

## Budget Justification

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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.

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 stationed full-time at JLab. The postdoc is intended to help pave the way for the ISU group to transition electroproduction  $N^*$  studies in CLAS6 to CLAS12. For additional information, please refer to the Mentoring Plan and the Letter of Support from the Hall-B group leader, Volker Burkert. 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 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 for the first half of 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 two collaboration meetings per year. The PIs 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 help 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 TDCs 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, gate generators, and signal 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.