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Neutrino Factory and Muon Collider Collaboration FY05 Supplemental Funding Request

DOE budget guidance for FY05 indicates a budget for the MC of only \$1.4M. At this reduced funding level, it will be impossible to complete some of the critical hardware development intended for this year. This request for supplemental funds, prepared in consultation with MC Co-spokespersons Stephen Geer and Robert Palmer, outlines the key areas where additional funds would permit us to make more rapid technical progress during FY05. The total request for supplemental funds is \$925K; *the ordering of the items listed reflects our view of their importance to the MC R&D program*. In both cases, partial funding would still advance the program. Thus, in the event that we do not get the entire amount requested, we would plan to use the funds to optimize the R&D program based on the budget available. We note that MUTAC and MCOG have both strongly endorsed our R&D program directions, verified that we are using our funds efficiently, and indicated to DOE that we are sorely in need of additional funding to make progress in a timely way.

1) *Targetry Magnet Cryogenics System (\$525K)*

Validating the target design for a Neutrino Factory requires that we perform beam tests—at realistic intensities and with realistic target parameters—in a high-field solenoid. In the absence of beam time in the A3 line at BNL, we have proposed an international Targetry experiment to be carried out at CERN, most likely during 2007. During FY04, fabrication of a pulsed magnet capable of operating at field levels between 5 and 15 T was nearly completed. In order to test the magnet, two things are needed—a 4.5 MW power supply and a cryogenics system that will permit magnet operation at about 70 K. We anticipate having sufficient MC funds to purchase the power supply in FY05, but would require supplemental funding in order to fabricate the cryogenics system. With supplemental funding, the magnet, along with its power supply and cryogenics system, would be available for initial testing in less than two years¹; without incremental funds, we anticipate a 1–2 year delay in operating the magnet. This would seriously delay, and potentially jeopardize, the proposed CERN Targetry experiment.

2) *Coupling Coil Design and Construction (\$400K)*

To fully test the recently fabricated 201-MHz RF cavity in the MUCOOL Test area, a large solenoid (“coupling coil”) surrounding the cavity is needed. These funds would permit developing a full engineering design for the coil and ordering

¹Funding at about the \$500K level will also be needed in FY06 and FY07 to install the magnet and its ancillary mercury-jet target system at CERN, in preparation for the Targetry beam experiment at the SPS.



the requisite superconducting cable. We anticipate that magnet fabrication could then be completed in FY06, permitting us to begin to address what is likely to be the most critical issue for a Neutrino Factory—behavior of a high-gradient 201-MHz RF cavity in a strong solenoidal field. We have already demonstrated in tests at 805 MHz that the influence of a superimposed solenoidal field on an RF cavity drastically changes the cavity behavior, lowering the achievable gradient by roughly a factor of two. Lack of supplemental funds will delay the beginning of coupling coil fabrication by at least one year, making it impossible to proceed in a timely way with RF testing in the presence of a realistic cooling channel magnetic field configuration. Such a delay may also lead to some slowdown in preparations for the Muon Ionization Cooling Experiment (MICE).