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Calculation of ground states of few-body nuclei using NVIDIA CUDA technology

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The possibility of application of modern parallel computing solutions to speed up the calculations of ground states of few-body nuclei by Feynman's continual integrals method has been investigated. These calculations may require large computational time, particularly in the case of systems with many degrees of freedom. The results of application of general-purpose computing on graphics processing units (GPGPU) using NVIDIA CUDA technology are presented. The algorithm allowing us to perform calculations directly on GPU was developed and implemented in C++ programming language. 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. The energy and the square modulus of the wave function of the ground states of several few-body nuclei have been calculated. The results show that the use of GPGPU significantly increases the speed of calculations.

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