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Study of ground states of 13,14C, 13,14N, 14O nuclei by Feynman's continual integrals

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The ground states of ^{13,14}C, ^{13,14}N, ^{14}O nuclei were studied in two complementary few-body models. In first model the studied isotopes were considered as cluster nuclei with following configurations: ^{13}C ($3\alpha+n$), ^{14}C ($3\alpha+2n$), ^{13}N ($3\alpha+p$), ^{14}N ($3\alpha+n+p$), ^{14}O ($3\alpha+2p$). In second model the studied isotopes were considered as systems consisting from nuclear core ^{12}C and one or two valence nucleons. The wave functions and energies of these few-body systems were calculated by Feynman's continual integrals method in Euclidean time [1–3]. The algorithm of parallel calculations was implemented in C++ programming language using NVIDIA CUDA technology [4]. Calculations were performed on the NVIDIA Tesla K40 accelerator installed within the heterogeneous cluster of the Laboratory of Information Technologies, Joint Institute for Nuclear Research, Dubna [5]. Results of the few-body model were compared with results of the shell model of deformed nuclei [6, 7].

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