

Understanding the dynamics of quarks and gluons is a challenge for physicists today. The physics required exceed traditional Quantum Field Theory. The goal for physicists is to determine the fundamental parameters that describe each particle in the current standard model.

Quantum Chromodynamics (QCD) is a theory that has proven to be very accurate in the determination of these parameters. Lattice Quantum Chromodynamics (LQCD), which is a discretized version of QCD, replaces the continuum with a four-dimensional grid for its calculations. LQCD is a challenging computational field that employs large-scale numerical calculations, and will be used to verify the current standard model.

To improve these calculations, it is necessary to exploit machines at a higher level. This could be achieved by employing Grid and Cluster Based Computing. Cluster Computing would do calculations faster and Grid Computing would enable international access to large sets of data, expanding the resources available to the lattice community.

Currently, there exist programs like International Lattice Data Grid (ILID), whose goal is to provide the infrastructure necessary to exchange data sets between scientific communities, accelerating LQCD science. National laboratories, such as Jefferson's Laboratory in Virginia, Brook Haven National Laboratory in New York, and FermiLab in Chicago, are constructing clusters of up to 512 processors to speed up LQCD calculations.

My current research, which involves LQCD, would greatly benefit from enhancing my knowledge of Grid and Cluster Bases computing, and from maintaining

proficiency in computer programming and networking. Training obtained within the CyberBridges Fellowship would aid in the advancement of my anticipated research, permitting its extension beyond local margins. This opportunity could shape the nature of future LQCD calculations.