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**Monte Carlo Simulation of three dimensional Edwards Anderson model with multi-spin coding and parallel tempering using MPI and CUDA**[1] SHENG FENG, Department of Physics and Astronomy, Louisiana State University, YE FANG, Center for Computation and Technology, Louisiana State University, KA-MING TAM, Department of Physics and Astronomy, Louisiana State University, BHUPENDER THAKUR, ZHIFENG YUN, Center for Computation and Technology, Louisiana State University, KAREN TOMKO, Ohio Supercomputer Center, JUANA MORENO, Department of Physics and Astronomy, Louisiana State University, JAGANNATHAN RAMANUJAM, Center for Computation and Technology, Louisiana State University, MARK JARRELL, Department of Physics and Astronomy, Louisiana State University — The Edwards Anderson model is a typical example of random frustrated system. It has been a long standing problem in computational physics due to its long relaxation time. Some important properties of the low temperature spin glass phase are still poorly understood after decades of study. The recent advances of GPU computing provide a new opportunity to substantially improve the simulations. We developed an MPI-CUDA hybrid code with multi-spin coding for parallel tempering Monte Carlo simulation of Edwards Anderson model. Since the system size is relatively small, and a large number of parallel replicas and Monte Carlo moves are required, the problem suits well for modern GPUs with CUDA architecture. We use the code to perform an extensive simulation on the three-dimensional Edwards Anderson model with an external field.

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