Massively parallel Monte Carlo simulations with HPC

Scientific Achievement

New event generation and analysis framework suitable for massively parallel processing at HPC facilities

Significance and Impact

Best simulation of V+jets: arXiv:1905.05120 [hep-ph] (in collaboration with S. Hoeche)

Generic Monte Carlo event simulation with efficient use of HPC resources

Research Details

- Compute parallelism with ASCR's DIY
- Data parallelism with HDF5
- Particle level simulation with Pythia8
- Analysis with Rivet
- Supports reading standardized LHE events in HDF5 format
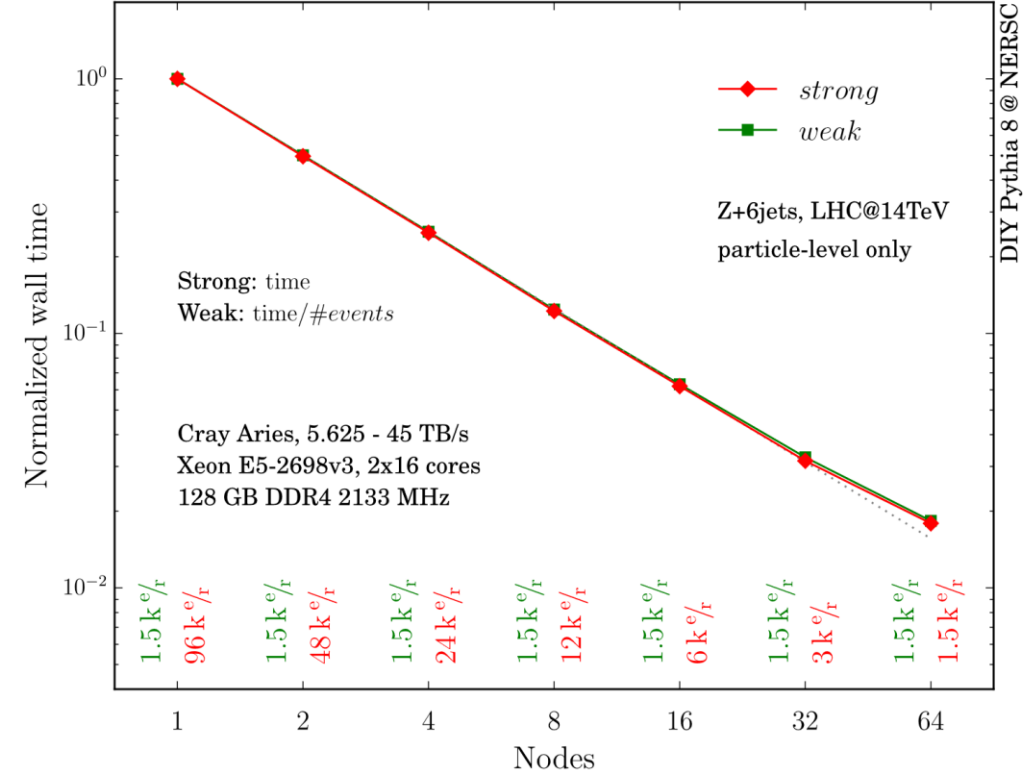
Scaling of particle level event simulation at NERSC. We observe very good scaling up to 2000 ranks.

Repositories:
- https://bitbucket.org/iamholger/pythia8-diy
- https://bitbucket.org/iamholger/lheh5