



Fusion Energy Science Research Needs Workshop

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NSTX-U / Magnetic Fusion Science Meeting

<https://www.iterresearch.us>

Background and purpose of the workshop

- Recent reports (NAS 2019, DPP-CPP 2021, FESAC 2021) called out the need for the U.S. Fusion community to move toward a targeted U.S. ITER Research Program that
 - Works to apply U.S. strengths toward ITER's success
 - Maximize our investment in ITER
 - Creates career paths for U.S. researchers to conduct ITER research
 - Brings back the research products and experience gained from a power-plant scale high-gain fusion facility to move toward a fusion pilot plant
- To start this process, DOE Fusion Energy Sciences has charged the community to conduct a Basic Research Needs workshop
 - There is lots of precedent for this, both within the fusion community and in other Office of Science areas

The Charge

In FY 2022, a Basic Research Needs workshop will be held to engage the U.S. fusion community in the elaboration of a plan describing the formation, organization, and research objectives of a national ITER research team. Workshop participants should adopt a long-term, comprehensive perspective on the U.S. engagement in ITER research by considering: (1) the present period of ITER hardware commissioning activities up to and including first plasma; (2) the period between ITER First Plasma and the end of Pre-Fusion Power Operation-1 (PFPO-1); (3) the PFPO-2 phase; (4) the Fusion Power Operation (FPO) phase, as described in the 2018 ITER Research Plan within the Staged Approach developed by the ITER Organization (IO); and (5) any upgrade program.

- The charge is divided into two areas:
 - **Research:** What research areas should the U.S. community prioritize during the assembly, First Plasma (FP), Pre-Fusion Power Operation (PFPO-1 and -2), and Fusion Power Operation (FPO) phases?
 - **Organization:** How should we organize ourselves to carry out this research?
- The workshop is being organized accordingly
 - Phase 1 starts immediately, focusing on **RESEARCH SCOPE**
 - Phase 2 will begin in March (tentatively), focusing on **ORGANIZATION**
- The charge has been rephrased as a set of six discussion group questions for the workshop to consider
 - Each question will be considered in one or more breakout discussions

Your participation is essential!

- We are hoping for participation from diverse and broad representation of the US fusion community, including
 - Early/mid/late career
 - Scientists, engineers, technologists
 - Universities, labs, industry
 - You!
- *Since this is a US-specific planning process, we are limiting non-US participation to by invitation only*
- Start by clicking on **CLICK HERE TO REGISTER** at <https://iterresearch.us>

Rough schedule and expected outcome

	February				March				April				May				
	7	14	21	28	7	14	21	28	4	11	18	25	2	9	16	23	30
<i>Kickoff Meeting</i>	█																
<i>Topical Breakout Discussion</i>		Q1		Q2													
<i>White papers</i>	◆						◆										
<i>Regroup Meeting</i>																	
<i>Mixed Breakout Discussion</i>																	
<i>Discussion Leads/Chairs Meet</i>																	
<i>Draft Report Release</i>																	
<i>Final Meeting</i>																	
<i>Final Report to FES</i>																	◆

- The workshop will begin immediately
 - From now until March we will focus on the research scope
 - From March through May our focus will turn to organization of the research program
 - *The bulk of the work will be done in the breakout sessions*
- The chairs (Chuck Greenfield and Cami Collins) will work with the attendees and the breakout group leaders to prepare a report to be submitted to DOE one month after the conclusion of the workshop
- Contents of the report will be presented and discussed at the final plenary session to allow participants to help fine-tune the report
 - The report will not be considered final until everybody has their say!
 - Input methods: whitepapers, breakout discussions, submit comments through website

Phase 1: Research Scope (starts immediately)

- We will begin with a kickoff meeting on Wednesday, February 9, starting at noon EST, 9:00AM PST
 - *Zoom connection information will be emailed to registered participants only*
 - Following an introduction to the workshop process, this meeting will focus entirely on the Research Scope
- During Phase 1, we will consider the first two charge questions with most of the discussion in breakout groups organized by topical area
- Following the breakout group discussions we will reconvene in a plenary “regroup meeting” for the breakout groups to report and to kick off Phase 2.

Q1. How can US research most effectively contribute to the success of ITER?

- Where do we have strengths that directly impact research areas identified in the ITER Research Plan?
- What are specific research activities that ITER needs from the US community, and when are results needed to be most impactful?

Q2. What essential ITER research products are needed to strengthen the domestic program to address strategic objectives aimed at the development of a fusion pilot plant?

- How can physics results accelerate the development of a fusion energy source?
- How can experience and knowledge gained from participating in engineering, facility maintenance, technology, and diagnostic systems on a reactor-scale nuclear facility be applied to the domestic program to develop a fusion energy source?
- How should these goals be prioritized in the mission of a US ITER Research effort?

Phase 2: Organization (after Phase 1)

- Following Phase 1, we will reconvene to consider an additional four questions focusing on organization of the U.S. ITER Research Program
- During Phase 2, we will consider charge questions 3-6 with most of the discussion in breakout groups organized randomly

Questions on next slide...

Questions for Phase 2

Q3. How should the US organize its activities on the ITER facility?

- In forming an ITER Research program, what selection mechanisms could be employed to maintain transparency and ensure broad participation? Program participation should be guided by principles of Diversity, Equity, and Inclusion.
- How can we maximize flexibility, agility, and impact?
- What is the proper balance between on-site and remote participation in ITER research?
- What resources will be needed to facilitate coordination, communication, data exchange, and analysis between the on-site and remote participants?

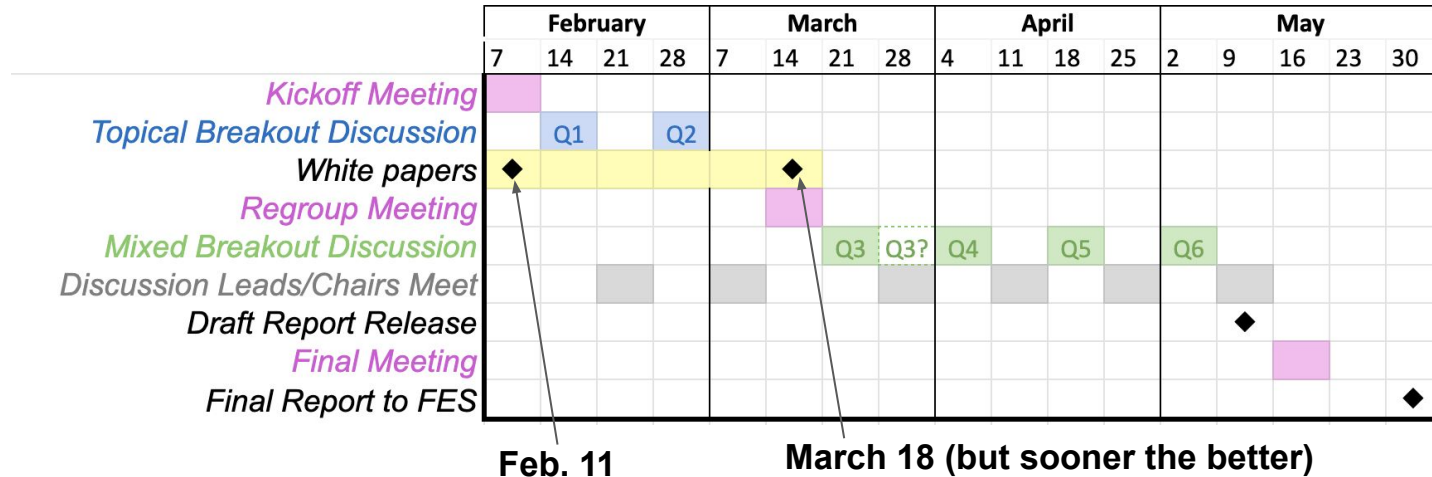
Q4. How can we best position US researchers to capture leadership opportunities and influence within the international ITER research program?

- What early opportunities for engagement exist in commissioning and operational planning?
- What preparation, capabilities, new skills, or collaborations are needed to maximize opportunities for U.S. researchers?
- How can we maximize the success rate of experimental proposals submitted by U.S. researchers during the anticipated highly competitive review process for conducting experiments on ITER?

Q5. How should ITER research efforts be coordinated with other segments of the FES portfolio, including domestic facilities, theory and simulation, technology, and international collaborations?

Q6. How can the private sector be incorporated into the ITER research program such that a two-way exchange of scientific research and technological development between ITER and existing U.S. commercial fusion endeavors is enabled?

Whitepapers



- Whitepapers will be used by discussion groups and will help form input to the report.
 - Phase 1 papers that address Q1 and Q2 are due Feb. 11 in order to be used as input to topical groups
 - Q1: How can US research most effectively contribute to the success of ITER?
 - Q2: What essential ITER research products are needed to strengthen the domestic program to address strategic objectives aimed at the development of a fusion pilot plant?
 - Phase 2 papers that address Q3-Q6 (the organizational aspects) are due March 18
- Whitepapers help to collect thoughts ahead of the breakout discussions to make those conversations productive
 - **Should be brief (2 pages) with the high level, important points. LESS IS MORE**
 - Small number of extended papers formed by collaborative groups will be allowed (up to 8 pages)
- We may ask that some whitepapers (esp. multi-institutional, collaborative) be presented at the Regroup Meeting

Whitepapers (cont)

- A white paper template is available on the website
- When you submit, you can select 1 or more questions that the paper helps to address
 - We encourage focus on just 1 question
- White papers will be viewable by registered workshop participants (not the general public)

Select Relevant Topic(s) *

- (Q1) How can US research most effectively contribute to the success of ITER?
- (Q2) What essential ITER research products are needed to strengthen the domestic program to address str...
- (Q3) How should the US organize its activities on the ITER facility?
- (Q4) How can we best position US researchers to capture leadership opportunities and influence within th...
- (Q5) How should ITER research efforts be coordinated with other segments of the FES portfolio?
- (Q6) How can the private sector be incorporated into the ITER research program such that a two-way exch...
- Other...

Summary

- Kickoff meeting Wed. Feb 9, 12-5 PM ET, 9AM-2PM PT
- Agenda for the kickoff meeting will be posted soon
 - We aim to make recordings of talks and slides available
- Topical Groups will be organized soon
 - Expect discussion group zoom meetings to begin week of Feb 14
- Discussion sessions are the most important part of this workshop!

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