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Study of Few-Body Nuclei by Feynman's Continual Integrals and Hyperspherical Functions

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The probability densities for the ground states of ${}^3\text{H}$, ${}^3,4,6\text{He}$, ${}^9\text{Be}$ nuclei were calculated in Refs. [1, 2] by Feynman's continual integrals method in imaginary (Euclidean) time [3, 4]. The present work is devoted to studying other light nuclei ${}^6,7,9,11\text{Li}$, ${}^6,10\text{Be}$ using the same approach. For example, the probability density for the ${}^6\text{Li}$ nucleus is shown in Figure. The correctness of calculations was checked by comparison with the results of the expansion in hyperspherical functions (K -harmonics) [5] using new effective method for the solution of the system of hyperradial equations using cubic splines [6].

Figure. The probability density for the ${}^6\text{Li}$ nucleus and the vectors in the Jacobi coordinates; neutrons are denoted as small empty circles, protons and alpha-clusters are denoted as small filled circles and large filled circles, respectively. The only one possible configuration is alpha-cluster + deuteron-cluster.

References

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Selected session

Few body systems

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