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FINAL TECHNICAL REPORT

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"Continuation of Support for the Intercampus Institute for Research at Particle Accelerators"

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During the budget period beginning May 16, 1995, the UCSD group of the U.C. Intercampus Institute for Research at Particle Accelerators devoted approximately 75% of its effort to the PEP-II B Factory and the associated BABAR detector at SLAC, and 25% of its effort to the LSND collaboration at LAMPF. Michael Sullivan spent all of his time on PEP-II, while Alan Eisner split his time between BABAR and LSND.

Sullivan remained a critical member of the group designing the PEP-II interaction region and the machine-detector interface; and, in fact, toward the end of the period he left IIRPA to become a SLAC employee, in order to ensure his continued participation in those efforts. That work has focused on developing an interaction region in which the accelerator can achieve the required high specific luminosity while, at the same time, maintaining low enough beam backgrounds to allow a detector to operate. Both requirements are essential to achieving the primary physics goal of not only detecting but doing detailed measurements of CP violation.

Eisner's work on the BABAR detector concentrated on the electromagnetic (CsI crystal) calorimeter. With the calorimeter geometry largely established, he turned his attention more fully to the areas of calorimeter data acquisition and calibration. The data acquisition focus, was on understanding the performance of the proposed system via calculations and simulations, a joint project with Yao-xun Wang of the UCSB IIRPA group. Eisner also chaired an active task force on calorimeter calibration, and worked on developing an overall calibration scenario. During this period the task force concentrated on the requirements, implementation options, and data acquisition implications of a radioactive gamma source system, which is an important ingredient in that scenario. This work culminated in a detailed report (May, 1996) on source calibration options, which in turn led to the decision by the calorimeter group to proceed with a circulating-fluid source system. (The report was later released as BABAR Note 322.) Finally, Eisner continued to participate in discussions (but not hardware development) of the BABAR trigger system, an area of interest based both on long experience and on its critical importance for two-photon physics, another long-term interest.

The LSND work concentrated on detector Monte Carlo developments and studies, and (in collaboration with the UCSB group) on physics analysis, particularly for the key neutrino oscillation measurements. This period saw the preparation of the detailed paper on the LSND experiment (since published in Nuclear Instruments and Methods), a paper

to which we actively contributed; and of both Physical Review Letters and Physical Review papers spelling out the confirmation of evidence for oscillations of anti-muon neutrinos to anti-electron neutrinos. The IIRPA and UCSB groups put much effort into studying the statistical significance of the results and their interpretation in terms of possible oscillation parameters. (In the latter area we were only partly successful in getting the results of these careful analyses embodied in the papers.)