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High Performance Computing Workflow for Liquid Argon Time Projection Chamber Neutrino Experiments

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Neutrino experiments that use liquid argon time projection chamber (LArTPC) detectors are growing bigger and expect to see more neutrinos with next generation beams, and therefore will require more computing resources to reach their physics goals of measuring CP violation in the neutrino sector and exploring anomalies. These resources can be used to their full capacity by incorporating parallelism through multi-threading and vectorization within algorithms, and by running these algorithms on High Performance Computers (HPCs). A HPC workflow is being developed for LArTPC experiments to take advantage of all of levels of parallelism, within and across nodes. It will be used to enhance the statistics available for use in physics analysis and will also make it possible to efficiently incorporate AI algorithms. Additional opportunities to incorporate parallelism within LArTPC algorithms is also being explored.

Experiment context, if any

References

Significance

Authors: REINSVOLD HALL, Allison (Fermilab); NORRIS, Boyana (University of Oregon); CERATI, Giuseppe (Fermi National Accelerator Lab. (US)); KOWALKOWSKI, Jim (Fermilab); KNOEPFEL, Kyle; PATERNO, Marc; WOSPAKRIK, Marianne (Fermi National Accelerator Laboratory); YILDIZ, Orcun (Argonne National Lab); Dr GARTUNG, Patrick (Fermilab (US)); ROSS, Robert (Argonne National Lab); SEHRISH, Saba (Fermilab); SYED, Sajid; BERKMAN, Sophie; PETERKA, Thomas (Argonne National Lab); KETCHUM, Wesley (Fermi National Accelerator Laboratory)

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