

Process in FY 1998 for Development of FY-1999 National Spherical Torus Experiment (NSTX) Research Program

(<http://fileroom.pppl.gov/nstxhome/index.html>, under "NSTX Research Program," then "National Process")

NSTX Program, 10/29/97

Research activities utilizing the NSTX Facility are to begin in May 1999. To ensure full and active national participation in this research in addition to researchers at the host laboratory, the Princeton Plasma Physics Laboratory (PPPL), the NSTX Program plans to conduct an open and proactive process during FY 1998. This document describes the components and the schedule of this proposed process. Discussion with the potential stakeholders of NSTX research will continue to improve this process, on which we welcome questions and suggestions. Please send them to Martin Peng at mpeng@pppl.gov.

NSTX is a national research facility to prove the fusion science principles of the spherical torus plasma. The spherical torus is an innovative concept and an alternative to the tokamak, and holds an exciting promise of high performance in compact fusion devices of lowered costs. The spherical torus plasma has attractive features of the tokamak as well as the compact tori (spheromak) plasmas. Research on the spherical torus has so far benefited much from research on the more well known concepts, and is expected to contribute strongly to magnetic fusion and plasma science.

Recent ST Proof-of-Concept tests on CDX-U, START, and HIT have shown surprisingly encouraging results in halo currents induced by forced termination of plasma current (<5% of plasma current), high beta (>30% in toroidal average), and noninductive plasma startup (via coaxial helicity injection).

I. Participants of NSTX Research

Participants of the NSTX Research are expected to include researchers from

- PPPL, which also hosts and operates the NSTX facility,
- Other national laboratories,
- Universities,
- Private industries, and
- Industries and universities under subcontract with PPPL.

Participants from groups other than these may be possible. We hope that participating institutions in the U.S. aside from the host PPPL will carry out approximately 1/3 of the research on NSTX.

These institutions together with the Office of Fusion Energy Sciences (OFES) of DOE will take part in the formation of the National Research Team. The NSTX Program Advisory Committee, composing of the scientific leadership of the fusion R&D community, will advise the PPPL Director concerning the scientific priorities of the NSTX Research Program. OFES makes funding decisions for the participants of the NSTX research, in response to the NSTX research proposals submitted directly to OFES by the participating institutions and groups, and the NSTX Program.

A process is therefore needed to develop for the first time the NSTX Research Program Proposal that accounts for the best scientific and innovative expertise available in the fusion community. The process must be open, fair, and conducive to positive evolution toward a vibrant national NSTX Research Program in the years to come.

In designing this process, we endeavor to understand and account for the general and the special needs of each institution or group interested in becoming a member of the National NSTX Research Team. The process envisioned has reached consensus at PPPL following scrutiny by and the Offices of the PPPL Director and the Advanced Systems Department. Collaboration with the NSTX Project, and the Research Departments at PPPL has also been instrumental and constructive. The timetable recommended below permits an accelerated schedule to account for special institutional needs.

A list of the actions in this process is provided in the same web folder as "Highlight" for convenience of the interested.

II. Proposed Process

We envision 5 sequential steps in this process, spanning September 1997 through September-October 1998:

- 1) Scientific Priorities and Available Research (9-10/97)
- 2) Research Forum and Working Group Reports (10-12/97)
- 3) Research Proposals and Program Outline (1-3/98)
- 4) DOE Review and Approval (4-9/98)
- 5) Research Team and Tasks Plan for FY 1999 (9-10/98)

The anticipated actions, the participating organizations and the suggested responsibilities in these steps are described below. All information of interest to the process will be made available on the Internet and distributed through electronic mail upon request.

Here month/year follows the convention of 1-12 for January-December.

1) Define Scientific Priorities and Announce Available Research (9-10/97)

- 1a) The PPPL Director calls an NSTX PAC meeting in 9/97 to advise on the scientific priorities of NSTX Research Program under consideration for FY 1999-2001. (The PAC met during September 17-18, 1997 at PPPL.)
- 1b) The PAC submits the meeting report to the PPPL Director in about two weeks following the meeting.
- 1c) The NSTX Program Director, under the advisement of the PPPL Director's Office and in consultation with DOE, prepares and issues in 10/97 the Notice of Available Research on NSTX for FY 1999-2001 as an aid to researchers interested in participating in the NSTX Research Forum scheduled in 12/97. (The FY-98 Notice of Available Research can be viewed at <http://fileroom.pppl.gov/nstxhome/index.html>, under "NSTX Research Program.")

2) Hold Research Forum and Produce Working Group Reports (10-12/97)

- 2a) The NSTX Program Director announces in 10/97 the NSTX Research Forum and invites interested researchers to participate. The Forum reaches out to the community by presenting the NSTX capabilities and plans, and discussing in topical Working Group sessions the elements of the NSTX research activities during FY 1999-2001. Research topics with enhanced collaboration opportunity are also discussed at the Forum. The NSTX Program Director calls for Letters of Interest from institutions and groups interested in participating in the NSTX research. (The announcement for the FY-98 NSTX Research Forum can be viewed at <http://fileroom.pppl.gov/nstxhome/index.html>, under "NSTX Research Program," "Meetings." It is now scheduled for December 3-5, Wednesday-Friday, at PPPL.)

- 2b) The NSTX Program Director together with the NSTX Project Director, the heads of the Research Departments at PPPL, and the NSTX Working Groups organize and hold the NSTX Research Forum on December 3-5, 1997.
 - 2c) The NSTX Program Director defines and solicits, during the Forum, Letters of Interest for participation in research on NSTX during FY 1999-2001.
 - 2d) OFES of DOE issues in 12/97 request for proposal to carry out collaborative research on NSTX.
 - 2e) The NSTX Working Groups issue in about 2 weeks following the Forum the Working Group reports describing the elements and timetable of the initial NSTX Research Program, as a reference for preparation of NSTX research proposals to be submitted directly to DOE by the interested institutions.
- 3) Develop Integrated Proposals and Outline NSTX Research Program (1-3/98)
- 3a) The NSTX Program Director, the NSTX Project Director, and the heads of the Research Departments at PPPL prepare in 1/98 PPPL NSTX pre-proposals. (The draft PPPL pre-proposals are scheduled for January 20, 1998.)
 - 3b) The Office of the NSTX Program Director receives in 1/98 Letters of Interest from national laboratories, universities, and private industries etc. (The due date is tentatively proposed to be January 20, 1998.)
 - 3c) OFES of DOE issues in 1-2/98 initial budget guidance on Fusion Energy Science for FY 1999.
 - 3d) The NSTX Program Director, the NSTX Project Director, the Heads of the PPPL Research Departments, and the Advanced Systems Department Heads formulate in 2/98 the Draft FY-99 NSTX Research Program Proposal.
 - 3e) The PPPL Director calls an NSTX PAC meeting for 2/98 to advise on the scientific priorities of Draft FY-99 NSTX Research Program Proposal.
 - 3f) The PAC submits the meeting report to the PPPL Director in about two weeks following the meeting.
 - 3g) The PPPL Director issues in 3/98 the NSTX Program Outline in letter to the OFES of DOE.
 - 3h) The NSTX Program Director and the NSTX Project Director, under the advisement of the PPPL Director's Office, updates in 3/98 the Draft FY-99 NSTX Research Program Proposal. This draft is distributed for use by the participating institutions in finalizing the Field Work Proposals (from PPPL including subcontractors, and national laboratories) and the Grant Proposals (from universities and private industries etc.) to be submitted directly to DOE.
 - 3i) The Draft FY-99 NSTX Research Program Proposal, together with the NSTX research proposals by the institutions and groups, are presented and discussed at the DOE FWP meeting in 3/98.
- 4) DOE Review and Approve Proposals (4-8/98)
- 4a) The OFES of DOE carries out reviews of Field Work and Grant Proposals and make in or before 7-8/98 decisions on funding for various institutions to carry out NSTX activities during FY-1999.
- 5) Form Research Team and Develop Tasks Plan for FY 1999 (8-10/98)
- 5a) The NSTX Program Director, the NSTX Project Director, the Heads of Research Departments, and the participating institutions form in 8-9/98 NSTX Program Executive Committee.
 - 5b) The NSTX Program Director, the NSTX Project Director, and the Executive Committee, call and hold in 9-10/98 NSTX Research Team Meeting to articulate goals, define research tasks, form task teams,

identify task leaders, and allocate and order the experimental run weeks on NSTX for FY 1999.

- 5c) The NSTX Program Director and the NSTX Project Director, based on the results of the Research Team Meeting, produce and issue in 10/98 the National NSTX Research Plan for FY 1999.
- 5d) The task teams, jointly with the NSTX facility and research operation groups, formulate and propose to the Executive Committee in 10-11/98 detailed plan for task execution.
- 5e) The NSTX Program Executive Committee issues in 11/98 a working NSTX experimental run plan.

III. Discussion

The collective experience in the PACs of previous and other fusion research programs have also influenced the formulation of the process proposed here. In particular, competitive procurement of research activities must remain solely a responsibility of the OFES of DOE. The NSTX PAC utilizes the information provided in the Letters of Interest and PPPL pre-proposals in advising the PPPL Director on the scientific priority of NSTX research, with no responsibility for comparative evaluation. The formulation in 2/98 of an integrated proposal for the NSTX Research Program, with full cognizance of community's scientific interests in participation, is a necessary step in the development of a truly national research program for NSTX.

The NSTX PAC is expected to meet in 9/98 to advise on the scientific priorities of the FY-2000 NSTX Program, accounting for the National Research Plan for FY 1999 and the new physics results of relevance to the scientific principles of the spherical torus.

The process during FY 1999 for developing the FY-2000 NSTX Research Program Proposal is expected to be similar in nature to what is describe above. However, the contribution of the newly formed National NSTX Research Team to the process will be important and should be accounted for fully. Experience in FY 1998 should help in streamlining of the process in FY 1999.
