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THE STRUCTURE OF $^6\text{Li}$ AND ITS COULOMB FORM FACTORS

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Nous étudions le $^6\text{Li}$ dans le cadre (1) du modèle de Hartree-Fock sur des fonctions d'onde d'essai projetées et (2) du modèle en couches avec correlation. Les facteurs de forme coulombiens, élastique et inélastique, sont calculés et comparés avec les données expérimentales.

The $^6\text{Li}$ nucleus has been studied within the framework of (1) the projected Hartree-Fock model and (2) the shell model with configuration mixing. The elastic and inelastic Coulomb form factors are calculated and compared with the experimental data.

Recently several precise measurements have been performed of the Coulomb form factors of $^6\text{Li}$ with results differing considerably from the previous ones. [1] - [4]

The CO form factor in the elastic electron scattering and the C2 form factor in the inelastic scattering to the first excited state given by these new data are shown in Fig. 1 and Fig. 2, respectively. The respective rms radius and $B(2\gamma)$ deduced from these are 2.54 fm and 25.1 $e^2 fm^4$. The CO form factor can be explained fairly well by modifying the radial behavior of the single-particle (s.p.) orbits without changing the simple shell-model configuration, $(\alpha \gamma)^4 (\alpha \beta)^2$. [5] It is impossible, however, to explain the C2 form factor by this method.

The projected Hartree-Fock (PHF) method offers a convenient way to take account of the effect of excited configurations. [6] A detailed calculation of the form factors on the basis of the PHF method has been made by Suzuki and this author. [7] Two types of trial s.p. orbits were investigated; (1) the deformed orbits with major-shell mixing and (2) the "molecular" orbits, which are a linear combination of the s.p. orbits around the a- and the deutron-clusters. The latter permits the introduction of parity-mixing into the trial wavefunctions and also the investigation of the importance of polarization of the a-4 structure. With the above trial functions, the energy variation and the $x^2$-fitting of the form factors have been performed. The results are shown in Figs.1,2 and Table 1. It is found that the C1 and higher configurations make an important contribution to the C2 form factor. An extended calculation is now in progress.

BIBLIOGRAPHIE

[5] Radhakant (S.) and Ullah (N.), Nucl.Phys. 1969, 66, 673
Table I - The rms radius and the $B(\gamma \gamma)$ calculated with the use of the wavefunctions given (a) by the energy variation or (b) by the $\chi^2$-fitting of the form factors.

<table>
<thead>
<tr>
<th></th>
<th>deformed orbit</th>
<th>molecular orbit</th>
<th>shell model</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>rms radius (fm)</td>
<td>2.29</td>
<td>2.42</td>
</tr>
<tr>
<td></td>
<td>$B(\gamma \gamma)$ ($e^2 fm^4$)</td>
<td>11.6</td>
<td>18.4</td>
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<tr>
<td>b</td>
<td>rms radius (fm)</td>
<td>2.36</td>
<td>2.41</td>
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<td></td>
<td>$B(\gamma \gamma)$ ($e^2 fm^4$)</td>
<td>17.7</td>
<td>19.5</td>
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<tr>
<td></td>
<td>$\chi^2$-value for $2\gamma$</td>
<td>2.7</td>
<td>1.2</td>
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<tr>
<td></td>
<td>$\chi^2$-value for $0\gamma$</td>
<td>44.4</td>
<td>25.5</td>
</tr>
</tbody>
</table>

Fig. 1 - The elastic form factor.

- - - - Deformed-orbit model
- - - - 2k$\hbar$ Shell Model
- - - - - - Molecular-orbit model

Fig. 2 - The inelastic form factor

- - - - - - - - - - - - Deformed-orbit model
- - - - - - - - - - - - Molecular-orbit model
- - - - - - - - - - - - Shell model with 2k$\hbar$ excitations