THE STRUCTURE OF ^{6}Be

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There is a serious disagreement between the experiment and the prediction on the flux of solar neutrinos[1,2]. An eventual resonance in the scattering ^{3}He + ^{3}He might remove the disagreement.

This contribution presents the calculation of the structures in ^{6}Be which come into the calculation of the reaction $[^3\text{He}+^3\text{He}] \rightarrow [^3\text{He}+^3\text{He}] + [^5\text{Li}+\text{p}]$. The ^{6}Be which appears as an intermediate system is described as an interplay [3] of two cluster structures (^{3}He+^{3}He) and (^{5}Li+p).

The trial wave function of the generator coordinate type is the superposition of two-centre Slater determinants corresponding to both cluster structures

$$\sum_{K,\varkappa_1} \int d\underset{\sim}{S}_1 \, f^{J\pi}_{\mathrm{Li},p,K,\varkappa_1}(\underset{\sim}{S}_1) P^{J\pi}_{MK} \mathcal{A}\left\{ \Phi^{\varkappa_1}_{\mathrm{Li}}(\underset{\sim}{S}_{\mathrm{Li}}) \, \Phi^{\varkappa_1}_{p}(\underset{\sim}{S}_p) \right\} +$$

$$\sum_{K,\varkappa_2} \int d\underset{\sim}{S}_2 \, f^{J\pi}_{^3\mathrm{He},^3\mathrm{He},K,\varkappa_2}(\underset{\sim}{S}_2) P^{J\pi}_{MK} \mathcal{A}\left\{ \Phi^{\varkappa_2}_{^3\mathrm{He}(1)}(\underset{\sim}{S}_{^3\mathrm{He}(1)}) \, \Phi^{\varkappa_2}_{^3\mathrm{He}(2)}(\underset{\sim}{S}_{^3\mathrm{He}(2)}) \right\},$$

$x=(x_1,\ldots,x_6)$. $\underset{\sim}{S}_1=\underset{\sim}{S}_{\mathrm{Li}}-\underset{\sim}{S}_p$. $\underset{\sim}{S}_2=\underset{\sim}{S}_{^3\mathrm{He}(1)}-\underset{\sim}{S}_{^3\mathrm{He}(2)}$. $P^{J\pi}_{MK}$ is the projector of angular momentum and parity and $\varkappa_1$, $\varkappa_2$ run over shell-model configurations. The variational principle leads to a system of coupled Hill-Wheeler equations for amplitudes $f^{J\pi}_{\mathrm{Li},p,K,\varkappa_1}$ and $f^{J\pi}_{^3\mathrm{He},^3\mathrm{He},K,\varkappa_2}$. The radial part of the two-body interaction used is of the Volkov type [4,5].

The energy levels are obtained (i) for the two-cluster structure (^{3}He+^{3}He), (ii) for the two-cluster structure (^{5}Li+p) and (iii) for the coupled system of both cluster structures.

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