

E-1039 Installation Review, Dec. 1-2, 2020 – CHARGE

The E-1039 (SpinQuest) experiment is designed to study the spin structure of the proton through measurements of the proton's sea-quark Sivers function. SpinQuest is the successor to the E-906 experiment (SeaQuest) and is planned to operate in the NM-4 hall, reusing the E-906 spectrometer and installing a new polarized target. It is jointly supported by the DOE Offices of Nuclear (ONP) and High-Energy Physics (OHEP), with Fermilab as host lab.

SpinQuest was approved in 2018 with the expectation that construction would occur in 2018-19, followed by a two-year run with 2E18 POT to be delivered [1]. Now approaching the end of CY 2020, the installation of the experiment is not yet complete, and substantial work remains before it can begin commissioning with beam. It is critical at this time that the experiment ensures that it understands the work remaining to complete the installation and the associated cost and schedule. The required resources and personnel should be identified to avoid further schedule delays. OHEP, with the concurrence of ONP, has therefore asked Fermilab to carry out a review of the experiment's plans for completion.

We ask the review committee to comment on the experiment's plan to complete installation in FY21 and whether the resources required, associated costs, and the schedule are well-understood and credible. Opportunities to streamline the schedule and shorten the time required to complete installation should be identified where possible. While the primary focus of this review is not on operations, we ask the committee to also comment on the experiment's commissioning plan and whether its run plan is expected to deliver on its scientific goals with the promised beam delivery. We also ask the committee to comment on whether the division of resources, responsibilities, and oversight for the experiment between the Offices of Nuclear and High-Energy Physics are clearly understood by the stakeholders and the experiment for the different phases (installation, commissioning, operations).

Specifically, we ask the review committee to address the following questions:

1. Does the collaboration have an achievable, sufficiently detailed, resource-loaded schedule for the remaining target construction and experimental installation work, which will lead to completion by mid-2021, in time for initial commissioning with beam before the Summer 2021 accelerator shutdown?
2. Are the requirements on Fermilab staff and resources and on collaboration personnel for completion of the remaining experimental installation work well understood? Have the required personnel been identified and allocated for the

installation in FY21? Is the remaining cost to complete installation well-understood, and is there an adequate estimate of the contingency on the remaining work?

3. Has the experiment developed a sufficiently detailed plan for commissioning the detector in preparation for physics data-taking? Are the roles and responsibilities of collaboration members and Fermilab staff well-defined for this commissioning period?
4. Has the collaboration prepared an initial run plan for experimental operations to record the data required to achieve the desired sensitivity? Is there sufficient margin in this plan to reach the desired sensitivity with an achievable operational efficiency? Are the roles and responsibilities of collaboration members and Fermilab staff well-defined for the run period?
5. The new polarized target is critical to the success of the experiment. Have sufficient resources been allocated to install, commission, and maintain the target throughout SpinQuest running? Have the technical risks been identified and mitigation plans developed?
6. Are the ES&H (Environment, Safety, and Health) aspects of all anticipated work during the completion of installation, initial commissioning, and initial running being properly assessed and managed, with clear roles and responsibilities? Did the polarized target get the required special attention?

We expect the review will take 2 (partial) days from start to closeout. We request a brief closeout report from the committee in slide format, including principal findings, comments, and recommendations, at the end of the day on Dec. 2, 2020. If there are additional or more detailed comments or suggestions that the committee feels would be useful, we would appreciate receiving those in written form by Friday, Dec. 11, 2020.

In preparation for the review, the experiment will provide the following brief, summary documents (~few pages each) one week prior to the review:

- Cost table(s) and narrative through completion of construction/installation
- Schedule (including milestones) and narrative through completion of construction/installation
- Commissioning Plan (including roles & responsibilities and estimated schedule)
- Initial Run Plan (including roles & responsibilities and estimated schedule)

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[1] Experiment E1039 Technical Scope of Work

https://programplanning.fnal.gov/wp-content/uploads/2018/07/E1039_TSW_signed.pdf