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Director's Office

December 14, 2011

Doug Glenzinski
MS. 122

Dear Doug:

Thank you for your review of the current status of the Mu2e experiment at the recent Fermilab Physics Advisory Committee (PAC) meeting. I had charged the PAC with commenting on Mu2e, and that charge and the PAC response are attached.

As you see, the PAC was very encouraged that, with the recent changes in plans, the cost of the experiment could be brought back to earlier estimates while not compromising on the eventual sensitivity of the measurement. At the same time, the PAC recognized how challenging the Mu2e project and experiment will be, and we recognize that to meet the recommendations of the Committee, the Laboratory will need to be both supportive and pay attention to the progress and needs of the effort. We will certainly do this.

Again, thank you, Doug, for taking the time needed to prepare and make your presentation.

Sincerely,

A handwritten signature in blue ink that reads "Piermaria Oddone". The signature is fluid and cursive, with a long horizontal stroke at the end.

Piermaria Oddone

cc:

B. Bernstein
J. Miller
Y. Kim
S. Henderson
R. Kephart
G. Bock
J. Appel

R. Dixon
V. White
G. Apollinari
C. Hogan
M. Lindgren
V. Shiltsev
L. Bauerdick

D. Bryman
M. Procaro
J. Whitmore
J. Reidy
D. Levy
S. Beering

(Charge in italics)

The Mu2e experiment is modifying its design as it moves through the CD process, and is also continuing to refine its understanding of the physics reach of the experiment. Please review the current thinking on the experiment design (both beam and detector) and comment on the potential effects of the evolving design on the experiment's physics reach, as well as progress on simulations.

Mu2e

The Committee heard a presentation on the status of the Mu2e experiment, which aims for an unprecedented improvement of four orders of magnitude in sensitivity for muon-to-electron conversion. In order to contain project costs within the anticipated budget, the project group worked effectively with the Laboratory to make substantial revisions of the plans for the accelerator and experimental configurations. The requirements were scrutinized, the proton delivery scheme was re-evaluated by an accelerator task force, and major costs were reviewed. The removal of the Accumulator from the proton delivery system resulted in substantial savings at the expense of about a factor of three in intensity which can be compensated by a longer run time. The Committee commends the Collaboration and the Laboratory for this timely work.

Since Mu2e is a challenging experiment, requiring considerable resources, its estimates of sensitivity and expected background rates deserve careful scrutiny. The Committee was pleased to hear of the progress being made on detailed simulations and on the initial assessments of uncertainties in the background estimates. Recent investigation of backgrounds has prompted the requirement for an order-of-magnitude improvement in the proton-extinction level. The Committee recommends that the demonstration of the proton-extinction capabilities be carried out in a timely manner. The Committee encourages the experiment to continue to quantify the risks associated with uncertainties in sensitivity and background projections, making measurements where possible, and to put mitigation plans into place as early as possible to avoid erosion of discovery capability. The Committee also recommends that the Laboratory pay particular attention to ensure that the project is ready for effective reviews.