



U.S. Muon Accelerator Program Memorandum

August 13, 2012

From: Mark Palmer, Director, U.S. Muon Accelerator Program
To: The Muon Accelerator Staging Study (MASS) Working Group
Subject: Establishment of the Muon Accelerator Staging Study

The Muon Accelerator Staging Study (MASS) working group is being established by the U.S. Muon Accelerator Program (MAP) to provide key program planning inputs during the MAP Feasibility Assessment Phase. The updated MAP plan, which will be reviewed by the U.S. Department of Energy later this year, envisions this feasibility assessment occurring in two parts – Phase I (FPI) covering the period FY13-15 and Phase II (FPII) covering the period FY16-18. During this time, the principal focus of the program is to validate the design concepts and technologies that will enable a project to build a neutrino factory and/or muon collider. The results of these assessments will enable the HEP community to make an informed decision on its path forward.

In addition to the design and technical demonstrations required for this assessment, it is necessary to understand how a path forward that incorporates a progressive program of accelerator R&D along with the production of key physics results might evolve. The MASS working group will be the body within MAP tasked with the development of an overarching vision for the program that can enable the U.S. High Energy Physics Program to achieve its goals at Intensity Frontier and provide a path to a new Energy Frontier facility. Thus the working group will be established to provide such guidance during Phase I of the MAP Feasibility Assessment, and will be expected to present its conclusions as one of the deliverables of the Phase I effort.

The working group is requested to evaluate the following issues:

- A review of possible intermediate facilities and physics capabilities that could be targeted in a staged approach to reaching a neutrino factory and/or muon collider – this should include an evaluation of both the physics and the accelerator R&D potential at each stage.
- An assessment of how such facilities could be coupled with an ongoing machine-based R&D program to improve and refine the concepts and technologies that will support the development of subsequent stages in the program.
- An assessment of the minimum physics performance required at each stage in such a plan to ensure that the community's physics goals can be achieved.
- An assessment of the physics performance that might be expected from such facilities based on the baseline technical concepts that are being designated by MAP over the course of Phase I of the feasibility program.



U.S. Muon Accelerator Program Memorandum

- An assessment of the potential physics performance improvements that might be expected from alternative concepts identified by MAP for continued development.
- Identification of the key synergies between the neutrino factory and muon collider development paths.

Key deliverables for the working group are as follows:

- During FPI, the working group is asked to prepare a yearly report, which will be included in the MAP Annual Report, describing the staging scenarios that it has examined.
- In the context of the upcoming 2013 Community Summer Study, the working group will take the lead in developing a program statement which addresses the following questions:
 - What are the unique capabilities of a muon-accelerator based program?
 - What are the most useful staging scenarios that could be supported by a laboratory facility based on muon accelerators?
 - What are the plausible timescales on which such a facility could be developed?
- Prior to the conclusion of FPI, the working group is requested to provide a set of recommendations on potential staging options and an evaluation of how those may couple to the MAP research program planned for FPII and beyond. These recommendations should be provided as early as possible in FPI, but no later than the conclusion of 2014.
- The working group will present its conclusions and recommendations as part of the final review of the MAP FPI effort.

The working group will report to the MAP Director and is charged with advising the director on the options for a staged physics and R&D program based on muon accelerator technology, which can address the current questions associated with the Intensity and Energy Frontiers of High Energy Physics. Since MAP is a U.S. program, the working group is asked to, in particular, review the options for a facility based at the single remaining U.S. HEP laboratory, Fermilab. It is anticipated that the working group will assign tasks to sub-committees that it appoints and which are led by one or more members of the working group. The working group is encouraged to pursue international participation in these evaluations. MAP will make every effort to provide the resources and expertise necessary to pursue the questions that are raised by these sub-committees. Since this represents a special draw on program resources, the chair of the MASS is expected to become a member of the MAP Management Council and provide regular updates on progress as well as resource requests during the Council's weekly meetings.

cc: Pier Oddone, Director, FNAL
Bruce Strauss, Program Manager, U.S. DOE, OHEP
Stuart Henderson, Assoc. Director for Accelerators, FNAL