

BONDING WOODS-SAXON POTENTIAL AND THE MECHANISM OF RESONANCE STATES IN THE $^{12}\text{C}+^{12}\text{C}$ SYSTEM

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Since the discovery by Bromley (1960) [1] of narrow resonances in the $^{12}\text{C}+^{12}\text{C}$ system near the Coulomb barrier, the concept of molecular resonances has become an interesting theoretical as well as experimental study in nuclear physics. Over the years an impressive array of data has been accumulated and different theoretical approaches have been developed on the basis of a diatomic molecular picture with qualitative success. The understanding of the mechanism is far from satisfactory owing to the lack of information about the nature of the bonding potential which gives rise to these resonances. A very interesting resonance has been observed by Wuosmaa et al. [2] in the inelastic channel of the $^{12}\text{C}+^{12}\text{C}$ system with both ^{12}C excited to the famous O^+_2 state - a linear chain configuration of three-alpha particles. This resonance is naturally expected to have a certain structure consisting of 6α cluster. As an interesting possibility, a linear chain of six α particles was discussed in work [3]. On the other hand, another interpretation was proposed: the resonance has the 6α cluster configuration of weakly coupled two $^{12}\text{CO}^+_2$ [4]. It should be noticed that there are many other resonances observed in the $^{12}\text{C}+^{12}\text{C}$ system, most of which are not yet understood.

In present work the $^{12}\text{C}+^{12}\text{C}$ system are investigated in the realistic Woods-Saxon potential with Coulomb interaction. The comparison of the calculated states with the experimental data has shown, that the observed (identified) resonances may be explained by the single-channel description, i.e., as potential resonances. The quadrupole moments and transition probabilities for low-lying states have been calculated.

LITERATURE

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