

Fermilab Accelerator Advisory Committee
November 16-18, 2009

Charge (Draft Rev. 3)

The Fermilab Accelerator Advisory Committee is asked to look at activities related to the ongoing high intensity proton development programs. There are two primary topics for review and discussion

1. Project X ICD-2 and R&D Plan

An initial configuration for a multi-MW proton facility, based on an 8 GeV superconducting H-linac, was completed and discussed with the AAC at its February meeting. This configuration is documented in Initial Configuration Document-1 (ICD-1) (see <http://projectx.fnal.gov>). Since then there has been a considerable effort in developing a better understanding of the physics program at the intensity frontier. As a result, a second configuration has been developed based on a 2 GeV superconducting cw H- linac, augmented by a rapid cycling synchrotron. This configuration is now documented in ICD-2. The ICD-2, we believe, provides greater flexibility in meeting the needs of rare-decay experiments with muons and kaons while also meeting the long-baseline neutrino program objectives which have been driving ICD-1. It also supports an 8-GeV program with an 8-GeV fast extracted beam (the leading experiment of this kind is the g-2 experiment). In essence, relative to ICD-1, the ICD-2 physics reach has widened considerably. The ICD-1 and ICD-2, along with their associated cost estimates and mission objectives are expected to form the basis for the establishment of a mission need for Project X (CD-0 in the Department of Energy system).

The Project X RD&D effort is aimed at supporting all activities required to complete a technical, cost, and schedule baseline (CD-2 in the language of DOE) by the end of 2013. The RD&D plan is integrated with R&D programs running in parallel on ILC, SRF Infrastructure, High Intensity Neutrino Source (HINS), and Muon-based Facilities.

The Committee is asked to review and offer comments/recommendations relative the ICD-2 and the accompanying Project X RD&D plan. In particular we request specific comments and recommendations in the following areas:

- Does ICD-2 describe a configuration that is likely to meet the proposed mission objectives (reference to Tschirhart's report)? Does it meet broader and more flexible physics demands on beams?

- What are the primary technical risks associated with ICD-2? In particular, are there areas in which ICD-2 is regarded as either more or less technically risky than ICD-1? Are these risks recognized and addressed effectively in the RD&D plan?
- Is the RD&D plan appropriately integrated with the ILC, SRF, HINS, and Muon programs?

More generally, we would be happy to receive comments and suggestions from the AAC on how the initial configurations and associated RD&D program could be strengthened.

2. High Intensity Neutrino Source Program

A program for the development of a novel approach to the acceleration of high intensity, non-relativistic, protons and ions was launched in 2006. This program has been operating with a goal of demonstrating the acceleration of an axially symmetric H⁻ beam to 30 MeV in the 2012 timeframe. The technologies to be demonstrated include: superconducting spoke cavity development and demonstration of beam acceleration; solenoidal focusing; utilization of fast rf vector modulators to control amplitude and phase of individual cavities fed by a common rf source; and high speed (325 MHz) beam chopping. The HINS program has very natural connections to the Project X development program, and a strategy is being developed to align the two programs more closely.

The committee is asked to review and offer comments and recommendations relative to the current status of the HINS program and the strategy for achieving alignment of the HINS and Project X programs. More specifically we would like the Committee to comment on:

- Are the technical goals of the HINS program well aligned with the needs of Project X? What are the primary technical risks within Project X that can and should be addressed within the HINS program?
- Does the execution strategy of HINS mesh with the requirements of Project X? What modifications to the HINS program would be effective in aligning with either ICD-1 or ICD-2?
- Are there other approaches, beyond those being explored in the HINS program, that should be investigated as the front end of the Project X facility?

As usual the committee is invited to issue comments or suggestions on any aspect of the programs discussed beyond those specifically included in this charge. It is requested that a concise report responsive to this charge be forwarded to the Fermilab Director by January 1, 2010. Thank you.