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ADDENDUM

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Abstract. In this addendum the recalculated values of the spin–orbit potential, the average field and the isobaric-spin potential are presented starting from an approximate relativistic equation for a many-nucleon system.

In the paper by Krutov *et al* (1974) the single-particle nuclear potential (ie, the average field, isobaric-spin potential and spin–orbit potential) has been obtained starting from the approximate relativistic equation for a bound many-nucleon system. The two-particle interactions employed in this paper were taken in the form of one-boson exchange potentials which well reproduce nucleon–nucleon scattering data. When calculating the value of the nuclear single-particle potential, we utilized some variants of two-particle forces considered in the papers by Green and Sawada (1967), Ueda and Green (1968), Stagat *et al* (1971). Unfortunately, some of these papers contain misprints and omissions†. In particular, in table 1 of the paper by Ueda and Green (1968) a factor $[\Lambda^2/(\Lambda^2-\mu^2)]^2$ was omitted erroneously. This factor, however, plays an essential role

Table 1. Spin–orbit splittings obtained in the framework of the Hartree–Fock approximation for the following variants of two-body forces: a, Green and Sawada (1967); b, Ueda and Green (1968) (model II); c, Ueda and Green (1968) (model III); d, Stagat *et al* (1971). The spin–orbit splittings in the Hartree approximation are given in parentheses†.

	a	b	c	d	Experimental data
$\Delta E^{SO}_{1f}(^{41}Ca)$	13·8	7·65	9·45	10·1	6·50
	(9·32)	(4·25)	(5·56)	(5·98)	
$\Delta E^{SO}_{2p}(^{41}Ca)$	3·30	1·82	2·25	2·37	2·00
	(2·22)	(1·01)	(1·32)	(1·41)	
$\Delta E^{SO}_{2g}(^{209}Pb)$	3·53	2·62	2·88	2·94	2·47
	(2·22)	(1·16)	(1·43)	(1·52)	
$\Delta E^{SO}_{1i}(^{209}Pb)$	11·2	8·33	9·22	9·37	4·57
	(7·08)	(3·70)	(4·59)	(4·82)	
$\Delta E^{SO}_{3d}(^{209}Pb)$	2·03	1·49	1·66	1·69	0·98
	(1·28)	(0·667)	(0·830)	(0·874)	

† All quantities are given in MeV. The relative thickness of the surface layer τ is assumed to be 0·4.

† This was also indicated in a recent paper by Calogero and Levi (1973).

in computing the values of the single-particle potential. This forced us to recalculate the values given in tables 1 and 2 of our paper (Krutov *et al* 1974).

In this addendum we give the recalculated values in tables 1 and 2 completely conserving the notation used in our previous paper (Krutov *et al* 1974). The results for the variant (a) of the two-particle forces remain unaltered (the factor $[\Lambda^2/(\Lambda^2-\mu^2)]^2$ being absent in this variant), the other results do change. The recalculated values generally proved to be better than those given in Krutov *et al* (1974). In particular, the recalculated values remove practically all doubts about the relativistic character of the nuclear single-particle spin–orbit potential. In addition, the recalculated values enable us to choose more definitely a nucleon–nucleon interaction from nuclear structure conditions imposed in addition to nucleon-nucleon scattering data. Actually, it is obvious from table 2 that the variant (b) of two-particle forces must be considered as inadequate. At the same time, variant (d) describes the single-particle potential well enough.

Table 2. The values of the neutron average field and isobaric-spin potential obtained in the framework of the Hartree–Fock approximation for the same variants of two-body forces as in table 1. To make comparison with the results obtained in the Hartree approximation (Krutov and Savushkin 1973) (figures in parentheses) more convenient we included V_{IS} into V_{av} in this table†.

	a	b	c	d	Experimental data
$\tilde{V}_{av}(^{41}Ca)$	−34·0	+6·79	−56·9	−70·9	
	(−45·3)	(−40·8)	(−87·1)	(−103)	
$\tilde{V}_{av}(^{209}Pb)$	−31·7	−4·53	−56·3	−68·3	
	(−45·3)	(−51·2)	(−89·4)	(−105)	
$V_{av}^{eff}(^{41}Ca)$	−27·1	+5·41	−45·4	−56·5	−46·1
	(−36·1)	(−32·6)	(−69·4)	(−82·1)	
$V_{av}^{eff}(^{209}Pb)$	−25·3	−3·61	−44·9	−54·4	−53·4
	(−36·1)	(−40·8)	(−71·3)	(−83·7)	
$v_{IS}^{eff}(^{209}Pb)$	36·1	−170	+9·19	+38·4	+79·4
	(0)	(−156)	(−33·8)	(−30·7)	

† All quantities are in MeV. The relative thickness of surface layer τ is assumed to be 0·4. The experimental values of V_{av}^{eff} are taken from the proton scattering data (Greenlees and Pyle 1966), for neutrons the experimental values of $|V_{av}^{eff}|$ for ^{208}Pb must be somewhat smaller than 53·4.

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