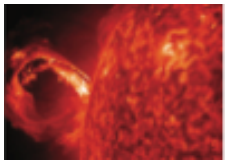
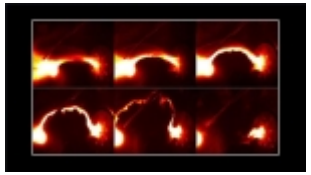
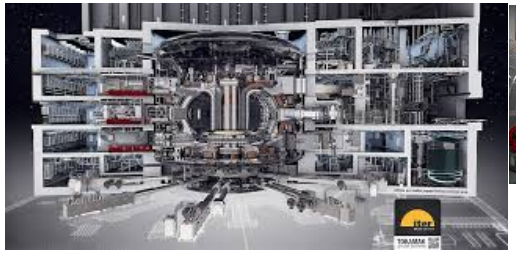
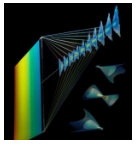
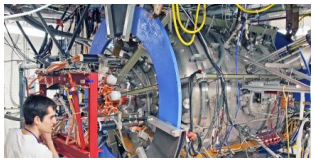
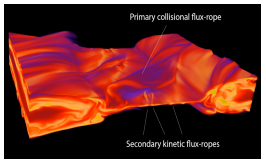
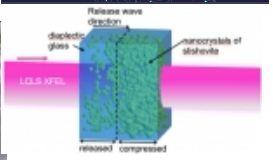
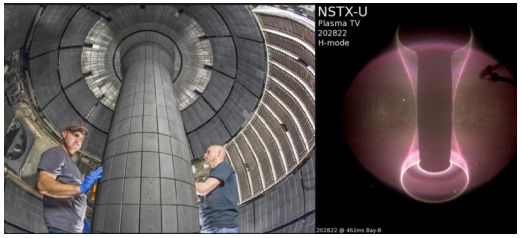
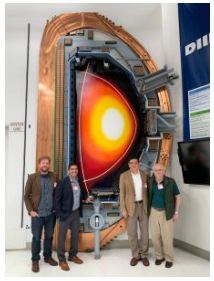




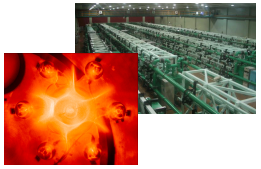
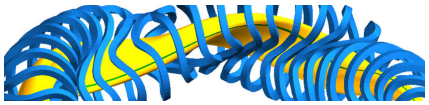
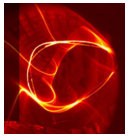
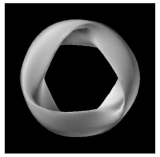


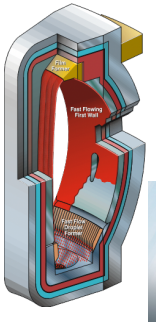
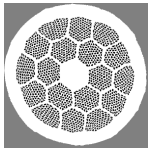



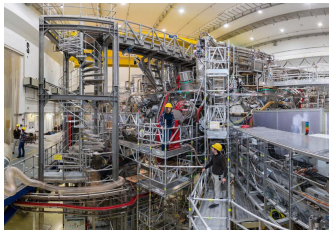
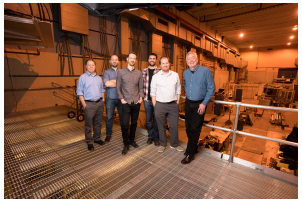
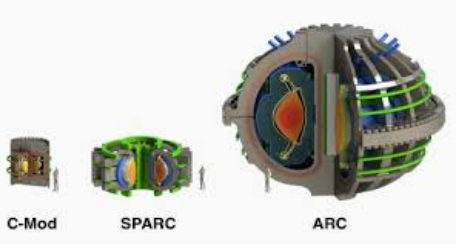



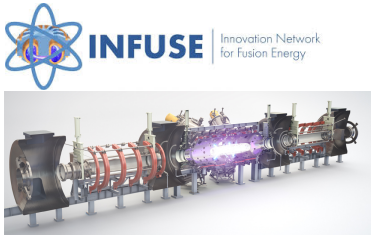


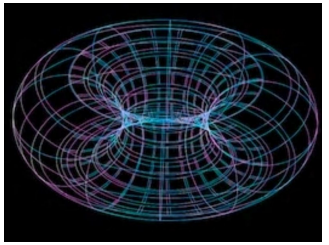
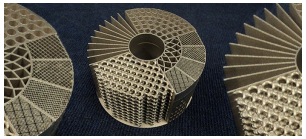
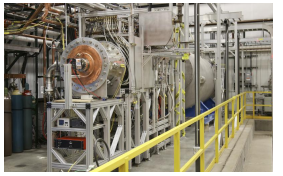


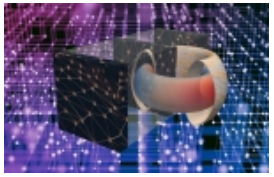
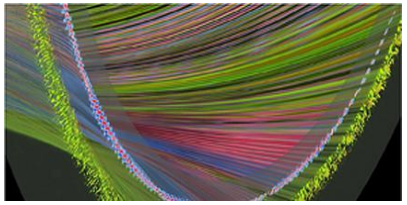
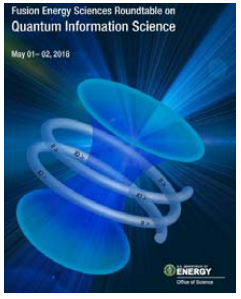







How did we get from a 2014 FESAC Report on Strategic Planning with partial consensus, significant disagreement, approved by a vote of 6-3 including a minority report to a Fusion Advisory Panel that Unanimously Approved the Long-Range Plan in 2020?

EXASCALE COMPUTING PROJECT

WASHINGTON STATE UNIVERSITY
Office of Research

December 30, 2014

Dr. Patricia M. Dehmer
Acting Director
Office of Science
U.S. Department of Energy
1000 Independence Avenue, S.W.
Washington, DC 20585

Dear Dr. Dehmer:

I am writing to respond to your April 8, 2014 charge to the Fusion Energy Sciences Advisory Committee (FESAC) to "assess the priorities among continuing and potential new FES program investments required to ensure that the U.S. is in a position to exert long term leadership roles within and among Burning Plasma Science- Foundations, Burning Plasma Science-Long Pulse, and Discovery Plasma Science (DPS)." You also asked that four specific budget scenarios be examined.

FESAC chartered a Panel led by Prof. Mark Koepke (West Virginia Univ.) to address this charge. Prof. Koepke is also the FESAC Chair. Hence, at the request of OFES, I served as Acting FESAC Chair for purposes of reviewing the Panel report.

FESAC commends the Panel for their hard work addressing the charge and developing the draft report. The Panel's extensive discussions regarding priorities for the Fusion Energy Sciences (FES) Program provided valuable input for both the report and future directions of the Fusion Energy Sciences (FES) Program.

FESAC reviewed the report initially on September 22-23, 2014. The report was revised based on comments at that meeting and reviewed again by FESAC on October 10, 2014. This letter contains the production version final report incorporating changes discussed at the October 10, 2014 meeting.

The Panel report generated intense discussion at both meetings. Excluding ex-officio members, 11 members of the 20 total FESAC membership were eligible to vote on the report. The report, subject to several revisions, was approved by a vote of 6-3 at the October 10, 2014 meeting, with two members eligible to vote not present. FESAC agreed at the October 10 meeting to also provide a separate "minority" comment. The final approved report and the minority comment are attached. The minority comment is signed by those voting "no" and one member not present for the vote.

In addition to forwarding the report, FESAC provides the following comments:

a) As evidenced in the public record, there is partial consensus, and significant disagreement, within the community regarding the top-level FES Program vision, strategy and associated priorities. Much of this derives from differing views on the degree to which the FES program is a "science" program versus a "fusion energy development" program. This is not just a question of the DPS funding level, but also the nature of the science and engineering effort and facilities associated with the Burning Plasma Science program.

   The lack of adequate consensus on top-level vision, strategy, and priorities makes it difficult for more technically oriented groups, such as Prof. Koepke's panel, to achieve widespread acceptance of recommended strategic initiatives and associated program-wide FES investments. FESAC recommends more extensive senior level HQ/field discussions be held to produce a vision and strategy with wider acceptance. This will simplify the development of detailed objectives and specific program initiatives by future groups similar to this panel.

b) The Panel did not perform a detailed analysis of the budget options in the charge sufficient to develop, for example, individual site, facility, and initiative budgets. *Further analysis by DOE OFES is necessary to produce a credible 10-year budget plan.*

c) FESAC recognizes the necessity of proper management of conflict-of-interest issues, and recommends OFES structure FESAC to enable voting participation on future reports by as many FESAC members as possible.

Please contact me if you have questions.

Sincerely,

Christopher J. Keane
Vice President for Research
Professor of Physics
Acting Chair
Fusion Energy Sciences Advisory Committee (FESAC)

cc: E. Synakowski (DOE/FES)
S. Barish (DOE/FES)

FESAC:
A. Bhattacharjee (PPPL)
T. Carter (UCLA)
B. Cohen (LLNL)
A. Dasgupta (NRL)
J. Foster (University of Michigan)
C. Greenfield (GA)
R. Groebner (GA)
C. Hegna (University of Wisconsin)
V. Izzo (UCSD)
J. Kim (FAR-TECH)
M. Koepke (West Virginia University)
G. Neilson (PPPL)
G. Patello (PNNL)
J. Rapp (ORNL)
D. Rej (LANL)
S. Reyes (LLNL)
R. Rosner (University of Chicago)
F. Skiff (University of Iowa)
J. Steadman (University of South Alabama)
L. Sugiyama (MIT)
S. Zinkle (University of Tennessee)
E. Zweibel (University of Wisconsin)

So how did we get from a 2014 FESAC Report on Strategic Planning with partial consensus, significant disagreement, approved by a vote of 6-3 including a minority report to a Fusion Advisory Panel that Unanimously Approved the Long-Range Plan in 2020?

- I'll will cover meetings and consultations from Summer 2018 to November 2018 when Steve Binkley sent our charge. Wayne Solomon will present the APS Community Plan for Fusion Energy and Discovery Plasma Sciences (Phase-1), while Troy Carter will present the FESAC Subcommittee Report (Phase-2).
- In my former role as the LANL Program Director for DOE Office of Science activities, I was able to attend all 6 FACA committee meetings. In doing so, I had opportunities to compare and contrast between those committees especially HEPAP, NSAC, and of course FESAC.
- I will explain activities over 2018 that led Steve Binkley to send us his charge on 11/30/2018, requesting FESAC undertake a new long-range strategic planning activity for the FES program.

Since my appointment in 2016 as the FESAC Chair, I had opportunities to consult with my counterpart Chairs from HEPAP, NSAC, and former FESAC Chairs:

- Andy Lankford, Current HEPAP Chair (P5)
- Jim Siegrist, HEP Associate Director of Science
- Don Geesaman, the current NSAC Chair, where their highly successful NSAC long-range plans go back to the 1970s under Herman Feshback!
- Martin Greenwald, FESAC Chair 2008-2013,
- Jim Van Dam, FES Associate Director of Science, and Gene Nardella,
- David Newman (APS-DPP) and Roger Falcone (APS). They, and their Excomm, were more then willing to work on the plan.
- Briefing with Paul Dabbar, Steve Binkley, and Jim Van Dam, (Sept 11, 2018)
- David Newman (Sep 26) preparing Letters to the community (Oct 2018)

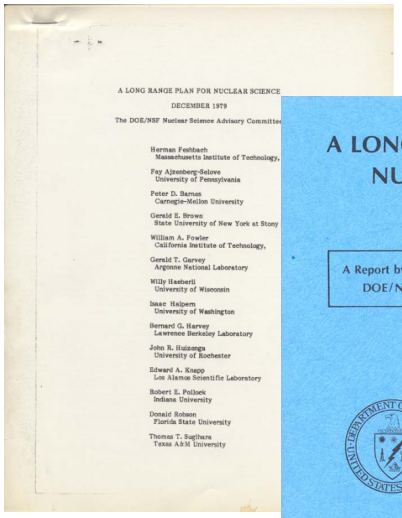
The Nuclear Physics Long Range Plan Process
FESAC Meeting, 12 March 2019

The 2015
LONG RANGE PLAN
for NUCLEAR SCIENCE

Nuclear Science in the U.S. has been guided by the NSAC Long Range Plans

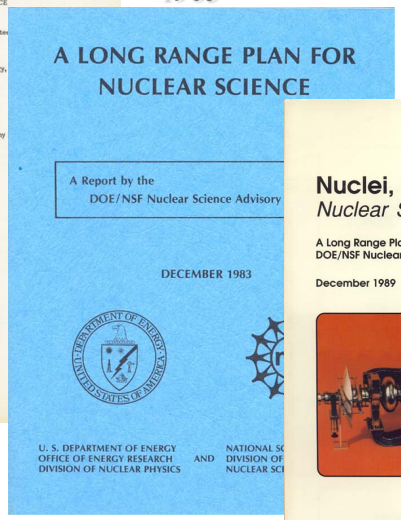
For large projects ~15 years between recommendation and first operation

1979



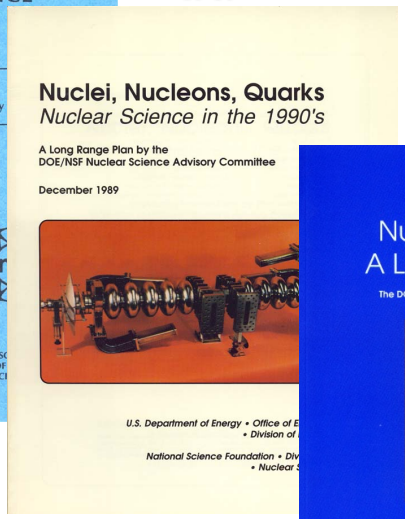
CW Electron Accelerator

1983



RHIC

1989



Two Rare Isotopes Facilities –in-flight, ISOL

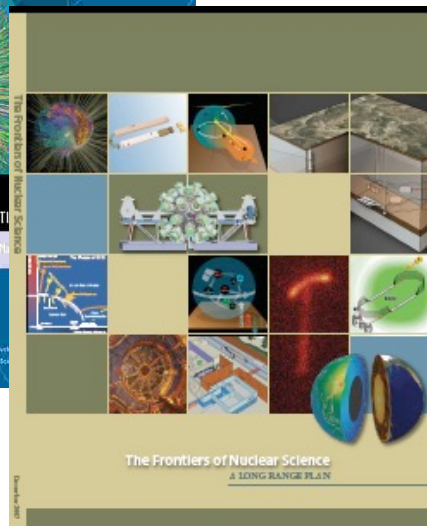
1996

RIA (Descoped)
JLAB 12 GeV

2002

FRIB
RHIC Upgrade

2007



Recommendations that did not happen, typically recommendation #3-4, but one was #1

10% budget increase

KAON

LISS

DUSEL

Snowmass Community Process

- Organized by The Division of Particles and Fields of the American Physical Society
- Designed to address the questions the particle physics community wishes to answer over the next two decades and methods to answer them
  - **Did not prioritize activities**; aim was to ask and answer hard questions
  - Supported inter-frontier discussions to ensure addressing the cross-cutting nature of the physics
    - **Subgroups**: Intensity Frontier; Energy Frontier; Cosmic Frontier; Theory; Accelerator Capabilities; Underground Laboratory Capabilities; Instrumentation; Computing; Communication, Education, and Outreach
  - Produced 358 page resource book that conveyed the health and diversity of the U.S. program in a global context
    - http://www.slac.stanford.edu/econf/C1307292/
- Timeline:
  - Planning began in 2011
  - Community Planning Meeting at Fermilab, Oct 11-13, 2012
  - Preparatory meetings held by subgroups during 2012-13
  - Final meeting held at U Minnesota, July 29 - Aug 6, 2013

Building for Discovery

Strategic Plan for U.S. Particle Physics in the Global Context

Department of Energy
Office of Science
Washington, DC 20585

30 November 2018

Dr. Donald Rej
Chair, Fusion Energy Sciences Advisory Committee
Program Director, Office of Science Programs at LANL
Los Alamos National Laboratory, MS-A121
Los Alamos, NM 87545

Dear Dr. Rej:

This letter requests that the Fusion Energy Sciences Advisory Committee (FESAC) undertake a new long-range strategic planning activity for the Fusion Energy Sciences (FES) program. The strategic planning activity—to encompass the entire FES research portfolio (namely, burning plasma science and discovery plasma science)—should identify and prioritize the research required to advance both the scientific foundation needed to develop a fusion energy source, as well as the broader FES mission to steward plasma science.

In developing recommendations within this long-range strategic planning activity, FESAC should take into account the following aspects:

- Identifying specific research areas, across the entire FES portfolio, in which the U.S. should establish or enhance global leadership.
- Maintaining a healthy and flexible program, which incorporates the roles and contributions of universities, national laboratories, and industry, to deliver science results throughout the next decade.
- Maintaining, upgrading, and/or pivoting current small-, mid-, and large-scale facilities, including DIII-D and NSTX-U, and also initiating new experiments/facilities/projects.
- Identifying international collaborative opportunities or partnerships that can give U.S. scientists access to devices outside of the U.S. with unique capabilities.
- Providing support for private-public partnership ventures.
- Positioning the U.S. to obtain maximum benefits in the ITER burning plasma science era.
- Considering the future budgetary constraints described below, as well as the technical readiness and feasibility for any activity to proceed.

Your report should provide recommendations on the priorities for an optimized FES program over the next ten years (FY 2022-2031) under the following three scenarios with the FY 2019 enacted budget for the FES program as the baseline:

- Constant level of effort (defined as the published OMB inflators for FY 2022-2031)
- Modest growth (use 2% above the published OMB inflators)
- Unconstrained budget: For this scenario, please list, in priority order, specific activities (beyond those mentioned in the previous budget scenarios) that are needed to achieve and maintain a leadership position addressing the scientific opportunities identified by the community.

Within each of the three scenarios, assume that the U.S. Contributions to ITER project will continue through this entire period.

You should consider these three budget scenarios as an opportunity to identify priorities and make high-level recommendations. The activities that you recommend should be (to some significant extent) implementable under reasonable budgetary and programmatic assumptions. At the same time, the budget scenarios should not drive the prioritization to the degree that research/projects are promoted solely for their ability to fit within an assumed profile.

The FESAC report should articulate the scientific opportunities that can and cannot be pursued, as well as the approximate overall level of support needed in the FES program to pursue these opportunities within the various funding scenarios identified above.

The FESAC activity in addressing this charge should commence after the completion of community-led activities to provide broad input to this long-range planning. This two-phase approach for long-range planning is similar to that used by both the High Energy Physics program and also the Nuclear Physics program within the DOE Office of Science.

For the first phase, we have asked the American Physical Society's Division of Plasma Physics (DPP) to lead with the organization of community-led activities (such as discussions, town halls, workshops, and any other forums it chooses). We want the community to be actively involved in this long-term planning process. We are grateful that the DPP leadership is willing to provide this valuable sponsorship of the community-driven first phase.

The second phase of the process involves this charge to FESAC. Although this charge will be discussed at the December 6 and 7 FESAC meeting, no FESAC subcommittee to address the charge will be formed at that time. Toward the end of the community's process to develop its important input for planning, a FESAC subcommittee shall be formed to carry out the work of developing the long-range plan.

We would appreciate receiving the report from FESAC by December 2020, if possible. We understand that this is a challenging task; however, your considerations of these issues will be essential input to DOE planning. Please let us know if there is anything we can do to help you in this process.

Sincerely,

JSBinkley

J. Stephen Binkley
Deputy Director for Science Programs
Office of Science

Charge letter issued 11/30/18 by J. Stephen Binkley, Deputy Director for Science Programs, Office of Science, to encompasses entire FES research portfolio

https://www.energy.gov/science/fes/fusion-energy-sciences-advisory-committee-fesac

Charge to consider:

- Identifying and prioritizing research areas across the entire FES portfolio,
- Maintaining a healthy and flexible program incorporating national labs, universities and industry
- Continuing, upgrading and/or pivoting current-, mid-, and large-scale facilities, including DIII-D and NSTX-U, and also initiating new experiments/facilities/projects,
- Providing support for private-public partnership ventures,
- Positioning U.S. to obtain maximum benefits in the ITER burning plasma science era,

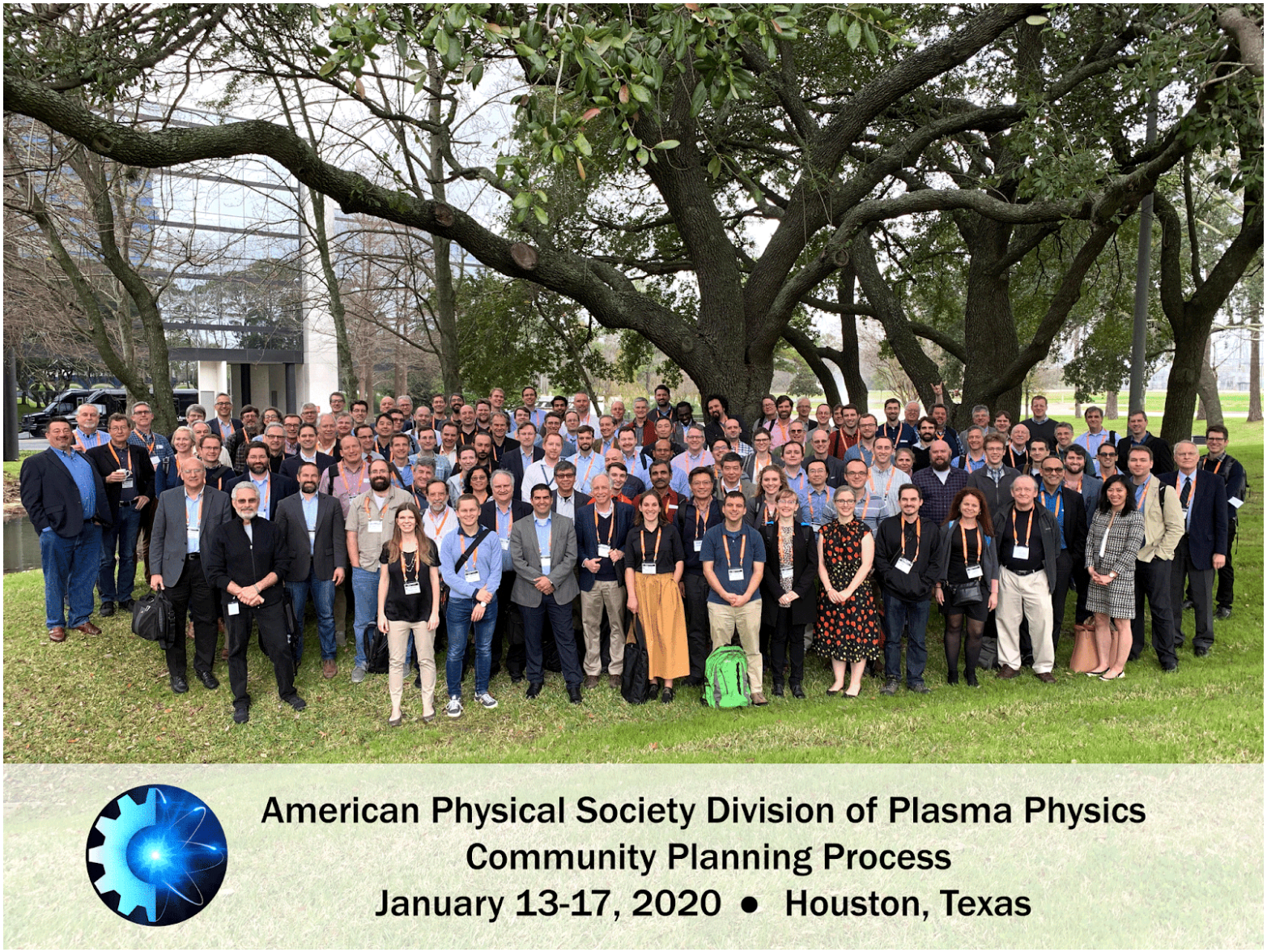
Report should:

- Consider future budgetary constraints as well as the technical readiness and feasibility for any activity to proceed, and
- Provide recommendations on the priorities for an optimized FES program over the next ten years (FY2022 – 2031), considering three budget scenarios as an opportunity to identify priorities.
- Articulate the scientific opportunities that can and cannot be pursued.

Charge letter indicated a community-led process

- Two-phase approach similar to that used by both High Energy and Nuclear Physics programs: i.e., FESAC commencing after the completion of community-led activities to provide broad input to this long-range planning.
- 1st-Phase: APS Division of Plasma Physics led organization of community-led activities, e.g., discussions, town halls, workshops.
  - community actively involved.
- 2nd-Phase: FESAC forms subcommittee toward end of the community's process to develops long-rang plan, using the community's input.

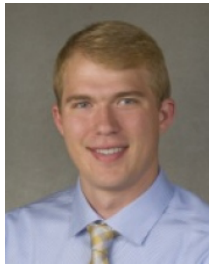
CPP-Houston Workshop, January 13-17, 2020



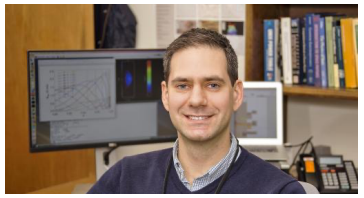
Thank you to CPP Co-Chairs, PC Members, and the entire Community

A Community Plan for Fusion Energy and Discovery Plasma Sciences

Report of the 2019–2020 American Physical Society Division of Plasma Physics Community Planning Process

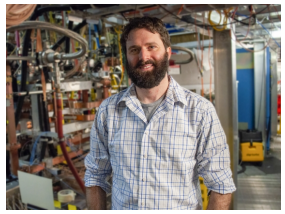


Prof. Scott Baalrud



Dr. Nathan Ferraro

Dr. Lauren Garrison



Dr. Nathan Howard

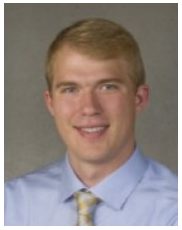
Prof. Carolyn Kuranz

Prof. John Sarff

Prof. Earl Scime

Dr. Wayne Solomon

FESAC Long Range Planning Subcommittee


Scott Baalrud


Riccardo Betti


Troy Carter


Tyler Ellis


John Foster


Cameron Geddes


Arianna Gleason


Chris Holland


Paul Humrickhouse

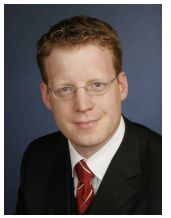

Chuck Kessel


Ane Lasa

Tammy Ma


Rajesh Maingi


David Schaffner


Oliver Schmitz

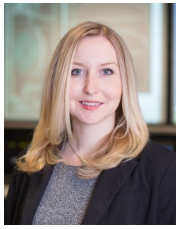

Uri Shumlak


Lance Snead


Wayne Solomon


Erik Trask


Francois Waelbroeck


Anne White


Don Rej (ex officio)

Powering the Future

Fusion & Plasmas

A long-range plan to deliver fusion energy and to advance plasma science

Report of the FESAC Long Range Planning Subcommittee
FESAC Meeting, December 2020