from formulas (4). In calculating $(\pi^-|S_+|\eta)$ we took the η-X mixing into account (for details see [5]). The empirical values of S_i in Table II were taken from [2], with due allowance for f-f' mixing with an angle $\theta = 30°$, i.e., the same as for the f and f' mesons [6]. In addition, the constants S_i turned out to be sensitive to the choice of ν_8^s/ν_3^s in formula (3), and therefore this ratio was chosen to agree with experiment; $\nu_8^s \sim \nu_3^s$ in order of magnitude, as required by SU(3) symmetry.

We emphasize that the constants S_i used by us were obtained in [2] by reduction of experimental data under the assumption that the cross sections are constant, $\alpha_f = 1$. Therefore the fact that theory and experiment agree in Table II within the $\sim$20% accuracy of SU(3) symmetry means that that there is no contradiction whatever between the hypothesis of universal interaction of the T reggeons (2) and the hypothesis of constant cross sections.

Thus, the hypothesis of the universal interaction of the reggeons with vector and scalar currents has so far been well justified.

The author is grateful to K. A. Ter-Martirosyan for suggesting the topic and useful advice, and also to B. L. Ioffe and A. M. Polyakov for interesting discussions.

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CONTRIBUTION OF UNPAIRED PARTICLE TO THE DEFORMATION OF THE NUCLEUS

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Submitted 18 March 1967
ZhETF Pis'ma 5, No. 11, 410-412 (1 June 1967)

It was shown in [1] that the experimental values of the internal quadrupole moments θ_0 of certain odd deformed nuclei differ greatly from the values of θ_0 of the preceding even-even nuclei. These changes in the quadrupole moments, which are due to the presence of unpaired particles, reach about 10 - 20% in some cases. The contribution to the quadrupole moment is positive in some cases and negative in others.

It is possible to estimate the contribution of the odd particle to the deformation of the nucleus by calculating the equilibrium deformations of the odd and preceding even-even nculei. We have minimized the sum of the doubly-degenerate single-particle energies corresponding to the Hamiltonian

$$H = T_{\rm kin} + \frac{M}{2}\omega_0^2(\epsilon)\, r^2(1 + \epsilon P_2(\cos\theta)) - c\mathbf{l}\mathbf{s} - D[\mathbf{l}^2 - \langle \mathbf{l}^2\rangle_{\rm shell}],$$

where ω_0 is the oscillator frequency, ϵ the deformation parameter, and C and D are parameters that are the same for all shells of like nucleons in the investigated nucleus. This Hamiltonian was proposed in [2] and represents a modification of the universally known expression used in [3].

Just as in [4,5], we disregard the pairing forces and the Coulomb energy, which act in opposite directions. The pairing effect predominates at low deformations [6, 7] and the influence of the Coulomb energy becomes dominating at large deformations, especially in heavy nuclei [2,7]. However, the magnitudes of these effects will be subtracted in determining the difference of the equilibrium deformations $\Delta\varepsilon_0 = \varepsilon_0(A + 1) - \varepsilon_0(A)$ of two nuclei with neighboring mass numbers A. In addition, the plot of the total energy $E(\varepsilon)$ (including the Coulomb and pairing energies) against the deformation has a much broader minimum than the plot without allowance for the energies, and when the equilirbium deformation is determined with allowance for these two factors the error is larger [8]. It was therefore deemed expedient to estimate the difference $\Delta\varepsilon_0$ by using the method of minimizing the single-nucleon energies.

The single-particle levels of the protons and neutrons at values ε = 0, 0.1, 0.2, 0.3, 0.4, and 0.5 were tabulated by V. V. Pashkevich. The parameter C was chosen equal to $-0.1274 \times \hbar\mathring{\omega}_0$ for both neutrons and protons, and the parameter D equal to $-0.03822\hbar\mathring{\omega}_0$ for protons and $-0.02675\hbar\mathring{\omega}_0$ for neutrons [2].

We used these data to calculate the equilibrium deformations of even-even and odd nuclei for which the experimental values of the quadrupole moments are known [1]. The differences $\Delta\varepsilon_0$ of neighboring nuclei are listed in the table. The experimental values of the equilibrium

Comparison of experimental and theoretical values of $\Delta\varepsilon_0$

$^{A+1}Z(\Omega^\pi[Nn_z\Lambda]) - {}^AZ'$	$\Delta\epsilon_0$ exp.	$\Delta\epsilon_0$ theor.
^{153}Eu(p 5/2$^+$[413]) – ^{152}Sm	0.024_5	0.015 or 0.04
^{155}Gd(n 3/2$^-$[521]) – ^{154}Gd	0.006_7	< 0.01
^{157}Gd(n 3/2$^-$[521]) – ^{156}Gd	-0.008_7	< 0.01
^{159}Tb(p 3/2$^+$[411]) – ^{158}Gd	0.005_5	< 0.01
^{161}Dy(n 5/2$^+$[642]) – ^{160}Dy	0.021_{10}	0.01
^{163}Dy(n 5/2$^-$[523]) – ^{162}Dy	0.002_8	< 0.01
^{165}Ho(p 7/2$^-$[523]) – ^{164}Dy	-0.004_7	< 0.01
^{167}Er(n 7/2$^+$[633]) – ^{166}Er	0.003_5	< 0.01
^{173}Yb(n 5/2$^-$[512]) – ^{172}Yb	-0.004_7	< 0.01
^{175}Lu(p 7/2$^+$[404]) – ^{174}Yb	-0.020_5	–0.02
^{177}Lu(p 7/2$^+$[404]) – ^{176}Yb	-0.031_8	–0.02
^{177}Hf(n 7/2$^-$[514]) – ^{176}Hf	-0.022_7	–0.02
^{179}Hf(n 9/2$^+$[624]) – ^{178}Hf	-0.001_7	< 0.01
^{181}Ta(p 7/2$^+$[404]) – ^{180}Hf	-0.021_6	–0.02
^{187}Re(p 5/2$^+$[402]) – ^{186}W	-0.026_{14}	–0.02
^{189}Os(n 3/2$^-$[512]) – ^{188}Os	-0.008_{12}	< 0.01
^{191}Ir(p 3/2$^+$[402]) – ^{190}Os	-0.039_6	–0.04

deformations were determined from the relation

$$Q_0 = 0{,}8\, ZR_0^2 \epsilon_0 (1 + 1/2\, \epsilon_0)$$

using mean-weighted data on the internal quadrupole moments Q_0 [1]. Theoretical calculations of ε_0 were made for those level combinations under the Fermi surface, which corresponded to the experimental values of the spin, parity, and quarupole moment of the nucleus.

Addition of an unpaired particle to an even-even core leads to a slight change in the order of the level occupation only in the case of the nuclei ^{153}Eu and ^{191}Ir. In the remaining cases listed in the table, the sets of configurations entering in the total sum of the energies coincide in the even and odd nuclei (with the exception of the last unpaired particle). The change in the equilibrium deformation is therefore due entirely to the character of the polarization of the core by this particle.

If the particle fills a descending orbital of the single-particle scheme [2], then the minimum of the total energy shifts upon addition of this particle to the region of larger deformations; on the other hand, if it populates an ascending orbital, the shift is towards lower values of the deformation. Horizontal orbitals do not cause shifts of the minima. The magnitude of the shift is determined by the slope of the orbital of the unpaired nucleon. This is seen from the table, where steep orbitals in the nuclei ^{161}Dy, ^{175,177}Lu, ^{177}Hf, ^{181}Ta, and ^{187}Re correspond to a larger shift of both the calculated and experimental values of ε_0. In the nuclei ^{153}Eu and ^{191}Ir, a large change in the values of the deformations, compared with those of the preceding ^{152}Sm and ^{190}Os respectively, is obtained as the result of changes in one or two orbitals in the set of configurations. Such changes in the set of configurations under the Fermi surface are quite typical of nuclei in the transition regions or directly adjoining them [9]. Such nuclei include ^{153}Eu and ^{191}Ir [10]. In the remaining cases listed in the table, the shifts of the minima of the $E(\varepsilon)$ curves upon addition of an unpaired nucleon lie within the limits of the accuracy with which the values of ε_0 are interpolated, and therefore only the upper limits are given for the differences $\Delta\varepsilon_0$.

As seen from the table, there is good agreement between the experimental values and the theoretical estimates of the contribution of the unpaired nucleon to the deformation of the nucleus.

We are grateful to Professor S. Nilsson for a preprint of his article and to V. V. Pashkevich for supplying the tables of the single-particle levels.

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