July 6, 1999
Peter Cooper
MS 122

Dear Peter,

Thank you for your presentation of proposal P-905, "Charged Kaons at the Main Injector (CKM)", at the May meeting of the Fermilab Physics Advisory Committee (PAC); thank you also for your responses to the PAC's questions from that meeting. At the June meeting of the PAC in Aspen, I asked the PAC to review the fixed-target program using the Main Injector. Specifically, I asked them to give a preliminary rating of the individual experiments and to make recommendations on what response should be given to each experiment. The Committee's comments on the Main Injector fixed-target program are as follows:

"The Committee has received proposals for nine experiments: eight fixed-target experiments that would use beams of, or derived from, 120 GeV protons using decelerated antiprotons. Though not all of these experiments meet the threshold needed for further consideration, the best of them suggest that a fixed-target program of high quality could be mounted at Fermilab. The Committee recommends that the Laboratory pursue such a program.

The fixed-target program requires a slow spill to minimize instantaneous interaction rates. This lengthens the Main Injector cycle time, reducing the antiproton stacking rate and thus the Collider luminosity. The Main Injector cycle time is 1.5s for dedicated antiproton production, 2.0s with NuMI, and 3.0s (for a 1s slow spill) with fixed-target running (with or without NuMI). This must be taken into account when scheduling any fixed-target experiment."

The Committee felt that the two kaon experiments, CKM and KAMI, if proven technically feasible, would form the core of a 120 GeV fixed-target program. The Committee's comments on CKM follow:

"The goal of CKM is to measure the branching ratio of $K^+ \to \pi^+ \nu \bar{\nu}$ with about 70 signal events and 7 events of backgound. In the Standard Model, the measured branching ratio provides a constraint on the CKM parameter $|V_{td}|$. Comparison with other constraints can indicate flavor-changing effects from physics beyond the Standard Model. With technical issues nearly as fearsome as KAMI's, this collaboration needs strengthening. A Brookhaven group proposes an experiment of sensitivity intermediate between that already achieved and that proposed by CKM. The groups are eager to collaborate on both experiments, and the Committee agrees that a combined effort would make each experiment more likely to succeed. The CKM group needs support from Fermilab to perform R&D and to bring resources to their collaboration with Brookhaven. The Committee recommends this support, without which the CKM group is not viable. Assistance from the Brookhaven group in preparing the CKM proposal would also be valuable."

After careful consideration of the impact on Collider Run II proton economy and the resources available, it appears that the appropriate timing for consideration of a 120 GeV fixed-target program would be in spring of 2001. By then, we will have made a good start on Run II, and the NuMI Project construction should be well underway. Therefore we should be able to make a realistic evaluation of the impact of a fixed-targe program.

I accept the Committee's recommendation to pursue CKM as a possible component of a 120 GeV fixed-target program. As a next step, you should work with Michael Shaevitz, the Associate Director for Research, to develop a plan for funding the CKM R&D program and the collaboration with BNL. Since the RF-separated K^+ beam is an important component of the CKM proposal, I urge you to work with members of the CP/T collaboration who have been active in the development of that beam.

Sincerely,
Michael Witherell