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## Lattice QCD Clusters at Fermilab

*Monday 27 September 2004 14:40 (20 minutes)*

As part of the DOE SciDAC “National Infrastructure for Lattice Gauge Computing” project, Fermilab builds and operates production clusters for lattice QCD simulations. We currently operate three clusters: a 128-node dual Xeon Myrinet cluster, a 128-node Pentium 4E Myrinet cluster, and a 32-node dual Xeon Infiniband cluster. We will discuss the operation of these systems and examine their performance in detail. We will describe the uniform user runtime environment emerging from the SciDAC collaboration.

The design of lattice QCD clusters requires careful attention towards balancing memory bandwidth, floating point throughput, and network performance. We will discuss our investigations of various commodity processors, including Pentium 4E, Xeon, Itanium2, Opteron, and PPC970, in terms of their suitability for building balanced QCD clusters. We will also discuss our early experiences with the emerging Infiniband and PCI Express architectures. Finally, we will examine historical trends in price to performance ratios of lattice QCD clusters, and we will present our predictions and plans for future clusters.

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