

Proposing an Experiment

Scientists who would like to carry out an experiment at Fermilab first submit a formal research proposal to the Laboratory Director. Although it is not a requirement, it often helps to discuss the proposal with Fermilab staff, and the Head of Program Planning, before making the formal submission. A list of experiments and proposals can be found on the Program Planning website: <http://programplanning.fnal.gov/>.

Consideration of Proposals - In deciding whether or not to approve an experiment, the Director usually relies heavily on the recommendations of the PAC, which meets two or three times a year to consider proposals. During an open PAC session, the proponents, or scientists proposing an experiment, make an oral presentation to the PAC. After the presentation the PAC has a preliminary discussion of the proposal and the presentation. The PAC may have questions or comments for the proponents, which are addressed either orally at that time or in written form for the next meeting.

At subsequent meetings the PAC considers all the material available regarding the proposal, including the responses to questions and impact statements prepared by Laboratory staff, before making a recommendation to the Director.

Deciding on Proposals - The Director makes a decision about the proposal on the basis of the PAC recommendation and other factors. The decision may result in approval, deferral, or rejection of the proposal.

Approval - The Director may grant Stage I approval if the proposed physics goals are worthwhile, the experiment seems technically feasible, and the costs in Laboratory resources and running time of the experiment appear appropriate for the expected physics results.

Experimenters should recognize that Stage I approval does not represent a commitment of Laboratory resources, either in support for setting up the experiment or in running time. Rather,

it helps Laboratory staff and experimenters in planning long-range projects. After Stage I approval, the experimenters and the Laboratory carry out a careful technical design and cost study for the experiment, and prepare a first draft of the Technical Scope of Work (TSW), as described later. If the PAC finds the results of this procedure acceptable, and the experiment fits into the overall priorities of the experimental program, the PAC recommends Stage II approval. In some cases, the Director grants full approval without the Stage I-II process.

Deferral - The Director may defer the decision on a proposal for a number of reasons; for example, a technical question may need clarification or the appropriate Fermilab facility may not be available within a reasonable time. In the case of deferral, the Director notifies the spokesperson in writing of this decision and the reasons for it, specifying the conditions to be met before reconsideration.

Rejection - The Director may reject a proposal. The Director notifies the spokesperson in writing of this decision and the reasons for it.

Withdrawal of a Proposal - The proposal may be withdrawn from consideration at the request of the spokesperson.

Withdrawal of Approval - The Director may withdraw approval if the conditions of the experiment's approval have changed sufficiently to warrant reconsideration. The Director will not withdraw approval without first discussing the situation with the experimenters and with the PAC.

Appeals - Proponents who wish to appeal a decision should send a written appeal to the Director. The Director may form an ad hoc committee to help in reviewing the proposal. The final decision on the appeal rests with the Director.

EOI's and LOI's

Although it is not a requirement, proposals are often preceded by an Expression of Interest (EOI) and/or a Letter of Intent

(LOI). These documents are submitted to the Laboratory Director via the Program Planning Office. An EOI is sometimes used to request support for R&D that is needed before a full proposal can be written. An EOI may be presented to the PAC, at the discretion of the Head of Program Planning. A Letter of Intent (LOI) provides a mechanism for the PAC to consider the scientific merit and appropriateness of a new initiative before a full proposal is developed. LOI's are presented to the PAC, which may recommend that the Director encourages an activity, and/or give feedback to the proponents as they proceed towards a full proposal.

Proposing a Test at Fermilab

Detector R&D, calibration of a detector in a beam line, and other tests requiring less funding and support than an experiment also require a less formal consideration process. However, researchers must submit a written request to the Fermilab Test Beam Facility (FTBF) Coordinator for approval by the Program Planning Office. Instructions on how to write the request, which is in the form of a Technical Scope of Work (TSW), can be found on the Become an FTBF User webpage:

<http://ftbf.fnal.gov/become-a-user/>. The TSW will be circulated among relevant Divisions and Sections for consideration of technical, cost, and schedule feasibility. Sample TSW's are available on the FTBF website at: <http://ftbf.fnal.gov/>.

To help plan the use of the Fermilab test beams, and to resolve schedule conflicts, the Program Planning Office receives advice from the Test Beam Committee, which consists of eight scientists from the community appointed by Program Planning.

Technical Scope of Work

When the Director notifies the spokesperson that a proposal has been approved (Stage I), the Laboratory asks the spokesperson to review the support required for the experiment with the Accelerator Division, Computing Sector, Technical Division, the ESH&Q Section, and if appropriate, the Particle Physics Division

and/or the Neutrino Division. Normally, the spokesperson prepares a draft Technical Scope of Work, or TSW, for implementing the experiment, which is then reviewed by the various Divisions and ESH&Q. The Program Planning Office coordinates this review.

In particular, the staff will review the draft TSW for feasibility of the experiment in terms of personnel, cost, accelerator impact and time scale. If the request for support in the TSW differs significantly from the proposal, or if the proposal cannot be implemented with the available resources of the Divisions in a reasonable time, the proposal goes back to the Director for reconsideration. When an acceptable TSW has been drafted, it goes to the Director for signature.

The TSW serves two important purposes. First, it helps the Laboratory assess the demands posed by approved experiments, including the adequacy of available funds and the scope of the experimental program. Second, after the Laboratory and users have negotiated and accepted the document, it serves as an understanding between Fermilab and the users through the planning and data-taking steps of the experiment. The TSW includes computing needs for data analysis and provision for the removal of the apparatus. The more specific the TSW, the fewer will be the misunderstandings that arise during the course of the experiment.

Drafting a TSW

The TSW draft needs to provide the following information:

Goals – Summary of the physics goals and techniques: The TSW includes a copy of a current one-page summary of the experiment, as an introduction to the TSW or as an appendix.

Personnel - A list of people who work on the experiment and their home institutions. The TSW clearly designates a scientific spokesperson or co-spokespeople for the experiment. The document shows any additional research commitments for each participating physicist listed. Where specific additional liaison

personnel from the experiment or from the Laboratory will be needed or useful, these shall be identified in the TSW.

Support Required – The support required to implement the experiment should be identified by the sources of support when it is known. When the source is unknown, the needed support should be identified, with the explicit statement that the source is not yet known.

Accelerator - Details of any beam requirements, such as energies, intensities, spill lengths, luminosity. The total beam desired to achieve the physics goals of the experiment must also be included. This latter item includes how much beam time the experiment needs, taking into consideration the time needed for setting up, testing, data-taking and dismantling of the experimental equipment. If the proposal's approval calls for a specific number of particles on target, the TSW should say so. This is called the duration of the run, and it influences planning; it must agree with the conditions of approval.

Equipment and Services - All major items and services needed for the experiment, clearly identifying which items Fermilab will provide and which items users will provide. To facilitate review of the TSW, ordinarily the Laboratory list is separated into subgroups, one for each Division and Section that will make a contribution. As a rule, the Laboratory provides general purpose, reusable equipment for approved experiments, while users provide items unique to each experiment, or items that the group will keep after the experiment ends. The cost of each item should be shown in the right margin of the page.

The TSW includes estimates of construction costs of building special facilities for the experiment. It also includes estimates of major operating costs such as rigging, gases, computing and the like. The Laboratory may distinguish between operating and equipment costs in editing the TSW.

Computing needs, including networking and data storage needs, must be identified. A plan for analysis of the data must be specified.

Funding - A summary detailing what funds are available and in what fiscal year, including required incremental funds. The document should indicate sources of funding and give a rough breakdown of budgets.

The Laboratory normally adds administrative charges to user direct charges.

Experimental Planning Milestones - Experimental milestones in sequence, including tentative dates for beginning the installation and for beginning data-taking. If the experiment requires construction of major pieces of equipment, the TSW should specify dates for one or more stages of the design, procurement and construction process.

Computing and Engineering - The TSW sets forth the allocation of computing and engineering resources to the experiment, project, or test.

The Computing Sector maintains the PREP equipment pool, a large number of some of the more common reusable electronic modules and other equipment from tests and experiments. PREP needs should be identified in the TSW.

Special Considerations - This section describes any special operating conditions that may be required; e.g., test beam needs. For experiments performed within accelerator enclosures, a protocol between the Accelerator Division and the experiment outlines the safe design, installation and operation of the experimental apparatus. It addresses requisite safety responsibilities, reviews and concerns.

More information on writing a TSW can be found:

<http://ftbf.fnal.gov/tsw-how-to-write/>.