			
^{193}Hg	6/139			
^{194}Hg	7/154	10		
^{195}Hg	5/207			
^{196}Hg	19/68	9		
^{197}Hg	23/60			2
^{198}Hg	24/97	27		
^{199}Hg	52/84	6		73
^{200}Hg	23/98	49		88
^{201}Hg	78/79	9		44
^{202}Hg	37/83	18		86
^{203}Hg	76/78			38
^{204}Hg	7/63	15		
^{205}Hg	52/53			23
^{206}Hg	9/10			
^{177}Tl	1*			
^{179}Tl	1*			
^{181}Tl	1*			
^{183}Tl	12*			
^{184}Tl	2*			
^{185}Tl	24*			
^{186}Tl	8*			
^{187}Tl	52*			
^{188}Tl	8*			
^{189}Tl	78*			
^{190}Tl	24*			
^{191}Tl	84*			
^{192}Tl	73*			
^{193}Tl	95*			
^{194}Tl	125*			
^{195}Tl	6/88	21		

Table 1.1. (continued) Numbers of bound states in compound nuclei ^{A}Z with $63 \leq Z \leq 99$ contained in the third part of this compilation (I/19B3). The ratio shows the number of states in Volume I/19B3 and its Supplement. Asterisks mark isotopes included in volume I/19C.
The number of bound states in the compilation LB I/18C, the number of resonances in reactions with charged particles in the compilation LB I/19A2 and the number of neutron resonances in the compilation LB I/16C are given in the same line for comparison.

^{A}Z	19B3	18C	19A	16C
^{196}Tl	5/35	5		
^{197}Tl	21/58	20		
^{198}Tl	3/31			
^{199}Tl	3/34	5		
^{200}Tl	6/16	10		
^{201}Tl	15/63	7		
^{202}Tl	12/15	3		
^{203}Tl	71/103	11		
^{204}Tl	86/86			138
^{205}Tl	73/88	32	10	2
^{206}Tl	81/94	7		139
^{207}Tl	23/42	7		
^{208}Tl	2/10			
^{209}Tl	7/7			
^{210}Tl	5*			
^{182}Pb	6*			
^{183}Pb	1*			
^{184}Pb	5*			
^{185}Pb	3*			
^{186}Pb	17*			
^{187}Pb	8*			
^{188}Pb	22*			
^{189}Pb	7*			
^{190}Pb	32*			
^{191}Pb	7*			
^{192}Pb	109*			
^{193}Pb	137*			
^{194}Pb	217*			
^{195}Pb	136*			
^{196}Pb	5/149	14		
^{197}Pb	2/184			
^{198}Pb	2/199			
^{199}Pb	4/152			
^{200}Pb	5/69	7		
^{201}Pb	4/69	20		
^{202}Pb	40/61			
^{203}Pb	22/63	23		
^{204}Pb	81/156	54	1	
^{205}Pb	152/183	25		242
^{206}Pb	151/335	84	1	
^{207}Pb	160/205	23		410
^{208}Pb	247/605	100		382
^{209}Pb	174/226	15		94

^{A}Z	19B3	18C	19A	16C
^{210}Pb	60/65	6		
^{211}Pb	19/24			
^{212}Pb	18/18			
^{214}Pb	1/1			
^{184}Bi	1*			
^{186}Bi	1*			
^{187}Bi	6*			
^{188}Bi	1*			
^{189}Bi	9*			
^{190}Bi	2*			
^{191}Bi	3*			
^{192}Bi	1*			
^{193}Bi	43*			
^{194}Bi	4*			
^{195}Bi	16*			
^{196}Bi	17*			
^{197}Bi	41*			
^{198}Bi	49*			
^{199}Bi	33*			
^{200}Bi	37*			
^{201}Bi	8/58	12		
^{202}Bi	6/37			
^{203}Bi	7/46	25		
^{204}Bi	5/41	14		
^{205}Bi	39/74	31	1	
^{206}Bi	36/45			
^{207}Bi	28/62	15	4	
^{208}Bi	116/199		44	
^{209}Bi	119/204	20	8	
^{210}Bi	104/107	11		178
^{211}Bi	41/62			
^{212}Bi	8/12			
^{213}Bi	4/4	1		
^{214}Bi	9/11	3		
^{215}Bi	1/3			
^{216}Bi	1*			
^{190}Po	6*			
^{191}Po	1*			
^{192}Po	5*			
^{193}Po	7*			
^{194}Po	18*			
^{195}Po	5*			
^{196}Po	3/22	13		

^{A}Z	19B3	18C	19A	16C
^{197}Po	5/5			
^{198}Po	3/55			
^{199}Po	3/25			
^{200}Po	3/44			
^{201}Po	3/23			
^{202}Po	3/42			
^{203}Po	8/54			
^{204}Po	3/70	35		
^{205}Po	7/54	30		
^{206}Po	2/98			
^{207}Po	7/63	15		
^{208}Po	6/52	10		
^{209}Po	15/51	14		
^{210}Po	41/76	28		
^{211}Po	38/97	5		
^{212}Po	5/30	10		
^{213}Po	2/9	2		
^{214}Po	3/81	16		
^{215}Po	2/14			
^{216}Po	4/10			
^{217}Po	3*			
^{218}Po	11*			
^{193}At	2*			
^{195}At	1*			
^{197}At	3*			
^{198}At	1*			
^{199}At	5*			
^{200}At	3*			
^{201}At	8*			
^{202}At	2*			
^{203}At	3/20	8		
^{204}At	1/1			
^{205}At	2/32	19		
^{206}At	11/31	8		
^{207}At	5/34	8		
^{208}At	2/40	4		
^{209}At	1/62	2		
^{210}At	124*			
^{211}At	115*			
^{212}At	66*			
^{213}At	6*			
^{214}At	23*			
^{215}At	6*			

Table 1.1. (continued) Numbers of bound states in compound nuclei ^{A}Z with $63 \leq Z \leq 99$ contained in the third part of this compilation (I/19B3). The ratio shows the number of states in Volume I/19B3 and its Supplement. Asterisks mark isotopes included in volume I/19C.
The number of bound states in the compilation LB I/18C, the number of resonances in reactions with charged particles in the compilation LB I/19A2 and the number of neutron resonances in the compilation LB I/16C are given in the same line for comparison.

^{A}Z	19B3	18C	19A	16C
^{216}At	18*			
^{217}At	15*			
^{219}At	4*			
^{197}Rn	1*			
^{198}Rn	5*			
^{199}Rn	1*			
^{201}Rn	2*			
^{202}Rn	14*			
^{203}Rn	18*			
^{204}Rn	51*			
^{205}Rn	25*			
^{216}At	18*			
^{217}At	15*			
^{219}At	4*			
^{197}Rn	1*			
^{198}Rn	5*			
^{199}Rn	1*			
^{201}Rn	2*			
^{202}Rn	14*			
^{203}Rn	18*			
^{204}Rn	51*			
^{205}Rn	25*			
^{206}Rn	18*			
^{207}Rn	20*			
^{208}Rn	3/41	22		
^{209}Rn	8/46	4		
^{210}Rn	4/31			
^{211}Rn	5/57	2		
^{212}Rn	3/33	2		
^{213}Rn	2/53			
^{214}Rn	2/48	12		
^{215}Rn	4/4			
^{216}Rn	2/20			
^{217}Rn	2/11			
^{218}Rn	3/23			
^{219}Rn	30/30			
^{220}Rn	16/20	3		
^{222}Rn	12/12	4		
^{200}Fr	1*			
^{201}Fr	1*			
^{202}Fr	1*			
^{204}Fr	2*			
^{206}Fr	2*			
^{209}Fr	11*			
^{210}Fr	16*			
^{211}Fr	26*			
^{212}Fr	43*			
^{213}Fr	3/41	17		
^{214}Fr	3/58			
^{215}Fr	3/21			
^{216}Fr	3/27			
^{217}Fr	3/18	8		
^{218}Fr	30/30			
^{219}Fr	3/30			
^{220}Fr	5/34	5		
^{221}Fr	40/46			
^{222}Fr	1/1			
^{223}Fr	11/58			
^{225}Fr	45/51			
^{227}Fr	38*			
^{206}Ra	4*			
^{207}Ra	3*			
^{208}Ra	6*			
^{209}Ra	9*			
^{210}Ra	11*			
^{211}Ra	4*			
^{212}Ra	3/13	3		
^{213}Ra	4/5			
^{214}Ra	3/50	32		
^{215}Ra	2/32			
^{216}Ra	3/21	12		
^{217}Ra	26/35			
^{218}Ra	50/50	17		
^{219}Ra	52/52			
^{220}Ra	31/31			
^{221}Ra	3/10			
^{222}Ra	3/24	7		
^{223}Ra	3/65	18		
^{224}Ra	24/52	11		
^{225}Ra	70/70	12		
^{226}Ra	31/61	25		
^{227}Ra	78/84	11		41
^{228}Ra	15/39	11		
^{229}Ra	32*	11		
^{230}Ra	23*			
^{231}Ra	30*			
^{206}Ac	3*			
^{208}Ac	1*			
^{212}Ac	2*			
^{214}Ac	2*			
^{215}Ac	5*			
^{216}Ac	1*			
^{217}Ac	10*			
^{218}Ac	36*			
^{219}Ac	3/44	22		
^{220}Ac	3/61			
^{221}Ac	1/1			
^{222}Ac	3/3			
^{223}Ac	3/10	11		
^{224}Ac	3/39			
^{225}Ac	3/16	12		
^{226}Ac	3/17			
^{227}Ac	56/63	30		
^{228}Ac	3/4	4		
^{229}Ac	27/32	13		
^{230}Ac	18/18			
^{231}Ac	21/25	12		
^{232}Ac	3/3	12		
^{216}Th	8*			
^{217}Th	1/1			
^{218}Th	2/5			
^{220}Th	3/17	11		
^{221}Th	3/13			
^{222}Th	3/26	10		
^{223}Th	3/27	16		
^{224}Th	3/18	10		
^{225}Th	5/5			
^{226}Th	3/24	11		
^{227}Th	3/57	7		
^{228}Th	28/91	50		
^{229}Th	9/64	23		3
^{230}Th	50/87	28		31
^{231}Th	83/97	54		30
^{232}Th	64/96	32		
^{233}Th	84/226	46		714
^{234}Th	9/13	11		
^{222}Pa	2*			
^{223}Pa	1*			
^{229}Pa	78/78			

Table 1.1. (continued) Numbers of bound states in compound nuclei ^{A}Z with $63 \leq Z \leq 99$ contained in the third part of this compilation (I/19B3). The ratio shows the number of states in Volume I/19B3 and its Supplement. Asterisks mark isotopes included in volume I/19C.
The number of bound states in the compilation LB I/18C, the number of resonances in reactions with charged particles in the compilation LB I/19A2 and the number of neutron resonances in the compilation LB I/16C are given in the same line for comparison.

^{A}Z	19B3	18C	19A	16C	^{A}Z	19B3	18C	19A	16C	^{A}Z	19B3	18C	19A	16C
^{230}Pa	1/1				^{240}Pu	29/132	38		1040	^{250}Bk	2/40	37		40
^{231}Pa	60/87	34			^{241}Pu	96/106	41		430	^{251}Bk	2/11	11		
^{232}Pa	1/1			138	^{242}Pu	24/54	21		243	^{243}Cf	3*			
^{233}Pa	35/74	28		33	^{243}Pu	61/69	33		255	^{244}Cf	2*			
^{234}Pa	3/7			22	^{244}Pu	12/46				^{245}Cf	2*			
^{235}Pa	17/24	7			^{245}Pu	14/21	14		35	^{246}Cf	1/2			
^{236}Pa	3/6				^{246}Pu	2/12				^{247}Cf	12/12	12		
^{237}Pa	13/20	9			^{237}Am	1*				^{248}Cf	2/18	16		
^{226}U	12*				^{238}Am	1*				^{249}Cf	2/55	38		
^{228}U	1*				^{239}Am	2/11	11			^{250}Cf	2/47	36		63
^{229}U	1*				^{240}Am	57/60	21			^{251}Cf	2/60	32		4
^{230}U	3/15	10			^{241}Am	24/110	17			^{252}Cf	2/9	9		4
^{231}U	7/7				^{242}Am	69/141	51		195	^{253}Cf	2/5	5		37
^{232}U	14/40	27			^{243}Am	23/29	15		106	^{243}Es	2*			
^{233}U	73/87	34		44	^{244}Am	30/114	55		240	^{244}Es	2*			
^{234}U	98/150	54		770	^{245}Am	2/21	14			^{245}Es	1*			
^{235}U	138/213	37		144	^{246}Am	8*				^{246}Es	2*			
^{236}U	93/120	27		3184	^{237}Cm	1*				^{247}Es	1*			
^{237}U	52/270	38		297	^{238}Cm	1*				^{251}Es	2/24	19		
^{238}U	61/152	43		36	^{239}Cm	1*				^{252}Es	2/7			
^{239}U	50/108	45		1692	^{240}Cm	3*				^{253}Es	2/7	7		
^{240}U	21/21				^{241}Cm	7*				^{254}Es	2/9	9		
^{232}Np	0/1				^{242}Cm	5/5				^{247}Fm	2*			
^{233}Np	2/14				^{243}Cm	27/30	10		13	^{248}Fm	1*			
^{234}Np	1/1				^{244}Cm	2/14			105	^{249}Fm	4*			
^{235}Np	43/47	21			^{245}Cm	33/62	29		68	^{250}Fm	10*			
^{236}Np	4/4				^{246}Cm	51/64	38		91	^{251}Fm	9*	8		
^{237}Np	45/105	30		41	^{247}Cm	52/56	15		17	^{252}Fm	1*			
^{238}Np	21/129	48		752	^{248}Cm	20/44	12		44	^{253}Fm	2*			
^{239}Np	41/63	31		17	^{249}Cm	50/50	24		50	^{254}Fm	4*	4		
^{240}Np	2/10				^{250}Cm	1/1				^{255}Fm	7*			
^{242}Np	2/7				^{241}Bk	3*				^{256}Fm	27*	22		
^{243}Np	22*				^{242}Bk	3*				^{247}Md	0*			
^{234}Pu	1*				^{243}Bk	4*				^{251}No	6*			
^{235}Pu	1/1				^{244}Bk	4*				^{252}No	10*			
^{236}Pu	6/10				^{245}Bk	3*				^{253}No	22*			
^{237}Pu	56/58	28		2	^{247}Bk	20/24	22			^{254}No	8*			
^{238}Pu	25/46	26			^{248}Bk	5/21								
^{239}Pu	63/96	42		64	^{249}Bk	33/51	32							

Table 1.2. Numbers of bound states in compound nuclei ^{A}Z with $Z \leq 36$ contained in the first part of this compilation (I/19B1). The ratio shows the number of states in this volume and in the Supplement.
The number of bound states in the compilation LB I/18A, the number of resonances in reactions with charged particles in compilation LB I/19A and the number of neutron resonances in the compilation LB I/16C are given in the same line for comparison. Asterisks mark the number of states in nuclei with $Z \leq 36$ situated far from the stability-line and included in volume I/19C.

^{A}Z	19B1	18A	19A	16C
^{4}H	4*			
^{5}H	1*			
^{4}He	15*			8
^{5}He	11*			11
^{6}He	7*			
^{7}He	2*			
^{8}He	4*			
^{9}He	2*			
^{10}He	2*			
^{4}Li	3*			
^{5}Li	13*		1	
^{6}Li	12/13	4	4	
^{7}Li	7/9	3	4	8
^{8}Li	6/10			13
^{9}Li	5/7			
^{10}Li	11*			
^{11}Li	3*			
^{6}Be	4*		1	
^{7}Be	8*		7	
^{8}Be	25*		23	3
^{9}Be	13/32	8	8	18
^{10}Be	37/40		5	8
^{11}Be	14/15			
^{12}Be	19*			
^{14}Be	1*			
^{8}B	4/4		1	
^{9}B	11/20		4	
^{10}B	14/39	12	51	
^{11}B	4/40	11	33	13
^{12}B	15/49		5	34
^{13}B	14/22			
^{14}B	8/15			
^{15}B	8*			
^{16}B	2*			
^{17}B	1*			
^{9}C	1*		1	
^{10}C	8*		4	
^{11}C	13/36		28	
^{12}C	27/55	9	46	
^{13}C	13/72	7	34	58
^{14}C	24/45	7		37
^{15}C	16/30			4
^{16}C	17/20			
^{17}C	3/3			

^{A}Z	19B1	18A	19A	16C
^{18}C	3*			
^{19}C	1*			
^{11}N	5*		7	
^{12}N	30*			
^{13}N	18/53		41	
^{14}N	61/121	10	154	
^{15}N	21/115	16	133	61
^{16}N	14/65		7	47
^{17}N	21/35			
^{18}N	7*			
^{19}N	5*			
^{13}O	3*			
^{14}O	17*		5	
^{15}O	8/84		95	
^{16}O	38/133	12	215	
^{17}O	36/119	11	70	92
^{18}O	31/123	23	33	15
^{19}O	21/55			21
^{20}O	15/22			
^{21}O	5*			
^{22}O	5*			
^{15}F	1*		2	
^{16}F	27*			
^{17}F	36/76		91	
^{18}F	25/100		432	
^{19}F	51/190	48	254	
^{20}F	49/152			66
^{21}F	14/36			
^{22}F	7/22			
^{23}F	4/6			
^{24}F	2*			
^{25}F	2*			
^{16}Ne	1*			
^{17}Ne	12*		13	
^{18}Ne	21*		13	
^{19}Ne	70*		48	
^{20}Ne	28/232	20	282	
^{21}Ne	33/116	27	74	102
^{22}Ne	65/101	42	65	45
^{23}Ne	12/34			20
^{24}Ne	1/12			
^{25}Ne	2/7			
^{26}Ne	4*			
^{28}Ne	3*			

^{A}Z	19B1	18A	19A	16C
^{30}Ne	1*			
^{18}Na	4*		11	
^{19}Na	6*		11	
^{20}Na	6/24		11	
^{21}Na	14/64		52	
^{22}Na	36/214		60	
^{23}Na	73/172	94	264	1
^{24}Na	78/119			114
^{25}Na	13/42			
^{26}Na	20/24			
^{27}Na	18/18			
^{28}Na	10*			
^{29}Na	6*		11	
^{30}Na	1*			
^{31}Na	2*		11	
^{21}Mg	12/21			
^{22}Mg	18/60		11	
^{23}Mg	66/78		21	
^{24}Mg	77/245	59	385	
^{25}Mg	56/131	51	67	64
^{26}Mg	48/204	79	155	35
^{27}Mg	23/55			12
^{28}Mg	3/24			
^{29}Mg	13*			
^{30}Mg	12*			
^{31}Mg	11*			
^{32}Mg	7*			
^{33}Mg	4*			
^{34}Mg	2*			
^{22}Al	2*			
^{23}Al	7*			
^{24}Al	46*		4	
^{25}Al	8/64		47	
^{26}Al	64/201		146	
^{27}Al	46/243	76	258	7
^{28}Al	33/166			260
^{29}Al	8/49			
^{30}Al	21*			
^{31}Al	15*			
^{32}Al	5*			
^{35}Al	1*			
^{24}Si	2*		1	
^{25}Si	12*		1	
^{26}Si	35*		7	

Table 1.2. (continued) Numbers of bound states in compound nuclei ^{A}Z with $Z \leq 36$ contained in the first part of this compilation (I/19B1). The ratio shows the number of states in this volume and in the Supplement.
The number of bound states in the compilation LB I/18A, the number of resonances in reactions with charged particles in compilation LB I/19A and the number of neutron resonances in the compilation LB I/16C are given in the same line for comparison. Asterisks mark the number of states in nuclei with $Z \leq 36$ situated far from the stability-line and included in volume I/19C.

^{A}Z	19B1	18A	19A	16C
^{27}Si	37/85		24	
^{28}Si	74/294	64	314	
^{29}Si	25/129	52	37	81
^{30}Si	31/135	108	69	31
^{31}Si	42/74			30
^{32}Si	37/58			
^{33}Si	4*			
^{34}Si	6*			
^{35}Si	3*			
^{36}Si	3*			
^{37}Si	1*			
^{38}Si	1*			
^{27}P	6*			
^{28}P	15/33			
^{29}P	15/68		77	
^{30}P	33/149		97	
^{31}P	127/171	46	504	
^{32}P	147/147			33
^{33}P	21/35			
^{34}P	3/12			
^{35}P	19*			
^{36}P	5*			
^{37}P	5*			
^{39}P	3*			
^{30}S	1/5		9	
^{31}S	40/60			
^{32}S	146/256	42	315	
^{33}S	27/151	64	156	105
^{34}S	39/133	100	104	60
^{35}S	36/59			82
^{36}S	7/23	17		
^{37}S	33/39			1
^{38}S	16*			
^{39}S	1*			
^{40}S	10*			
^{41}S	2*			
^{42}S	4*			
^{43}S	2*			
^{44}S	3*			
^{31}Cl	19/24			
^{32}Cl	8/47		4	
^{33}Cl	1/84		65	
^{34}Cl	33/120		194	

^{A}Z	19B1	18A	19A	16C
^{35}Cl	134/248	41	224	
^{36}Cl	92/127			84
^{37}Cl	28/84	77	422	16
^{38}Cl	24/39			37
^{39}Cl	16/26			
^{40}Cl	18*			
^{41}Cl	4*			
^{42}Cl	11*			
^{45}Cl	1*			
^{33}Ar	7*			
^{34}Ar	20*			
^{35}Ar	38*			
^{36}Ar	10/186	41	179	
^{37}Ar	39/105			1
^{38}Ar	79/219	133	578	4
^{39}Ar	39/75			
^{40}Ar	108/198	73	59	
^{41}Ar	57/126			207
^{42}Ar	29/64			
^{43}Ar	3/14			
^{44}Ar	6/12			
^{45}Ar	3/3			
^{46}Ar	6*			
^{35}K	13*			
^{36}K	15*			
^{37}K	90*		78	
^{38}K	23/86			
^{39}K	34/93	70	99	
^{40}K	45/100			70
^{41}K	123/205	87	256	39
^{42}K	56/171			110
^{43}K	27/65			
^{44}K	10/18			
^{45}K	15/26			
^{46}K	11/15			
^{47}K	27/27			
^{48}K	4/4			
^{37}Ca	1*			
^{38}Ca	24*			
^{39}Ca	58/85			
^{40}Ca	109/580	53	382	
^{41}Ca	204/271			253
^{42}Ca	105/544	127	415	9

^{A}Z	19B1	18A	19A	16C
^{43}Ca	111/150	64		95
^{44}Ca	73/91	45		55
^{45}Ca	82/103			65
^{46}Ca	38/90	6		
^{47}Ca	102/135			1
^{48}Ca	119/247	44		
^{49}Ca	26/58			39
^{50}Ca	10/35			
^{51}Ca	12/13			
^{52}Ca	6/6			
^{38}Sc	1*			
^{39}Sc	2*			
^{40}Sc	9/41			
^{41}Sc	25/200		182	
^{42}Sc	85/118		112	
^{43}Sc	105/142	31	315	
^{44}Sc	101/116	21	4	
^{45}Sc	53/210	22	1110	
^{46}Sc	177/255	36		197
^{47}Sc	49/144	14	294	
^{48}Sc	57/101	25		
^{49}Sc	149/213	18	107	
^{50}Sc	42/50			
^{51}Sc	9/19			
^{52}Sc	6*			
^{54}Sc	8*			
^{56}Sc	7*			
^{42}Ti	16/31			
^{43}Ti	12/15			
^{44}Ti	43/114	21	66	
^{45}Ti	39/43	12		
^{46}Ti	120/248	44	106	
^{47}Ti	95/212	36		114
^{48}Ti	118/289	78		118
^{49}Ti	98/108	34		87
^{50}Ti	117/259	15		79
^{51}Ti	22/33	10		34
^{52}Ti	4/24	10		
^{53}Ti	11*			
^{54}Ti	9*			
^{56}Ti	4*			
^{43}V	1*			
^{44}V	1*			

Table 1.2. (continued) Numbers of bound states in compound nuclei ^{A}Z with $Z \leq 36$ contained in the first part of this compilation (I/19B1). The ratio shows the number of states in this volume and in the Supplement.
The number of bound states in the compilation LB I/18A, the number of resonances in reactions with charged particles in compilation LB I/19A and the number of neutron resonances in the compilation LB I/16C are given in the same line for comparison. Asterisks mark the number of states in nuclei with $Z \leq 36$ situated far from the stability-line and included in volume I/19C.

^{A}Z	19B1	18A	19A	16C	^{A}Z	19B1	18A	19A	16C	^{A}Z	19B1	18A	19A	16C
^{45}V	19*				^{53}Fe	51/76	17			^{58}Cu	21/55			
^{46}V	17/76				^{54}Fe	108/235	38			^{59}Cu	107/260		359	
^{47}V	48/144	33	282		^{55}Fe	83/183	36		425	^{60}Cu	6/89			
^{48}V	56/81	21	105		^{56}Fe	114/271	78	92		^{61}Cu	50/126	27	592	
^{49}V	94/254	26	1213		^{57}Fe	136/180	38		316	^{62}Cu	80/133	18		
^{50}V	150/180	13	98		^{58}Fe	54/184	64		127	^{63}Cu	114/250	33	369	
^{51}V	117/213	38	322	18	^{59}Fe	24/77	18		82	^{64}Cu	147/172	9		291
^{52}V	79/131	19		153	^{60}Fe	32/49	24			^{65}Cu	42/193	8	88	
^{53}V	9/55				^{61}Fe	4/6				^{66}Cu	97/123	16		197
^{54}V	10/27				^{62}Fe	5/14				^{67}Cu	16/18			
^{57}V	6*				^{67}Fe	2*				^{68}Cu	19/19			
^{60}V	3*				^{52}Co	1*				^{69}Cu	10/22			
^{46}Cr	1*				^{53}Co	2/2				^{70}Cu	5/5			
^{47}Cr	20/34				^{54}Co	26/95				^{71}Cu	6/6			
^{48}Cr	32/37				^{55}Co	119/467	17	321		^{73}Cu	8*			
^{49}Cr	99/158	18			^{56}Co	102/111	32			^{59}Zn	8*			
^{50}Cr	47/146	37			^{57}Co	105/219	31	587		^{60}Zn	18/62			
^{51}Cr	152/269	70		382	^{58}Co	152/181	41	135		^{61}Zn	4/55			
^{52}Cr	227/299	42	32		^{59}Co	20/165	11	194		^{62}Zn	32/109	19	2	
^{53}Cr	51/166	16		341	^{60}Co	138/286	22		221	^{63}Zn	49/72	31		
^{54}Cr	35/138	29		124	^{61}Co	94/120			5	^{64}Zn	79/230	26	2	
^{55}Cr	64/106	18		111	^{62}Co	12/41				^{65}Zn	63/171	29		402
^{56}Cr	35/36				^{63}Co	49/56				^{66}Zn	65/171	26	22	
^{57}Cr	4/4				^{64}Co	16/16				^{67}Zn	80/129	32		400
^{58}Cr	1/1				^{54}Ni	2*				^{68}Zn	73/128	21		504
^{59}Cr	10*				^{55}Ni	19/24				^{69}Zn	38/69	16		292
^{60}Cr	1*				^{56}Ni	59/87				^{70}Zn	35/41	22		
^{61}Cr	4*				^{57}Ni	157/163	18			^{71}Zn	38/38			167
^{62}Cr	1*				^{58}Ni	215/263	36	4		^{72}Zn	10/14			
^{48}Mn	3/5				^{59}Ni	192/325	33		576	^{73}Zn	9*			
^{49}Mn	6/12				^{60}Ni	72/201	35	22	15	^{74}Zn	21*			
^{50}Mn	25/25				^{61}Ni	230/263	28		465	^{76}Zn	8*			
^{51}Mn	40/140	13	406		^{62}Ni	68/145	44		67	^{77}Zn	1*			
^{52}Mn	83/101	14			^{63}Ni	86/100	19		81	^{78}Zn	4*			
^{53}Mn	153/416	36	973		^{64}Ni	45/110	20			^{61}Ga	4*			
^{54}Mn	79/146	38	281		^{65}Ni	59/113	19		58	^{62}Ga	17*			
^{55}Mn	125/213	18	374		^{66}Ni	22/63				^{63}Ga	15*			
^{56}Mn	209/263	21		175	^{67}Ni	3/9				^{64}Ga	38/56			
^{57}Mn	47/75				^{68}Ni	8/21				^{65}Ga	20/130		220	
^{58}Mn	12/34				^{69}Ni	6/6				^{66}Ga	7/61	12		
^{50}Fe	3/7				^{70}Ni	2/7				^{67}Ga	51/127	32	156	
^{51}Fe	11/11				^{74}Ni	2*				^{68}Ga	63/86	15		
^{52}Fe	91/100	23			^{57}Cu	3/8				^{69}Ga	87/107	23	23	

Table 1.2. (continued) Numbers of bound states in compound nuclei ^{A}Z with $Z \leq 36$ contained in the first part of this compilation (I/19B1). The ratio shows the number of states in this volume and in the Supplement.
The number of bound states in the compilation LB I/18A, the number of resonances in reactions with charged particles in compilation LB I/19A and the number of neutron resonances in the compilation LB I/16C are given in the same line for comparison. Asterisks mark the number of states in nuclei with $Z \leq 36$ situated far from the stability-line and included in volume I/19C.

^{A}Z	19B1	18A	19A	16C
^{70}Ga	91/97	12		109
^{71}Ga	54/79	22	15	
^{72}Ga	53/110			26
^{73}Ga	30/30			
^{74}Ga	11*			
^{75}Ga	19/45			
^{76}Ga	22*			
^{77}Ga	34*			
^{78}Ga	19*			
^{79}Ga	19*			
^{80}Ga	13*			
^{61}Ge	5*			
^{64}Ge	22*			
^{65}Ge	9*			
^{66}Ge	48*			
^{67}Ge	34*			
^{68}Ge	36/171	33		
^{69}Ge	36/173	31		
^{70}Ge	136/176	65		
^{71}Ge	104/180	40		22
^{72}Ge	145/180	58		
^{73}Ge	81/119	22		17
^{74}Ge	144/251	66		85
^{75}Ge	73/103	34		11
^{76}Ge	65/137	24		
^{77}Ge	43/51	10		10
^{78}Ge	11/48			
^{79}Ge	39*			
^{80}Ge	31*			
^{81}Ge	36*			
^{82}Ge	6*			
^{65}As	1*			
^{66}As	7*			
^{67}As	15*			
^{68}As	42*			
^{69}As	108*			
^{70}As	40*			
^{71}As	41/63		52	
^{72}As	8/66			
^{73}As	48/144	9	36	
^{74}As	38/77			
^{75}As	56/118	18	23	
^{76}As	122/156			247
^{77}As	55/98	12	10	
^{78}As	21/32			
^{79}As	36/37			
^{80}As	11/22			
^{81}As	22/43			
^{82}As	12*			
^{83}As	27*			
^{68}Se	20*			
^{69}Se	60*			
^{70}Se	63*			
^{71}Se	5/26			
^{72}Se	4/52	21		
^{73}Se	6/81	28		
^{74}Se	24/101	27		
^{75}Se	60/144	22		9
^{76}Se	65/166	18	17	
^{77}Se	51/159	28		22
^{78}Se	85/185	76		58
^{79}Se	68/113	35		14
^{80}Se	43/84	11		
^{81}Se	48/74	16		15
^{82}Se	31/38	14		
^{83}Se	27/51	15		16
^{84}Se	42/64			
^{85}Se	13/28			
^{86}Se	3*			
^{88}Se	1*			
^{69}Br	1*			
^{70}Br	32*			
^{71}Br	77*			
^{72}Br	77*			
^{73}Br	121*	16		
^{74}Br	93*			
^{75}Br	4/102		11	
^{76}Br	2/68	8		
^{77}Br	41/110	8	8	
^{78}Br	51/69			
^{79}Br	36/140	13	8	
^{80}Br	60/119			340
^{81}Br	27/112	9	7	
^{82}Br	23/67			330
^{83}Br	38/73		15	
^{84}Br	2/2			
^{85}Br	9/25			
^{86}Br	8/9			
^{87}Br	8*			
^{88}Br	8*			
^{72}Kr	30*			
^{73}Kr	53*			
^{74}Kr	80*			
^{75}Kr	88*			
^{76}Kr	12/58	12		
^{77}Kr	6/66			
^{78}Kr	6/97	14		
^{79}Kr	13/98	24		5
^{80}Kr	12/49	17		
^{81}Kr	27/101	13		9
^{82}Kr	13/71	8		
^{83}Kr	25/77	12		176
^{84}Kr	5/69	26		6
^{85}Kr	26/76	13		207
^{86}Kr	40/63	9		
^{87}Kr	17/169			225
^{88}Kr	23/73			
^{89}Kr	44*			
^{90}Kr	47*			
^{91}Kr	20*			
^{92}Kr	36*			
^{93}Kr	8*			
^{94}Kr	3*			

Table 1.3. Numbers of bound states in compound nuclei ^{A}Z with $37 \leq Z \leq 62$ contained in the second part of this compilation (I/19B2). The ratio shows the number of states in Volume I/19B2 and its Supplement. Asterisks mark isotopes included in I/19C.
The number of bound states in Volume LB I/18B, the number of resonances in reactions with charged particles in the compilation LB I/19A2 and the number of neutron resonances in the compilation LB I/16C are given in the same line for comparison.

^{A}Z	19B2	18B	16C
^{73}Rb	1*		
^{74}Rb	28*		
^{75}Rb	31*		
^{76}Rb	77*		
^{77}Rb	99*		
^{78}Rb	70*		
^{79}Rb	18/97		
^{80}Rb	2/75		
^{81}Rb	34/102		
^{82}Rb	2/57		
^{83}Rb	69/134	5	
^{84}Rb	16/66	2	
^{85}Rb	70/99	12	
^{86}Rb	50/69	11	348
^{87}Rb	66/113	18	
^{88}Rb	17/61		99
^{89}Rb	15/58		
^{90}Rb	2/31		
^{91}Rb	2/60		
^{92}Rb	26*		
^{93}Rb	55*		
^{94}Rb	8*		
^{95}Rb	0*		
^{96}Rb	12*		
^{76}Sr	1*		
^{77}Sr	32*		
^{78}Sr	27*		
^{79}Sr	29*		
^{80}Sr	3/129		
^{81}Sr	2/149		
^{82}Sr	8/95	44	
^{83}Sr	14/114		
^{84}Sr	5/59	28	
^{85}Sr	39/106	20	11
^{86}Sr	56/75	17	
^{87}Sr	139/202	22	75
^{88}Sr	152/244	35	115
^{89}Sr	110/134	25	443
^{90}Sr	80/101	10	
^{91}Sr	2/50		
^{92}Sr	26/35		
^{93}Sr	4/97		
^{94}Sr	3/72		
^{95}Sr	57*		

^{A}Z	19B2	18B	19A	16C
^{96}Sr	58*			
^{97}Sr	53*			
^{98}Sr	43*			
^{99}Sr	16*			
^{100}Sr	9*			
^{101}Sr	6*			
^{102}Sr	1*			
^{78}Y	1*			
^{79}Y	11*			
^{80}Y	84*			
^{81}Y	114*			
^{82}Y	71*			
^{83}Y	138*			
^{84}Y	76*			
^{85}Y	38/92		15	
^{86}Y	22/29			
^{87}Y	78/147	15	11	
^{88}Y	36/85		8	
^{89}Y	70/190	20	30	
^{90}Y	135/188	38		697
^{91}Y	45/55	8		
^{92}Y	15/15			
^{93}Y	17/48	4		
^{94}Y	9/25			
^{95}Y	6/36			
^{96}Y	5/7			
^{97}Y	24*			
^{98}Y	33*			
^{99}Y	33*			
^{100}Y	30*			
^{101}Y	34*			
^{102}Y	10*			
^{80}Zr	5*			
^{81}Zr	14*			
^{82}Zr	55*			
^{83}Zr	123*			
^{84}Zr	5/85			
^{85}Zr	2/29			
^{86}Zr	5/113	25		
^{87}Zr	3/62			
^{88}Zr	17/81	7		
^{89}Zr	95/132	28		
^{90}Zr	99/273	37	23	
^{91}Zr	121/157	11		141

^{A}Z	19B2	18B	19A	16C
^{92}Zr	99/135	43		145
^{93}Zr	72/76	9		101
^{94}Zr	23/67	23		139
^{95}Zr	45/77	2		73
^{96}Zr	54/134	50		
^{97}Zr	12/32	3		30
^{98}Zr	30/58			
^{99}Zr	73*			
^{100}Zr	48*			
^{101}Zr	48*			
^{102}Zr	30*			
^{103}Zr	7*			
^{104}Zr	4*			
^{83}Nb	8*			
^{85}Nb	7*			
^{84}Nb	21*			
^{86}Nb	79*			
^{87}Nb	5/99			
^{88}Nb	7/46			
^{89}Nb	2/46			
^{90}Nb	30/93	11		
^{91}Nb	75/137	10	30	
^{92}Nb	107/165		5	
^{93}Nb	41/100	11	10	
^{94}Nb	45/385			238
^{95}Nb	83/118	18	18	3
^{96}Nb	36/36			
^{97}Nb	50/62		4	
^{98}Nb	9/16			
^{99}Nb	23/23			
^{100}Nb	4/35			
^{101}Nb	48*			
^{102}Nb	10*			
^{103}Nb	47*			
^{104}Nb	9*			
^{105}Nb	5*			
^{106}Nb	2*			
^{84}Mo	2*			
^{85}Mo	18*			
^{86}Mo	30*			
^{87}Mo	27*			
^{88}Mo	48*			
^{89}Mo	5/34			
^{90}Mo	18/85			

Table 1.3. (continued) Numbers of bound states in compound nuclei ^{A}Z with $37 \leq Z \leq 62$ contained in the second part of this compilation (I/19B2). The ratio shows the number of states in Volume I/19B2 and its Supplement. Asterisks mark isotopes included in I/19C.
The number of bound states in Volume LB I/18B, the number of resonances in reactions with charged particles in the compilation LB I/19A2 and the number of neutron resonances in the compilation LB I/16C are given in the same line for comparison.

^{A}Z	19B2	18B	19A	16C	^{A}Z	19B2	18B	19A	16C	^{A}Z	19B2	18B	16C
^{91}Mo	79/132				^{109}Tc	20*				^{106}Rh	9/9		
^{92}Mo	38/236	33			^{110}Tc	9*				^{107}Rh	28/57		
^{93}Mo	57/132	14		77	^{111}Tc	14*				^{108}Rh	3/12		
^{94}Mo	51/164	25	23		^{88}Ru	4*				^{109}Rh	22/78		
^{95}Mo	91/113	15		57	^{89}Ru	13*				^{110}Rh	7*		
^{96}Mo	75/96	40		107	^{90}Ru	22*				^{111}Rh	54*		
^{97}Mo	120/163	29		75	^{91}Ru	32*				^{112}Rh	5*		
^{98}Mo	38/136	12		107	^{92}Ru	39*				^{113}Rh	58*		
^{99}Mo	58/127	30		159	^{93}Ru	41*				^{114}Rh	5*		
^{100}Mo	58/119	18			^{94}Ru	4/81				^{93}Pd	14*		
^{101}Mo	40/57			125	^{95}Ru	11/73				^{94}Pd	16*		
^{102}Mo	32/33				^{96}Ru	7/75	20			^{95}Pd	36*		
^{103}Mo	36*				^{97}Ru	23/75	24			^{96}Pd	14*		
^{104}Mo	49*				^{98}Ru	32/70	9			^{97}Pd	171*		
^{105}Mo	30*				^{99}Ru	14/72	23			^{98}Pd	199*		
^{106}Mo	64*				^{100}Ru	42/139	18		40	^{99}Pd	3/49		
^{107}Mo	29*				^{101}Ru	107/149	38		89	^{100}Pd	4/50	6	
^{108}Mo	16*				^{102}Ru	1/133	20		173	^{101}Pd	16/66		
^{109}Mo	6*				^{103}Ru	79/134	14		140	^{102}Pd	4/89	39	
^{110}Mo	5*				^{104}Ru	4/52	10		8	^{103}Pd	39/115	21	4
^{86}Tc	3*				^{105}Ru	35/60			105	^{104}Pd	80/124	53	
^{87}Tc	2*				^{106}Ru	13/49	4			^{105}Pd	36/105	11	327
^{88}Tc	11*				^{107}Ru	43*				^{106}Pd	62/132	71	319
^{89}Tc	52*				^{108}Ru	34*				^{107}Pd	83/104	38	320
^{90}Tc	49*				^{109}Ru	33*				^{108}Pd	35/61	22	133
^{91}Tc	68*				^{110}Ru	24*				^{109}Pd	112/134	44	243
^{92}Tc	50*				^{111}Ru	50*				^{110}Pd	20/193	39	
^{93}Tc	58/130		240		^{112}Ru	23*				^{111}Pd	33/46		232
^{94}Tc	10/112				^{113}Ru	11*				^{112}Pd	6/54	2	
^{95}Tc	88/110	33	9		^{92}Rh	19*				^{113}Pd	51*		
^{96}Tc	5/111	58			^{93}Rh	28*				^{114}Pd	39*		
^{97}Tc	45/161	24			^{94}Rh	39*				^{115}Pd	30*		
^{98}Tc	69/93				^{95}Rh	21*				^{116}Pd	48*		
^{99}Tc	51/123	25	6		^{96}Rh	48*				^{117}Pd	13*		
^{100}Tc	28/69			691	^{97}Rh	68*		2		^{118}Pd	16*		
^{101}Tc	17/98				^{98}Rh	4/43				^{120}Pd	2*		
^{102}Tc	7/24				^{99}Rh	5/77	15	4		^{94}Ag	2*		
^{103}Tc	22/32				^{100}Rh	3/42				^{97}Ag	12*		
^{104}Tc	19*				^{101}Rh	34/79	10	5		^{98}Ag	19*		
^{105}Tc	40*				^{102}Rh	7/61		1		^{99}Ag	14*		
^{106}Tc	16*				^{103}Rh	167/189	19	3		^{100}Ag	56*		
^{107}Tc	26*				^{104}Rh	187/187			293	^{101}Ag	77*		
^{108}Tc	27*				^{105}Rh	73/127	21	4		^{102}Ag	52*		

Table 1.3. (continued) Numbers of bound states in compound nuclei ^{A}Z with $37 \leq Z \leq 62$ contained in the second part of this compilation (I/19B2). The ratio shows the number of states in Volume I/19B2 and its Supplement. Asterisks mark isotopes included in I/19C.
The number of bound states in Volume LB I/18B, the number of resonances in reactions with charged particles in the compilation LB I/19A2 and the number of neutron resonances in the compilation LB I/16C are given in the same line for comparison.

^{A}Z	19B2	18B	19A	16C
^{103}Ag	96*		2	
^{104}Ag	65*			
^{105}Ag	80/147	31	19	
^{106}Ag	84/117			
^{107}Ag	80/141	21	11	
^{108}Ag	65/168	35		434
^{109}Ag	60/85	14	4	
^{110}Ag	76/76	4		438
^{111}Ag	94/123	36		11
^{112}Ag	1*			
^{113}Ag	15*			
^{114}Ag	4*			
^{115}Ag	37*			
^{116}Ag	7*			
^{117}Ag	25*			
^{118}Ag	14*			
^{119}Ag	4*			
^{120}Ag	5*			
^{98}Cd	5*			
^{100}Cd	28*			
^{101}Cd	40*			
^{102}Cd	39*			
^{103}Cd	69*			
^{104}Cd	90*			
^{105}Cd	11/65			
^{106}Cd	8/98	28		
^{107}Cd	27/146			58
^{108}Cd	194/298	68	11	
^{109}Cd	19/149	44		65
^{110}Cd	110/290	62	8	
^{111}Cd	104/167	40		103
^{112}Cd	208/300	156		157
^{113}Cd	216/231	45		121
^{114}Cd	138/156	40		443
^{115}Cd	35/70	9		86
^{116}Cd	57/97	26		
^{117}Cd	6/55			48
^{118}Cd	10/52			
^{119}Cd	2/32			
^{120}Cd	4/29			
^{121}Cd	61*			
^{122}Cd	6*			
^{123}Cd	24*			
^{124}Cd	20*			

^{A}Z	19B2	18B	19A	16C
^{125}Cd	1*			
^{126}Cd	9*			
^{128}Cd	2*			
^{130}Cd	1*			
^{100}In	1*			
^{101}In	1*			
^{102}In	36*			
^{103}In	32*			
^{104}In	46*			
^{105}In	99*			
^{106}In	55*			
^{107}In	9/62		3	
^{108}In	3/104			
^{109}In	6/95		3	
^{110}In	6/84			
^{111}In	34/210	37	33	
^{112}In	35/65		2	
^{113}In	25/167	15	30	
^{114}In	8/62	2		76
^{115}In	64/100	14	25	
^{116}In	40/86			258
^{117}In	34/77		4	
^{118}In	5/18			
^{119}In	39/74			
^{120}In	2/2			
^{121}In	3/53			
^{122}In	14/16			
^{123}In	36/36			
^{124}In	4/7			
^{125}In	47*			
^{126}In	7*			
^{127}In	15*			
^{128}In	5*			
^{129}In	6*			
^{130}In	4*			
^{131}In	5*			
^{132}In	8*			
^{102}Sn	4*			
^{103}Sn	4*			
^{104}Sn	19*			
^{105}Sn	30*			
^{106}Sn	45*			
^{107}Sn	25*			
^{108}Sn	111*			

^{A}Z	19B2	18B	16C
^{109}Sn	96*		
^{110}Sn	44/84		
^{111}Sn	73/142		
^{112}Sn	30/122	41	
^{113}Sn	66/148	35	15
^{114}Sn	42/271	51	4
^{115}Sn	80/190	18	15
^{116}Sn	185/288	64	5
^{117}Sn	138/151	9	218
^{118}Sn	124/150	44	103
^{119}Sn	127/154	10	86
^{120}Sn	111/137	17	30
^{121}Sn	130/140	12	282
^{122}Sn	80/92	23	
^{123}Sn	81/111	11	361
^{124}Sn	173/218	47	
^{125}Sn	63/73	5	192
^{126}Sn	50/85	41	
^{127}Sn	26/49		
^{128}Sn	2/41		
^{129}Sn	31*		
^{130}Sn	20*		
^{131}Sn	32*		
^{132}Sn	22*		
^{133}Sn	5*		
^{134}Sn	4*		
^{106}Sb	4*		
^{107}Sb	23*		
^{108}Sb	59*		
^{109}Sb	112*		
^{110}Sb	69*		
^{111}Sb	101*		
^{112}Sb	43*		
^{113}Sb	6/59		
^{114}Sb	5/127		
^{115}Sb	15/77		
^{116}Sb	39/87		
^{117}Sb	37/104		
^{118}Sb	5/131		
^{119}Sb	19/129		
^{120}Sb	36/79		
^{121}Sb	167/181	7	
^{122}Sb	65/118	5	301
^{123}Sb	96/105	6	

Table 1.3. (continued) Numbers of bound states in compound nuclei ^{A}Z with $37 \leq Z \leq 62$ contained in the second part of this compilation (I/19B2). The ratio shows the number of states in Volume I/19B2 and its Supplement. Asterisks mark isotopes included in I/19C.
The number of bound states in Volume LB I/18B, the number of resonances in reactions with charged particles in the compilation LB I/19A2 and the number of neutron resonances in the compilation LB I/16C are given in the same line for comparison.

^{A}Z	19B2	18B	19A	16C	^{A}Z	19B2	18B	19A	16C	^{A}Z	19B2	18B	19A	16C
^{124}Sb	58/104	4		261	^{136}Te	22/22				^{124}Xe	4/105	20		
^{125}Sb	39/62	10	9		^{137}Te	11*				^{125}Xe	2/233			4
^{126}Sb	2/5				^{138}Te	6*				^{126}Xe	3/195	29		
^{127}Sb	17/77	2			^{139}Te	5*				^{127}Xe	2/107	16		3
^{128}Sb	2/8				^{109}I	11*				^{128}Xe	2/186	24		
^{129}Sb	7/49				^{111}I	38*				^{129}Xe	2/57	9		10
^{130}Sb	63*				^{113}I	124*				^{130}Xe	4/103	12		71
^{131}Sb	51*				^{114}I	37*				^{131}Xe	4/42	15		17
^{132}Sb	22*				^{115}I	100*				^{132}Xe	27/74	17		43
^{133}Sb	106*				^{116}I	54*				^{133}Xe	3/28	11		6
^{134}Sb	14*				^{117}I	157*				^{134}Xe	2/23	10		
^{135}Sb	25*				^{118}I	26*				^{135}Xe	18/28			6
^{136}Sb	1*				^{119}I	172*				^{136}Xe	12/76	13		1
^{106}Te	3*				^{120}I	80*				^{137}Xe	6/163			35
^{107}Te	3*				^{121}I	27/171				^{138}Xe	2/62			
^{108}Te	27*				^{122}I	3/22				^{139}Xe	46*			
^{109}Te	45*				^{123}I	79/115		14		^{140}Xe	28*			
^{110}Te	2/50				^{124}I	4/45				^{141}Xe	18*			
^{111}Te	2/48				^{125}I	133/151	33	18		^{142}Xe	21*			
^{112}Te	2/46				^{126}I	3/58	2			^{143}Xe	8*			
^{113}Te	2/19				^{127}I	58/115	8	23		^{144}Xe	5*			
^{114}Te	3/105				^{128}I	205/232			377	^{111}Cs	1*			
^{115}Te	4/81				^{129}I	32/57	19	11		^{116}Cs	1*			
^{116}Te	8/84				^{130}I	29/57			127	^{117}Cs	51*			
^{117}Te	4/75				^{131}I	7/83	14	27		^{118}Cs	3*			
^{118}Te	2/95	14			^{132}I	2/5				^{119}Cs	18*			
^{119}Te	116/173	13			^{133}I	2/87				^{120}Cs	69*			
^{120}Te	7/67	28			^{134}I	2/9				^{121}Cs	56*			
^{121}Te	146/212	5			^{135}I	1/27				^{122}Cs	59*			
^{122}Te	146/161	15			^{136}I	2/20				^{123}Cs	40*			
^{123}Te	146/210	7		395	^{137}I	5*				^{124}Cs	108*			
^{124}Te	101/153	29	3	361	^{112}Xe	12*				^{125}Cs	54*			
^{125}Te	178/307	17		444	^{113}Xe	60*				^{126}Cs	83*			
^{126}Te	119/137	21		297	^{114}Xe	76*				^{127}Cs	84*			
^{127}Te	168/253	13		321	^{115}Xe	7*				^{128}Cs	53*			
^{128}Te	9/96	15			^{116}Xe	103*				^{129}Cs	70*			
^{129}Te	319/323	9		40	^{117}Xe	138*				^{130}Cs	46*			
^{130}Te	21/85	13			^{118}Xe	61*				^{131}Cs	24/37	14		
^{131}Te	307/317			23	^{119}Xe	104*				^{132}Cs	5/46			
^{132}Te	84/97	3			^{120}Xe	121*				^{133}Cs	24/56	11		
^{133}Te	36/36				^{121}Xe	124*				^{134}Cs	52/111	12		324
^{134}Te	5/25				^{122}Xe	83*				^{135}Cs	1/10	4		8
^{135}Te	17/48				^{123}Xe	2/94				^{136}Cs	1/1			6

Table 1.3. (continued) Numbers of bound states in compound nuclei ^{A}Z with $37 \leq Z \leq 62$ contained in the second part of this compilation (I/19B2). The ratio shows the number of states in Volume I/19B2 and its Supplement. Asterisks mark isotopes included in I/19C.
The number of bound states in Volume LB I/18B, the number of resonances in reactions with charged particles in the compilation LB I/19A2 and the number of neutron resonances in the compilation LB I/16C are given in the same line for comparison.

^{A}Z	19B2	18B	16C	^{A}Z	19B2	18B	19A	16C	^{A}Z	19B2	18B	19A	16C
^{137}Cs	12/60	4		^{128}La	90*				^{146}Ce	118*			
^{138}Cs	28*			^{129}La	74*				^{147}Ce	32*			
^{139}Cs	70*			^{130}La	107*				^{148}Ce	49*			
^{140}Cs	40*			^{131}La	120*		5		^{149}Ce	40*			
^{141}Cs	32*			^{132}La	28*				^{150}Ce	4*			
^{142}Cs	44*			^{133}La	4/141		5		^{151}Ce	13*			
^{143}Cs	29*			^{134}La	4/63				^{152}Ce	8*			
^{144}Cs	1*			^{135}La	4/77		8		^{126}Pr	46*			
^{120}Ba	38*			^{136}La	13/87				^{128}Pr	47*			
^{121}Ba	60*			^{137}La	5/61	13	8		^{129}Pr	23*			
^{122}Ba	62*			^{138}La	38/62				^{130}Pr	152*			
^{123}Ba	52*			^{139}La	94/94	11	16	11	^{131}Pr	30*			
^{124}Ba	81*			^{140}La	218/233			173	^{132}Pr	144*			
^{125}Ba	64*			^{141}La	32*				^{133}Pr	170*			
^{126}Ba	133*			^{142}La	23*				^{134}Pr	75*			
^{127}Ba	98*			^{143}La	46*				^{135}Pr	104*			
^{128}Ba	38/130	21		^{144}La	25*				^{136}Pr	105*			
^{129}Ba	78/143			^{145}La	33*				^{137}Pr	93*			
^{130}Ba	3/74	13		^{146}La	48*				^{138}Pr	69*			
^{131}Ba	77/129	24	41	^{147}La	50*				^{139}Pr	8/69			
^{132}Ba	81/159	30		^{148}La	25*				^{140}Pr	37/37			
^{133}Ba	44/46	9	17	^{124}Ce	7*				^{141}Pr	22/111	31	18	
^{134}Ba	98/116	20	6	^{125}Ce	19*				^{142}Pr	166/170			258
^{135}Ba	94/100	8	90	^{126}Ce	62*				^{143}Pr	9/29	6	8	
^{136}Ba	34/98	21	156	^{127}Ce	44*				^{144}Pr	4/4			5
^{137}Ba	82/85	14	189	^{128}Ce	122*				^{145}Pr	6/24			
^{138}Ba	105/163	30	81	^{129}Ce	93*				^{146}Pr	8*			
^{139}Ba	78/108		148	^{130}Ce	151*				^{147}Pr	36*			
^{140}Ba	58/60	17		^{131}Ce	121*				^{148}Pr	16*			
^{141}Ba	94*			^{132}Ce	159*				^{149}Pr	20*			
^{142}Ba	37*			^{133}Ce	129*				^{150}Pr	1*			
^{143}Ba	49*			^{134}Ce	9/83	15			^{128}Nd	41*			
^{144}Ba	31*			^{135}Ce	3/70				^{129}Nd	17*			
^{145}Ba	44*			^{136}Ce	44/96	12			^{130}Nd	52*			
^{146}Ba	42*			^{137}Ce	4/79			10	^{131}Nd	155*			
^{147}Ba	58*			^{138}Ce	46/78	19			^{132}Nd	89*			
^{148}Ba	15*			^{139}Ce	47/52	10			^{133}Nd	173*			
^{121}La	21*			^{140}Ce	165/180	52	14		^{134}Nd	86*			
^{123}La	79*			^{141}Ce	88/88	23		198	^{135}Nd	85*			
^{124}La	42*			^{142}Ce	68/104	14		6	^{136}Nd	174*			
^{125}La	59*			^{143}Ce	38/76			76	^{137}Nd	144*			
^{126}La	37*			^{144}Ce	3/61	11			^{138}Nd	104*			
^{127}La	107*			^{145}Ce	8/42				^{139}Nd	49*			

Table 1.3. (continued) Numbers of bound states in compound nuclei ^{A}Z with $37 \leq Z \leq 62$ contained in the second part of this compilation (I/19B2). The ratio shows the number of states in Volume I/19B2 and its Supplement. Asterisks mark isotopes included in I/19C.
The number of bound states in Volume LB I/18B, the number of resonances in reactions with charged particles in the compilation LB I/19A2 and the number of neutron resonances in the compilation LB I/16C are given in the same line for comparison.

^{A}Z	19B2	18B	16C	^{A}Z	19B2	18B	19A	16C	^{A}Z	19B2	18B	19A	16C
^{140}Nd	58/74	18		^{140}Pm	63*				^{140}Sm	71*			
^{141}Nd	82/88			^{141}Pm	92*				^{141}Sm	83*			
^{142}Nd	156/246	41		^{142}Pm	2/79				^{142}Sm	23/98			
^{143}Nd	146/252	71	85	^{143}Pm	52/90	18	8		^{143}Sm	56/89			
^{144}Nd	187/202	18	150	^{144}Pm	39/84				^{144}Sm	98/183	34		
^{145}Nd	123/139	41	90	^{145}Pm	37/53	21	4		^{145}Sm	42/169	35		206
^{146}Nd	280/291	146	210	^{146}Pm	5/78				^{146}Sm	100/190	64		
^{147}Nd	138/138	23	93	^{147}Pm	62/65	7	4		^{147}Sm	27/99	22		
^{148}Nd	26/113	22	12	^{148}Pm	4/43	2		42	^{148}Sm	132/289	49		213
^{149}Nd	82/82		123	^{149}Pm	37/73	24		1	^{149}Sm	115/193	31		25
^{150}Nd	32/133	72		^{151}Pm	57/131		2		^{150}Sm	88/191	47		160
^{151}Nd	21/95		79	^{152}Pm	4/14				^{151}Sm	63/240	19		25
^{152}Nd	14/53			^{153}Pm	39/70				^{152}Sm	47/152	46		121
^{153}Nd	17*			^{154}Pm	28*				^{153}Sm	272/296			92
^{154}Nd	24*			^{155}Pm	36*				^{154}Sm	14/110	47		
^{156}Nd	9*			^{132}Sm	8*				^{155}Sm	100/141			36
^{133}Pm	67*			^{133}Sm	65*				^{156}Sm	9/38			
^{134}Pm	50*			^{134}Sm	6*				^{157}Sm	17*			
^{135}Pm	32*			^{135}Sm	50*				^{158}Sm	11*			
^{136}Pm	103*			^{136}Sm	79*				^{159}Sm	1*			
^{137}Pm	38*			^{137}Sm	41*				^{160}Sm	7*			
^{138}Pm	60*			^{138}Sm	82*								
^{139}Pm	70*			^{139}Sm	106*								

Properties of nuclear excitations and binding energies have a general origin. The interconnection between values of nuclear excitations and nuclear binding energies was pointed out by I. Arima and A. Bohr [90Ar0A, 68Bo0A]. In Table 2 the standard parameters of the residual nucleon interaction $\varepsilon_{\mathrm{N,2N}}$ derived from the differences of valence nucleon separation energies (for nuclei differing by two additional nucleons of another type) are compared with excitations of near-magic nuclei ($Z = 50 + 2, Z = 82 + 2$). The stable character of E^* in $Z = 84$ isotopes was noticed [95Be31, 90Ma14].

Table 2. Comparison of E^* (keV) in near-magic nuclei with $Z = 84$ (and $N = 90$ top part of the Table) and in tellurium isotopes ($Z = 52$) with the parameters of the residual interaction of valence nucleons $\varepsilon_{\mathrm{N,2N}} = 682$ keV ($Z = 51, Z = 83, N = 83$ [96Su0A, 97SuZX]), n $= E^*/\varepsilon_{\mathrm{N,2N}}$.

^{A}Z	^{200}Po	^{202}Po	^{204}Po	^{206}Po	^{208}Po	^{208}Po	^{211}Po	^{125}Nd	^{119}Sm	^{113}Gd	^{116}Dy
$2J^{\pi}, J^{\pi}$	2^+	2^+	2^+	2^+	2^+	4^+	11^+	0^+	0^+	0^+	0^+
E^*	665.9	677.3	684.3	700.7	686.5	1347	687.2	675.4	684.7	680.7	675.6
$\varepsilon_{\mathrm{N,2N}}$	682	682	682	682	682	1364	682	682	682	682	682
^{A}Z	^{116}Te	^{116}Te	^{116}Te	^{117}Te	^{121}Te	^{121}Te	^{121}Te	^{122}Te	^{122}Te	^{126}Te	^{127}Te
$2J^{\pi}, J^{\pi}$	2^+	4^+	6^+	7^+	1^+	7^+	$3^+, 5^+$	0^+	4^+	4^+	7^+
E^*,	678.9	1359.4	2002.2	681.5	681.3	683.1	1364.0	1357.4	2042.0	1361.4	685.02
n$\varepsilon_{\mathrm{N,2N}}$	682	1364	2044	682	682	682	1364	1364	2044	1364	682

1.2 List of notations

Table 3. List of principal notations in Volume I/19B3.

No.	Symbol	REFERENCE Its meaning	Explanation
1		PROPERTIES OF COMPOUND NUCLEUS	
	Z	Atomic number	Integer number Z
	A	Atomic weight	Integer number A
	Abundance	Abundance	Percentage of isotope abundance
	J^{π}, $2J^{\pi}$, J	Spin of the state	π indicates parity
	T	Isotopic spin	$T_{\mathrm{g.s}}=\lvert N-Z\rvert/2$
	$T_{1/2}$	Half-life	[04Nu0A]
2		PARAMETERS OF EXCITED STATES	
	E^*	Excitation energy	Total excitation energy
	$X, Y, Z, U...$	Additional energy	Additional unknown energy
	E^*_{anal}	Excitation energy	E^* of the analog state
	E^*_{f}	Final energy	Energy of the final state
	$\mathit{\Gamma}_{\mathrm{cm}}$, $\mathit{\Gamma}$	$\mathit{\Gamma}_{\mathrm{cm}} = M/(M+m)\ \mathit{\Gamma}$	Width in center-of-mass frame
	$\mathit{\Gamma}_{\mathrm{n}}$, $\mathit{\Gamma}_{\mathrm{p}}$, $\mathit{\Gamma}_{\mathrm{d}}$, $\mathit{\Gamma}_{\alpha}$	Nucleon width	Width of capture/emission
3		TRANSFER REACTIONS	
	(α,p); $\sigma(\alpha$,p); I_{p}	Three-nucleon transfer	Cross section, proton yield
	(α,n); $\sigma(\alpha$,n); I_{n}	Three-nucleon transfer	Cross section, neutron yield
	(α,d); $\sigma(\alpha$,d); I_{d}	Two-neutron transfer	Cross section, deuteron yield
	(α,t); $\sigma(\alpha$,t); I_{t}	Proton transfer	Cross section, tritium yield
	(α,^{3}He); $\sigma(\alpha,\tau)$; I_{τ}	One-neutron transfer	Cross section, yield of ^{3}He
	(α,^{2}He); $\sigma(\alpha$,^{2}He)	Two-neutron transfer	Cross section of (α,^{2}He) reaction
	(^{3}He,d); $\sigma(\tau$,d); I_{d}	Proton transfer	Cross section, deuteron yield
	(^{3}He,n); $\sigma(\tau$,n); I_{n}	Two-nucleon transfer	Cross section, neutron yield
	(^{3}He,p); $\sigma(\tau$,p); I_{p}	Two-nucleon transfer	Cross section, proton yield
	(t,p); σ(t,p); I_{p}	Two-neutron transfer	Cross section, proton yield
	(t,d); σ(t,d); I_{d}	One-neutron transfer	Cross section, deuteron yield
	(d,n); σ(d,n); I_{n}	One-proton transfer	Deuteron stripping, yield
	(d,p); σ(d,p); N_{dp}	One-neutron transfer	Deuteron stripping, yield
	(^{16}O,^{14}N); σ(^{16}O,^{14}N)	Two-nucleon transfer	All differential cross sections
	(^{16}O,^{15}N); σ(^{16}O,^{15}N)	One-proton transfer	$d\sigma/d\Omega$ are given in [μbarn/sr]
	(^{12}C,^{10}Be); σ(^{12}C,^{10}Be)	Two-proton transfer	All integral cross sections σ
	(^{12}C,α); σ(^{12}C,α)		are given in [μbarn] or [mbarn]
	(^{6}Li,d); σ(^{6}Li,d)	α transfer	S_{α} – spectroscopic factor
	(^{7}Li,p); σ(^{7}Li,p)	^{6}He transfer	Cross section of ^{6}He transfer
	(^{7}Li,t); σ(^{7}Li,t)	α transfer	
	(^{7}Li,^{6}He); σ(^{7}Li,^{6}He); $I^{^{6}\mathrm{He}}$	One-proton transfer	Cross section, yield of ^{6}He

Table 3. (continued) List of principal notations in Volume I/19B3.

No.	Symbol	REFERENCE Its meaning	Explanation
4		TRANSFER PICKUP REACTIONS ETC.	
	(d,τ); σ(d,τ); I_τ; $I_{\mathrm{d}\tau}$	One-proton pickup	Cross section, ^{3}He yield
	(e,e′p); σ(e,e′p)	One-proton pickup	Cross section
	(p,t); σ(p,t); I_t	Two-neutron pickup	Cross section, tritium yield
	(p,d); σ(p,d); I_d	One-neutron pickup	Cross section, deuteron yield
	(d,t); σ(d,t)	One-neutron pickup	Cross section
	(p,α); σ(p,α)	Three-nucleon pickup	Cross section
	(d,α); σ(d,α)	Two-nucleon pickup	Cross section
	(t,α); σ(t,α)	One-proton pickup	Cross section
	(τ,α); $\sigma(\tau,\alpha)$; $I_{\tau\alpha}$	One-neutron pickup	Cross section, α yield
	(p,τ); σ(p,τ)	Two-nucleon pickup	Cross section
	(d,^{6}Li); σ(d,^{6}Li)	α pickup	S_α – spectroscopic factor
	(t,^{6}Li); σ(t,^{6}Li)		
	(τ,^{6}He); σ(τ,^{6}He)	Three-neutron pickup	(^{3}He,^{6}He) reaction
	I_{p}, I_{n}, I_α	Particle yield	Proton–, neutron–, α–yield
	(τ,t); σ(τ,t); (t,τ)	Charge-exchange	Charge-exchange reactions (t,τ), (τ,t)
	(p,p′); σ(p,p′)	Inelastic scattering	Inelastic scattering of protons
	(d,d′); σ(d,d′)	Inelastic scattering	Inelastic scattering of deuterons
	(α,α'); $\sigma(\alpha,\alpha')$	Inelastic scattering	Inelastic scattering of α-particles
	γ^2_{p}; γ^2_α; $\gamma^2_\alpha/\gamma^2_{\mathrm{W}}$	Reduced widths	Widths of resonances, see LB I/19A
	β, β_L, $\beta_L R$	β-parameters	Deformation parameters, $\beta_L R$ in [fm] calculated with the parameter $r_\circ$
5		SPECTROSCOPIC FACTORS	
	S, S_{N}, C^2S	Spectr. factor	Factors of stripping or pick-up reaction
	C^2	Clebsch-Gordon factor	Isospin factor, see LB Vol. I/18A, p. 2-5
	S^+_{p}, S^+	Spectr. factor	Single proton transfer reaction (d,n),...
	S^-_{p}, S^-	Spectr. factor	Single proton pick-up reaction (d,τ),...
	S^+_{n}, S^+	Spectr. factor	Single neutron transfer reaction (d,p),...
	S^-_{n}, S^-	Spectr. factor	Single neutron pick-up reaction (p,d),...
	S'; C^2S'	Spectr. factor	$(2J+1)S$; $(2J+1)C^2S$
	S''; C^2S''	Spectr. factor	$(2J+1)/(2I+1)S$, I is the initial spin
	SG_{lj}	Spectr. factor	$(2J+1)/(2I+1)C^2S$; other factors
	l, l_{p}, l_{n}, l_1+l_2,...	Orbital moments	See definitions of S in the works
	S_{dp}, N_{dp}, S_{dn}	S factor, yield	S of deuteron stripping reaction (yield)
	S_{pd}, S_{dt}, $S_{\tau\alpha}$	Spectr. factor	S^-_{n} of neutron pick-up reaction
	S_{pt}, $S_{\mathrm{d}\tau}$, $S_{\mathrm{p}\tau}$, $S_{\alpha\mathrm{t}\gamma}$	Spectr. factors	S of the different transfer reactions
	$d\sigma/d\Omega$	Experimental yield	Yield of transfer reaction [μbarn/sr]
	ε	Enhancement factor	Parameter which shows the goodness of the fit of a few-nucleon transfer
	N	Norm. parameter	Theoretically calculated overlap of the wave-functions of interacting particles in a transfer, see original work

Table 3. (continued) List of principal notations in Volume I/19B3.

No.	Symbol	REFERENCE Its meaning	Explanation
6		PROPERTIES OF GAMMA TRANSITIONS	
	E_γ	Energy of γ-quanta	
	I_γ	Relative intensity of γ	Normalized at 100 for the strongest one
	$Br; BR$	Branching ratio	Percentage of the relative intensity [%]
	Mult.	Multipolarity	
	E1, E2, E3	Multipolarity	In units [e^2fm^4], [e^2fm^2], [$10^{-3}e^2fm^2$]
	M1, M2, M3	Multipolarity	In units of μ_N^2 etc.
	E_f^*, J_f, J_f^π	Excitation, spin	Excitation energy and spin of final state
	$I_{s,0}$, I_s	Cross section in [eVbarn]	In NRF
	$\Gamma_{\gamma\circ}$,$\Gamma_{\gamma f}$, Γ_γ	Total radiative width	In NRF
	Γ_γ/Γ_W	Γ_γ in Wigner units	See LB Vol. I/18
	${\Gamma_\circ}^2/\Gamma$, $g{\Gamma_\circ}^2/\Gamma$	Observed quantity	In NRF (in units [eV] or [meV])
	$\Gamma_\circ^{red}$, $g\Gamma_\circ^{red}$	Reduced radiative width	In units [meV/MeV^3]=[meV′]
	B(M1), B(GT), ...	Transition intensity	See LB Vol. I/18
	EWSR	γ-transition strength	Energy Weighted Sum Rule (in [%])
	ω_γ, $S_{p\gamma}$, σ, σ_γ	Radiative strength	See LB Vol. I/19A
	$\Gamma_\alpha\Gamma_\gamma/\Gamma$, $\Gamma_p\Gamma_\alpha/\Gamma$		Strength of (α,γ) or (p,α) reactions
	E_γ^1+E_γ^2		Sum energy of γ cascade
7		OTHER PARAMETERS	
	A_y	VAP parameter	Vector Analyzing Power of the nucleon transfer $(\sigma_+$-$\sigma_-)/(\sigma_+$+$\sigma_-)$
	T_{20}	Tensor parameter	Parameter of nucleon transfer
	$E_\circ$, $E_\circ^{cm}$	E_α^{cm}, E_p^{cm}	Resonance energy in lab. or cm. frame
	$\sigma_{p\gamma}$, $\sigma_{n\gamma}$	Cross sections	Radiative cross sections
	nlj	Quantum numbers	Quantum numbers of a certain state
	L, l_n, l_p, l	Quantum number	Orbital momentum
	j, $2j$, $2j_p$, $2j_n$	Quantum number	Momentum of the transferred nucleon
	rel., *arb.u.*		Relative, arbitrary units
	eval., theor.		Evaluated, theoretical values

The abbreviation *Br* is used for the branching ratios of transitions from the neutron capturing state. This column is located, together with the spectroscopic factors, before the branching ratios of all other states. Due to the limited space many parameters are only given in the Supplement.

The abundance of stable isotopes [05TuZX] is given as Comments. Doublets and triplets are marked "doublt" and "triplt". For parameters in the tables, a quantity enclosed in angular brackets ⟨...⟩ indicates that it is preferred by the authors of the original work, a quantity enclosed in square brackets [...] is guessed by the compilers. In all tables the mark "include" means that the value given in the line above the marked one belongs to two states. As in many other compilations we give values $2J^\pi$ and $2T$ for all A-odd nuclei ($2J = 1^+$ instead of $J = 1/2^+$, etc.). Double spin notation 1^-,3^- or 3^+,5^+ is widely used. Alternative values (A,B ...) of the parameter are given as A,B ... while a mixture of parameters for one state are given as A+B ...

Notations presented in Table 3 are common for the data in all four Volumes I/19BC.

1.3 Data presentation

The data in Vol. LB I/19B3 are presented in tables whose format is analogous to that of the compilation of energy levels of light nuclei by P. Endt [98En04]. In these tables each horizontal line belongs to one excited state. The line starts with such standard parameters as energy of excitation E^*, spin J^π and isospin T. Each date-line in the Volumes I/19B contains also the half-life $T_{1/2}$ of the state or its total width $\Gamma_{\rm cm}$. Spectroscopic information on different nuclear transfer reactions together with one (main) reference in NSR-code forms the central part of each data-line. The notations of the parameters given in CRF are listed in Table 3. They are the same as those used in original works, review papers and compilation LB I/18.

The general properties of nuclei are presented in two sections (Nos. 1-2) of Table 3. Data on the charged particle reactions: yields and cross sections ($d\sigma/d\Omega$, σ, etc., see Nos. 3-4 of Table 3) and spectroscopic factors ($S_{\rm N}$, see No. 5) derived from the experimental data on cross sections of transfer reactions are given after E^* and are followed by the main reference.

Direct referencing to the original papers in each data-line could be used by the interested reader for his own judgment. At the bottom of each column with the experimental data we give again the corresponding reference (seen only in Supplement). Additional references given at the end of the Tables and references in comments could serve for a better orientation in the material. Data taken from papers not included in the Nuclear Science Reference system are provided by reference which is shown as NSR reference with zero and a letter in the last two (out of 6) characters.

Each data-line contains at the end branching ratios (in percents) of γ-transitions to the levels situated below this excited state. In cases when there are many transitions from a certain initial state the corresponding horizontal line has a continuation in the Supplement (CD) where branching ratios of all known transitions are given.

For each isotope, data-lines for states are ordered by increasing E^* and form one isotope-table which ends by reference-codes and by short comments where additional information can be found. Each isotope-table is labelled by the atomic number (Z) and the atomic weight (A) of the nucleus.

The whole set of isotope-tables for a given element (Z) is ordered by the increasing atomic weights (A) of the compound nucleus and forms the unit of the total file mentioned in the list of Contents. Ordered by Z these files for all the elements make up the total file CRF with references presented at the end of each book. Additional references given after the Tables and references in comments serve for better orientation in the material.

As in many other compilations we give values $2J^\pi$ and $2T$ for all A-odd nuclei ($2J = 1^+$ instead of $J = 1/2^+$, etc.). Double spin notation 1^-,3^- or 3^+,5^+ is widely used.

Data from the great number of transfer reactions used for obtaining information on properties of excited states are grouped in the following way. Transfer reactions with the stripping of the ongoing particle are given first. The sequence of data for these reactions starts with many-nucleon transfer and ends with one-nucleon transfer like the well-known deuteron stripping reaction.

Data from pickup reactions are given in the inverse order – one-nucleon transfer first, many-nucleon pickup reaction at the end. Such a method of data presentation (used also in NDS) permits a more effective comparison of results for one-nucleon transfer reactions (stripping and pickup) obtained by the use of different projectiles. For example, data on one-neutron transfer reactions (α,^{3}He), (t,d) and (d,p) can be compared between themselves as well as with data on one-neutron pickup transfer reactions (p,d), (d,t) and (τ, α).

Spectroscopic factors together with occupation probabilities and magnetic moments are basic elements needed for the understanding of nuclear structure. The spectroscopic factor S is defined as the probability to reach a final single-particle (hole) state when a nucleon is added to (or removed from) the target nucleus (correspondingly $S^+_{\rm p}, S^+_{\rm n}$ or $S^-_{\rm p}, S^-_{\rm n}$). The mean field approximation is a basic idea of nuclear shell-models used for description of nuclear states. The occupation number is the number of nucleons in the certain quantum state in the target nucleus, relative to the $2j + 1$ limit. The commonly used method of data analysis consists in the comparison with results of calculations by Distorted Waives Born Approximation (DWBA) (see references in I/19B1).

The measured cross section σ_{exp} and nucleon transfer reaction spectroscopic factor S_{N} are connected with the theoretically estimated cross section σ_{DWBA} by the relation:

$\sigma_{\text{exp}}=(2J+1)(2I+1)^{-1}(2j+1)^{-1}\times S_{\text{N}}\times N\times\sigma_{\text{DWBA}}$

with N – normalization parameter, J, I, j – total moments of the final state, the target nuclei and the transferred nucleon, respectively.

The measured cross section σ_{exp} of few-nucleon transfer reaction is connected with the estimated cross section σ_{DWBA} by the relation which includes the spectroscopic "enhancement factor" ε:

$\sigma_{\text{exp}}=(2J+1)(2I+1)^{-1}(2j+1)^{-1}\times\varepsilon\times N\times\sigma_{\text{DWBA}}$.

The final goal of the comparison consists in a judgement on the validity of single-particle approximation of the shell-model. It was found after many experimental works that in near-magic nuclei this model gives good results. It permits to determine the single-particle properties of the real excited states. The closeness of their spectroscopic factors to shell-model values is in accordance with the observed closeness of magnetic moments of near-magic nuclei to the single-particle limit.

Data from inelastic scattering of different particles and data obtained by NRF – Nuclear Resonance Fluorescence method – can be found at the end of the data-line or between transfer reaction data. In some cases we use Wigner units 1W.u.(M1) = $1.79\mu_{\text{N}}^2$ and 1W.u.(E1) = $1.28\text{e}^2\text{fm}^2$.

In Table 3 different reactions are given in the same order as they appear in data-lines of LB Vol. I/19B3.

1.4 Interpretation of data of nuclear excitations

The general description of the spectroscopic information for nuclear bound states is given in the Introduction to Vol. I/18 written by V. Soloviev and coauthors. V. Soloviev also studied the structure of deformed nuclei [97So21] and transition from order in low-lying levels to quantum chaos. References for these works can be found in Vols. I/18ABC [01Sc0A, 02Sc0A, 03Sc0A].

The shell model as a unified view of nuclear structure and the role of dynamical symmetries in nuclear collective models are discussed in works by A. Arima, F. Iachello, R. Jolos and others [97Jo06]. Now it is known as IBA – Interacting Boson Approximation [85Ca13, 85Ca19, 85Ca29, 85Ca33] and references in Vol. I/19B2. New results in the study of high-spin excitations and many examples of the application of IBA can be found in Proceedings of International Conferences on Nuclear Structure held in Berkeley (2001), Lund (2000) and Goeteborg (2004). Numbers of rotational bands evaluated in PNPI are given in Table 4. The information concerning the low-lying rotational-band energies in rare-earth A-odd nuclei was analyzed in [76Bo0A].

The application of nuclear physics to many practical tasks including astrophysics demands knowledge of properties of nuclear states in the whole energy region of nuclear excitations. Besides the statistical approach based on N. Bohr's hypothesis about the chaotic motion of the nucleons in nuclei, the study of the role of symmetries in the description of the properties of nuclear levels is the commonly used method of general data interpretation. For obtaining parameters of many excited states different experimental methods are used and we include in this compilation accurate data obtained by the Nuclear Resonance Fluorescence method by P. von Brentano and co-workers [90Zi05, 92Zi02, 96Kn0A, 98Fr01] (see also references in Vols. I/19B1 and I/19B2).

A great number of data on heavy nuclei were obtained in measurements of $\gamma\gamma$ cascades after thermal neutron capture performed in JINR by A. Sukhovoy and co-workers [97Kh0A, 99BoZR, 99BoZT,01Kh0A]. Neutron strength function, population of superdeformed bands and some other related topics were discussed in [74Ba26, 83Ci01, 90Sc31, 93Ba35, 00Gi05, 02Mi16, 04Ga03].

Table 4. Number of rotational bands in nuclei with $Z = 63 - 100$ evaluated in PNPI Nuclear Data Center [03AlZX] (see corresponding tables in I/19B1 and I/19B2).

^{A}Z	N	^{A}Z	N	^{A}Z	N	^{A}Z	N	^{A}Z	N	^{A}Z	N
		^{137}Eu	1	^{139}Eu	5	^{141}Eu	5	^{143}Eu	3	^{147}Eu	1
^{149}Eu	7	^{151}Eu	8	^{153}Eu	5	^{155}Eu	8	^{157}Eu	4	^{159}Eu	4
^{139}Gd	3	^{141}Gd	6	^{149}Gd	8	^{151}Gd	5	^{153}Gd	10	^{155}Gd	12
^{157}Gd	6	^{159}Gd	10	^{161}Gd	7	^{143}Tb	6	^{149}Tb	5	^{151}Tb	2
^{153}Tb	6	^{155}Tb	5	^{157}Tb	8	^{159}Tb	6	^{161}Tb	6	^{163}Tb	5
^{143}Dy	7	^{153}Dy	7	^{155}Dy	9	^{157}Dy	8	^{159}Dy	9	^{161}Dy	12
^{163}Dy	10	^{165}Dy	7	^{167}Dy	1	^{151}Ho	2	^{155}Ho	6	^{157}Ho	4
^{159}Ho	5	^{161}Ho	8	^{163}Ho	11	^{165}Ho	11	^{167}Ho	3	^{169}Ho	2
^{155}Er	3	^{157}Er	5	^{159}Er	6	^{161}Er	5	^{163}Er	14	^{165}Er	7
^{167}Er	12	^{169}Er	8	^{171}Er	5	^{153}Tm	2	^{157}Tm	4	^{159}Tm	4
^{161}Tm	5	^{163}Tm	5	^{165}Tm	6	^{169}Tm	5	^{171}Tm	5	^{173}Tm	2
^{175}Tm	3	^{153}Yb	1	^{159}Yb	3	^{161}Yb	5	^{163}Yb	4	^{165}Yb	4
^{167}Yb	7	^{169}Yb	9	^{171}Yb	10	^{173}Yb	5	^{175}Yb	7	^{177}Yb	4
^{161}Lu	2	^{163}Lu	3	^{165}Lu	7	^{167}Lu	7	^{169}Lu	5	^{171}Lu	10
^{173}Lu	7	^{175}Lu	7	^{177}Lu	6	^{179}Lu	3	^{157}Hf	4	^{163}Hf	3
^{165}Hf	6	^{167}Hf	7	^{169}Hf	3	^{171}Hf	8	^{173}Hf	8	^{175}Hf	7
^{177}Hf	7	^{179}Hf	9	^{181}Hf	2						
^{167}Ta	4	^{169}Ta	1	^{171}Ta	5	^{173}Ta	5	^{175}Ta	4	^{177}Ta	6
^{179}Ta	11	^{181}Ta	2	^{185}Ta	1	^{165}W	4	^{167}W	4	^{169}W	3
^{171}W	5	^{173}W	3	^{175}W	3	^{177}W	2	^{179}W	18	^{181}W	8
^{183}W	6	^{185}W	6	^{187}W	2	^{171}Re	5	^{173}Re	4	^{175}Re	6
^{177}Re	4	^{179}Re	7	^{181}Re	3	^{183}Re	5	^{185}Re	3	^{187}Re	2
^{171}Os	6	^{173}Os	3	^{175}Os	3	^{177}Os	3	^{179}Os	8	^{181}Os	6
^{183}Os	5	^{185}Os	5	^{187}Os	5	^{189}Os	2	^{191}Os	1	^{171}Ir	6
^{173}Ir	3	^{175}Ir	4	^{179}Ir	6	^{181}Ir	4	^{183}Ir	2	^{185}Ir	4
^{187}Ir	5	^{189}Ir	4	^{191}Ir	6	^{193}Ir	5	^{195}Ir	3	^{171}Pt	1
^{175}Pt	1	^{177}Pt	3	^{179}Pt	3	^{181}Pt	5	^{183}Pt	5	^{185}Pt	7
^{187}Pt	2	^{191}Pt	2	^{193}Pt	3	^{195}Pt	4	^{181}Au	6	^{183}Au	4
^{185}Au	5	^{187}Au	5	^{191}Au	3	^{193}Au	4	^{195}Au	1	^{181}Hg	3
^{183}Hg	3	^{185}Hg	4	^{187}Hg	3	^{191}Hg	8	^{193}Hg	11	^{195}Hg	8
^{197}Hg	2	^{199}Hg	2	^{187}Tl	5	^{189}Tl	3	^{191}Tl	5	^{193}Tl	6
^{195}Tl	2	^{197}Tl	2	^{199}Tl	1	^{201}Tl	1	^{187}Pb	1	^{193}Pb	7
^{195}Pb	4	^{197}Pb	2	^{199}Pb	1	^{199}Po	1	^{201}Bi	11		
^{217}Fr	2	^{219}Fr	2	^{225}Fr	1	^{217}Ra	3	^{219}Ra	3	^{221}Ra	1
^{223}Ra	6	^{225}Ra	3	^{227}Ra	3	^{219}Ac	3	^{223}Ac	3	^{225}Ac	4
^{227}Ac	6	^{229}Ac	1	^{223}Th	2	^{225}Th	1	^{229}Th	5	^{231}Th	9
^{233}Th	5	^{229}Pa	1	^{231}Pa	5	^{233}Pa	1	^{235}Pa	1	^{233}U	6
^{235}U	15	^{237}U	6	^{239}U	9	^{235}Np	4	^{237}Np	6	^{239}Np	7
^{237}Pu	6	^{239}Pu	9	^{241}Pu	4	^{243}Pu	7	^{245}Pu	2	^{239}Am	2
^{241}Am	3	^{243}Am	4	^{245}Am	3	^{243}Cm	2	^{245}Cm	7	^{247}Cm	4
^{249}Cm	4	^{241}Bk	1	^{243}Bk	1	^{247}Bk	5	^{249}Bk	5	^{251}Bk	1
^{247}Cf	3	^{249}Cf	6	^{251}Cf	6	^{253}Cf	2	^{251}Fm	1	^{253}Es	2

The stable character of several few-nucleon excitation shown in Table 2 can be considered as the "tuning effect" in nuclear data seen simultaneously in the stable character of differences of nuclear binding energies. Standard parameters of the residual interactions $\varepsilon_{\rm n2p} = \Delta S_{\rm n}(\Delta Z = 2)$ and $\varepsilon_{\rm n2n} = \Delta S_{\rm n}(\Delta N = 2)$ have distributions with maxima at 680keV $= \varepsilon_{\rm N,2N}$ and at 340keV $= \varepsilon_{\rm N,2N}/2$

corresponding to the linear trends in valence nucleon separation energies [97SuZX]. For nuclei situated after lead the stability of $\varepsilon_{\rm np} = 340$ keV was noticed in [90Mo11]. In the same nuclei the stable character of excitation shown in Table 2 persists in other neighbour nuclei (Table 5).

Table 5. Comparison of E^* (keV) in heavy nuclei ($Z = 84-90$) with the parameter of the residual interaction $\varepsilon_{\rm N,2N} = 682$ keV (closeness of stable excitation to $\varepsilon_{\rm N,2N}$, continuation of Table 2).

^{A}Z	^{203}Po	^{207}Po	^{205}At	^{206}At	^{207}At	^{207}At	^{211}At	^{214}Rn	^{216}Ra	^{218}Th
$2J^\pi$,J^π	5^-	5^+	13^-	9^+	5^-	13^-	(7^-)	2^+	2^+	2^+
E^*	686.5	685.8	664.3	686	674	686	674.1	694.7	688.2	689.6
$\varepsilon_{\rm N,2N}$	682	682	646	682	682	682	682	682	682	682

Parameters of the residual interaction of valence nucleons can be estimated from excitations in nuclei with three neutrons above the double-magic core. In case of $Z = N = 28$ and $Z = N = 50$ cores the values $E^* = 340$ keV in ^{59}Ni and $E^* = 168.0(1)$ keV are rational to the stable parameters of the residual interaction of valence neutrons determined from differences of binding energies [01Su0A, 01So01, 03So0B, 03Su0B]. The observation of the stable character of intervals between excited states in neighbour nuclei is another method to check this "tuning effect" of low-energy excitations. Data in LB I/19BC can be used for this purpose. For example, stable interval in the sum distribution of spacings in ^{125}Te and ^{127}Te ($D_{ij} = 1360$ keV) corresponds to the two-phonon excitation in the neighbour ^{126}Te with $E^* = 2\varepsilon_{\rm N,2N}$ (see Table 2). Collected information on the properties of excited states of all nuclei permits a study of few-nucleon effects of very general origin [06Su0A, 05Su0A, 01So0A].

1.5 Conclusions

This file (Vol. LB I/19B3) has a complimentary character to compilations of data on low-lying levels of the selected number of heavy nuclei presented in I/18C [03Sc0A]. Together with Vols. I/19B1, I/19B2, I/19C and compilations of parameters of resonances in reactions with neutrons and charged particles it gives almost all information about all known excited states of all nuclei.

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