

Abstract Submitted
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Solving Coupled Gross–Pitaevskii Equations on a Cluster of PlayStation 3 Computers¹ MARK EDWARDS, Georgia Southern University and NIST, JEFFREY HEWARD, Georgia Southern University, C.W. CLARK, NIST — At Georgia Southern University we have constructed an 8+1–node cluster of Sony PlayStation 3 (PS3) computers with the intention of using this computing resource to solve problems related to the behavior of ultra–cold atoms in general with a particular emphasis on studying bose–bose and bose–fermi mixtures confined in optical lattices. As a first project that uses this computing resource, we have implemented a parallel solver of the coupled time–dependent, one–dimensional Gross–Pitaevskii (TDGP) equations. These equations govern the behavior of dual– species bosonic mixtures. We chose the split–operator/FFT to solve the coupled 1D TDGP equations. The fast Fourier transform component of this solver can be readily parallelized on the PS3 cpu known as the Cell Broadband Engine (CellBE). Each CellBE chip contains a single 64–bit PowerPC Processor Element known as the PPE and eight “Synergistic Processor Element” identified as the SPE’s. We report on this algorithm and compare its performance to a non–parallel solver as applied to modeling evaporative cooling in dual–species bosonic mixtures.

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