Revised Resource Request by Projects

We realize that our resource request is large. Indeed, it is limited by what we thought was reasonable to ask for, rather than by the science we would like to accomplish in the coming year. To minimize our request, we only asked for resources on the machines on which our code runs best: the NCSA Tungsten Cluster, the PSC Cray XT3 and the Teragrid Clusters. We did not ask for time on the PSC Alpha-Server Lemieux, even though we have used it to great advantage since it was installed, because our code runs approximately 60% slower on it than on the above machines. However, after we had submitted our proposal, we learned that Lemieux may be under-subscribed for the coming year. If this is the case, we could use Lemieux to significantly enhance our research.

As pointed out in our proposal, during the coming year we expect to generate gauge configurations at a lattice spacing of $a = 0.09$ fm with a light quark mass $m_l = 0.1\,m_s$. We also expect to generate two sets of configurations with a lattice spacing of $a = 0.06$ fm, with light quark masses $m_l = 0.4\,m_s$ and $0.2\,m_s$. These are the two smallest lattice spacings at which simulations in full QCD have been run to date, and the $0.1\,m_s$ run has the smallest light quark mass simulated to date. Thus, these runs will greatly improve the accuracy of a wide variety of calculations. In our proposal we requested time to evaluate the masses of a number of strongly interacting particles and to study the properties of light pseudoscalar mesons on these configurations. In particular we proposed to analyze 200 of the $a = 0.09$ fm configurations, 200 of the $a = 0.06$ fm, configurations with $m_l = 0.4\,m_s$, and 125 of the $a = 0.06$ fm configurations with $m_l = 0.2\,m_s$. Since our code runs at approximately 60% of the speed on Lemieux as it does on the Cray or the Tungsten cluster, we see from the proposal that 575,000 processor-hours on Lemieux would be required to analyze an additional 100 $a = 0.09$ fm configurations, 688,000 processor-hours to analyze 50 $a = 0.06$ fm configurations with a light quark mass $m_l = 0.4\,m_s$, and 1,435,000 processor-hours to analyze 75 $a = 0.06$ fm configurations with a light quark mass $m_l = 0.2\,m_s$. The total would then be 2,698,000 processor-hours on Lemieux. If this time were available, it would greatly enhanced the progress of our research. If only a fraction of the time is available, we could make very good use of it by analyzing a subset of the configurations. We have therefore added time on Lemieux to the last column of Table 1.

A breakdown of our request by projects and computing platforms is given in Table 1. We request 2,577,000 processor-hours on the NCSA Tungsten Cluster, 1,891,500 processor-hours on the PSC Cray XT3, and 1,500,000 processor-hours on the Teragrid Itanium Clusters. Our code performs similarly on a per processor basis on each of these platforms, so our projects can be moved among them if that would help with load balancing. The timing estimates on these three machines come from benchmarks on one or more of them, unless otherwise noted in the proposal. As previously noted, on Lemieux our code runs at approximately 60% the speed obtained on the above machines, so if part of our request for these platforms is moved to Lemieux, we ask that the number of transferred service units be increased by a factor of 1.67. We are eager to try the SDSC BlueGene/L and request an allocation of 100,000 processor-hours on it to adapt our code and run benchmarks on production sized jobs. Although we have not requested time for production work on DataStar at SDSC, we do ask that our accounts on DataStar be kept open, as they have been for the last two years, so that we can continue to access the large amount of data we have in archival storage at SDSC.

Table 1: Resource Request by Projects in Processor-Hours

Project	Tungsten Cluster	Teragrid Cluster	Cray TX3	BlueGene/L	Lemieux
Spectrum and Light Pseudoscalars	2,277,000	1,500,000			2,698,000
Weak Decays of Heavy-Light Mesons			1,460,000		
Partially Quenched Baryon Masses			431,500		
Equation of State	300,000				
Code Adaptation and Benchmarking				100,000	
Totals	2,577,000	1,500,000	1,891,500	100,000	2,698,000