**Major equipment at the University of Michigan that is relevant to this proposal**

**Great Lakes HPC cluster.** The primary computing resource that we will utilize for this project is the new, Great Lakes HPC cluster. Great Lakes is an HPC Linux-based cluster intended to support parallel and other applications that are not suitable for departmental or individual computers. Each Great Lakes compute node comprises multiple CPU cores with at least 4 GB of RAM per core; Great Lakes has approximately 14,000 cores. All compute nodes are interconnected with InfiniBand networking. The larger memory Great Lakes hardware comprises 3 compute nodes, each configured with 1.5 TB RAM. Great Lakes contains 20 GPU nodes, with a total of 40 NVIDIA Tesla V100 CUDA-capable GPUs. There are also 4 visualization nodes available, each equipped with a single NVIDIA Tesla P40. Computing jobs on Great Lakes are managed through the SLURM Scheduler. The high-speed scratch file system provides 2 petabytes of storage at approximately 80 GB/s performance (compared to 7 GB/s on Flux). All Great Lakes nodes are interconnected with InfiniBand HDR100 networking, capable of 100 Gb/s throughput. In addition to the InfiniBand networking, there is 25 Gb/s ethernet for the login and transfer nodes and a gigabit Ethernet network that connects the remaining nodes. This is used for node management and NFS file system access. Great Lakes is connected to the University of Michigan’s campus backbone to provide access to student and researcher desktops as well as other campus computing and storage systems. The campus backbone provides 100 Gbps connectivity to the commodity internet and the research networks Internet2 and MiLR. The Great Lakes cluster includes a comprehensive software suite of commercial and open source research software, including major software compilers, and many of the common research-specific applications. Great Lakes computing services are provided through a collaboration of University of Michigan units: Advanced Research Computing (in the Office of the VP of Research and the Provost’s Office), and computing groups in schools and colleges at the university.