Excerpt from Physics Advisory Committee Comments and Recommendations, June 2012

Overview

The proposal for a Polarized-Proton-Beam Drell-Yan Experiment was considered for the first time at this meeting. It involves development of new polarized beam capabilities at Fermilab and use of the existing SeaQuest apparatus. The Committee discussed this proposal and suggested several areas for further investigation.

Polarized Drell-Yan Measurements with the Main Injector (P-1027)

Members of the SeaQuest Collaboration presented their proposal (P-1027), an experiment to expose their E-906 detector to a transversely-polarized proton beam. The goal of the experiment is to measure the "Sivers Function" by comparing polarization asymmetries in the Drell-Yan process, a high priority measurement in QCD. The polarized Drell-Yan process is thought to be the cleanest of many competing determinations of this quantity. The proponents emphasized that Fermilab is the best place to make this measurement. The P-1027 Collaboration proposes a fabrication and installation schedule to begin in 2013, with data taking to commence in 2015. The requested exposure is likely to be two years.

Although the SeaQuest detector would be reused in P-1027, numerous modifications to the Main Injector, Booster, and Linac will be required in order to produce a 70% transversely polarized beam directed to an unpolarized hydrogen target. Nevertheless, P-1027 is a natural way to capitalize on the investment made in SeaQuest, and cooperation between the DOE Offices of Nuclear Physics and High Energy Physics is valuable.

As proposed, P-1027 could significantly impact the core programs at the Laboratory. Even with this concern in mind, the PAC can imagine a scenario in which impacts on the core program might be minimized.

The PAC has concerns, and would like answers to some questions before being able to consider making a recommendation on the request for Stage I approval.

Questions for P-1027

1. Running with two Siberian Snakes in the Main Injector would impact the core Fermilab program as one of them would require removal of the NOvA extraction kickers. What would the reduction in polarization be with one MI snake and what would be the quantitative effect on the goals of the experiment?
2. In-kind and M&O contributions from outside of Fermilab sufficient to mount and sustain the experiment would be necessary in order to recommend approval, and the budget model needs to be fleshed out in greater detail with the DOE ONP, OHEP, and NSF. What arrangements can be made to secure outside funding?
3. There are two estimates for Snake fabrication and they vary widely. What are the anticipated costs for snake fabrication?
4. What are the likely impacts on the Fermilab infrastructure and expert personnel in the installation and commissioning of the components of the proposed polarized-proton beam in this system?
5. What are the likely resource and infrastructure implications for operating such a beam?