

Budget Justification

The four senior personnel on this project, Dr. Phil Cole, Dr. Dan Dale, Dr. Tony Forest, and Dr. Dustin McNulty each have established physics programs at Jefferson Lab (JLab) and will continue to pursue those endeavors using the support itemized in the budget. Nearly half of the budget for this proposal is devoted to supporting several graduate students currently pursuing their Ph. D. degrees within the JLab research program. In addition, the budget accounts for two undergraduate students to be supported by this grant. Undergraduates supported in past years have made substantial contributions to the program while gaining research experience. The support from this grant will be used to extend those experiences to include accelerator operations. We plan to use undergraduates as operators of the accelerators we will be using to provide ionizing radiation for testing the detectors we build.

To greatly assist in the productivity of the proposed Hall B, 6 and 12 GeV, research activities, the budget provides three years of funding to support a postdoctoral researcher to be stationed full-time at JLab. The significance of the ISU group's involvement in the present and future Hall B physics programs justifies the need for this expense which represents $\sim 22\%$ of the budget.

Our annual travel budget of \$30,000 is based primarily on the several collaboration meetings we will need to attend at JLab as well as the number of shifts we expect to take. The ISU group will be assigned 16 CLAS shifts in 2012 which requires at most 4 trips to JLab when the shifts are taken in blocks of 4. Our past experiences indicate that the costs of an individual trip to JLAB from Idaho range between \$1,200 and \$2,000 per trip. We estimate that we will spend approximately \$8,000 per year in order to absorb the market fluctuations as well as the probable increases in travel costs. Each PI expects to attend at least 2 collaboration meetings per year. The PI's have substantial roles in the CLAS, PRIMEX, Qweak, and MOLLER collaborations. We estimate a cost of \$16,000 for this travel. We also expect to present the results of our work at conferences each year and request \$6,000 to defray those costs.

A shipping budget for \$100 is requested to support the exchange of materials between JLab and ISU as we continue construction of the RI tracking system for CLAS12. Our Laboratory for Detector Science expends on average \$2000 in consumables each year. We expect to upgrade or replace an average of 1 computer each year which is used for data acquisition or analysis at a cost of \$1000. We will also add to our data acquisition system by purchasing NIM/VME modules at a cost of \$3000. During the first year we plan on purchasing F1 TDC's for the purpose of measuring the performance of Drift Chambers developed as part of the CLAS 12 GeV upgrade. We plan on purchasing several more channels of leading edge discriminators and post amplifiers in the final two years to increase the number of detector channels we are capable of measuring with our current CODA based DAQ system.