National Spherical Torus eXperiment Upgrade

NSTX-U / Magnetic Fusion Science Meeting

Dec. 14, 2020





Some upcoming events

- Dec. 14-17, 2020 (virtual), High Temperature Plasma Diagnostics
- Dec. 16-17, 2020 (virtual), <u>Fusion Power Associates</u>
- Jan. 24-29, 2021 (virtual), Int. Conf. on Plasma Surface Interactions
- May 10-15, 2021 (Nice, France or virtual), IAEA-FEC
 - April 9, 2021: Conference "pre-prints" due
 - May 31, 2021: Nuclear Fusion manuscripts due
 - Please be prepared to provide a couple paragraphs + figure for NSTX-U Research Overview paper and poster (talk is rapporteured)
 - Should be work that's new since FEC 2018 as published in Kaye et al. Nucl. Fusion 59, 112007 (2019): <u>https://doi.org/10.1088/1741-4326/ab023a</u>
- NSTX-U collaborators we intend to schedule ~15 minute talks in the near future (~Jan/Feb 2021) for collaborators to briefly summarize their plans, schedules and needs

Last week FESAC unanimously approved the FES Long Range Plan (LRP)

- "Powering the Future: Fusion and Plasmas" draft report available on <u>FESAC website</u>
 - Spans entire FES portfolio (Fusion Science & Technology, Plasma Science & Technology)
- Subcommittee presented plan to FESAC
- 3 day interrogation by discussion with FESAC
 - Questions and clarifications
 - Wordsmithing of Recommendation language
 - Additional minor edits requested, to be implemented for final report
- All 27 recommendations, and the report as a whole, was approved unanimously by FESAC → incredible success!



LRP recommendations clearly reflect community-driven CPP activities & final report

E.g., from Fusion Science & Technology Recommendations:

- *Explicit vision of a US Fusion Pilot Plant in the 2040s* (Initiate FPP design effort)
- Expand Fusion Material & Technology programs and facilities (FPNS, MPEX, HHF)
- Establish ITER research team to fully engage in ITER
- Close tokamak FPP design gaps via NSTX-U, DIII-D, international facilities
- New EXCITE facility to close integrated tokamak exhaust and performance gap
- Strengthen innovative program elements for core confinement and PFCs (stellarators, LM PFC, IFE, alternates)

Some Overarching Recommendations

- Expand current, and establish new, public-private partnership programs
- Establish plan to improve Diversity, Equity & Inclusivity; workforce development
- Support regular pre-conceptual design scoping & costing
- Provide resources for ongoing design & construction of new facilities
- Community-led long range planning should be repeated every five years (or sooner)

LRP budget scenarios reflect CPP input

- LRP provides prioritization under three budget scenarios as requested by DOE/SC in the <u>FESAC</u> <u>charge</u>
- Clearly follows prioritization discussion that occurred as part of CPP workshops (Knoxville, Houston)
- "Constant level of effort" scenario (painful) respects CPP desire to expand FM&T efforts
 - With unfortunate consequences that nobody likes or wants, but FESAC was charged to address
- "Unconstrained" scenario supports vision of a FPP in the 2040's with a not-unrealistic budget expansion (~3-4x non-ITER \$)

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It is critical for the FES community to convey our unified support and excitement for the plan!

- Sending a unified, consistent message (NAS BP 2018, CPP 2020, FES-LRP 2020) to congress, OMB, DOE, and the public is critical to enable continued support (and hopefully new activities and growth) even as administrations change
- What's not to be excited about Let's continue gathering momentum!



Dec 19, 2014

Dec 11, 2020



The plan formalizes a goal set out 2 years ago by the National Academies of Sciences, Engineering, and Medicine (*Science*, 21 December 2018, p. **1343**) and embraced in a March report