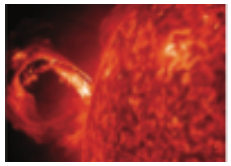
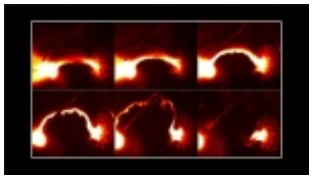
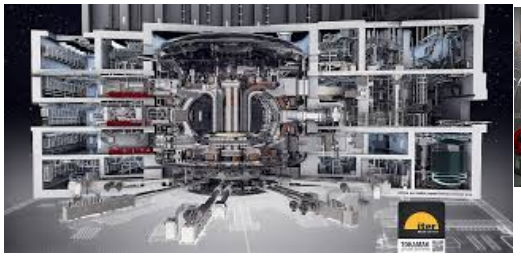
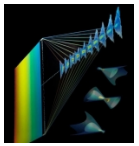
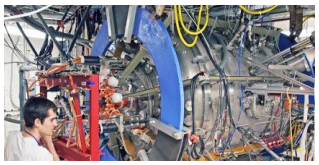
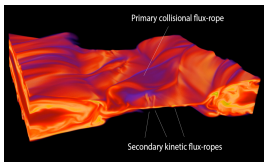
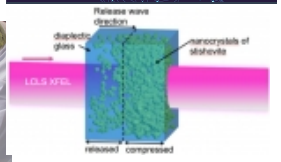
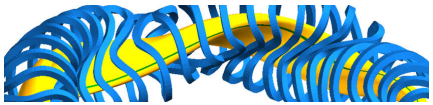
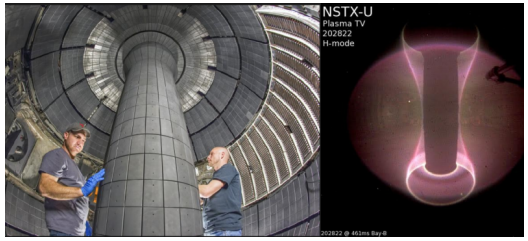




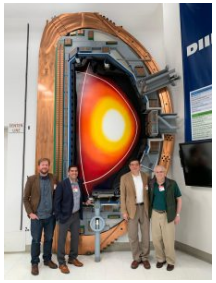


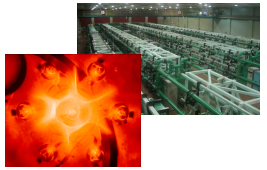
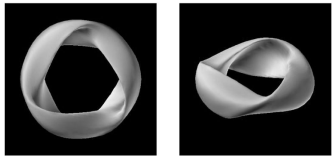



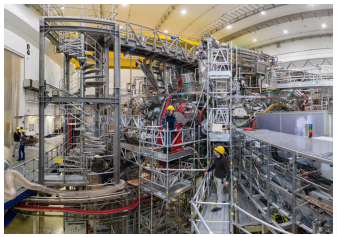
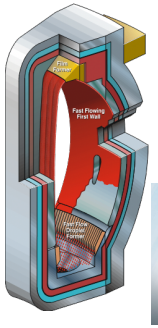
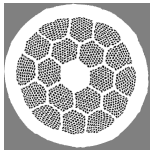
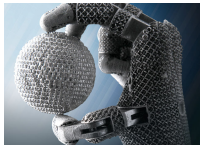
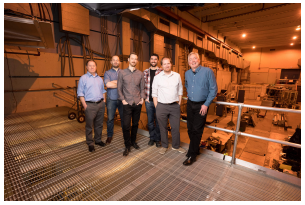
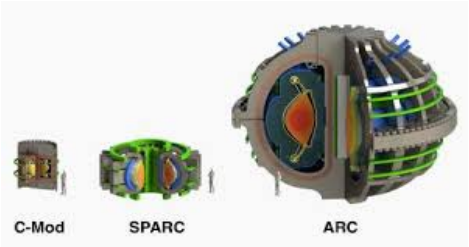



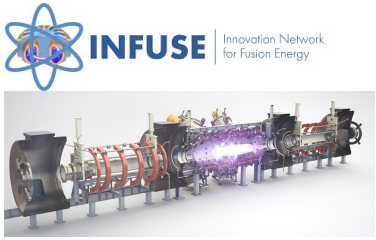


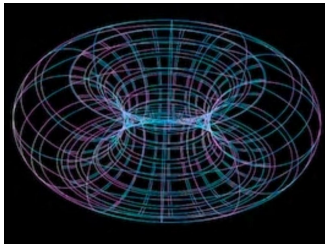
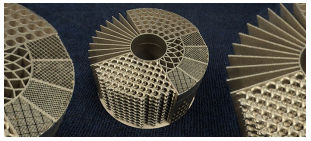




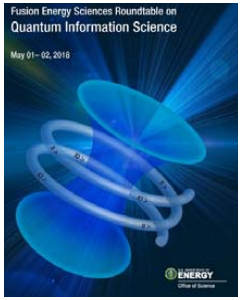







Updates on the DOE Office of Fusion Energy Sciences Long-range Strategic Planning Dec 4, 2019

Presented by Don Rej, FESAC Chair

Charge letter issued 11/20/18 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:

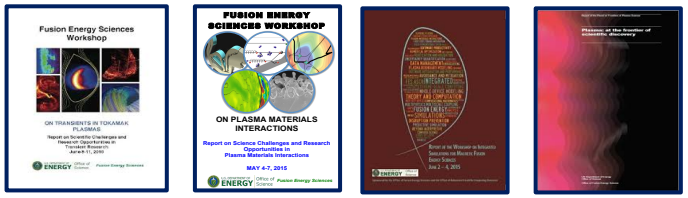
- Consider future budgetary constraints as well as the technical readiness and feasibility for any activity to proceed, and
- Provide recommendations on the priorities for an optimized FES program over the next ten years (FY2022 – 2031), considering three budget scenarios as an opportunity to identify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

Charge letter indicates 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.

Recent FES activities inform this long-range strategic plan

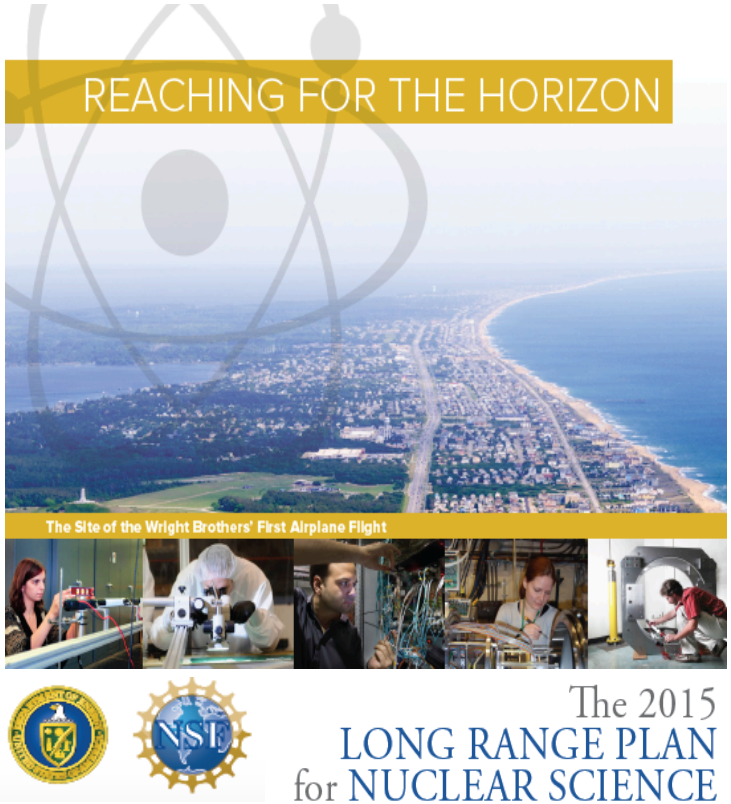
- **2012 FESAC MFE Priorities Report ("Rosner" Report)**
  - COI Issues
  - Did not address budgets
- **2012 report on International Collaboration as one of the important previous studies leading up to this current exercise**
- **2014 FESAC Strategic Plan ("Koepke" Report)**
  - 6 month performance period to meet Congressional deadline was insufficient
  - Insufficient time for community input
  - Result: Fractured community that produced majority and minority reports
- **2015 FES Publishes "10-Year Perspective" research directions (similar to HEP "frontiers")**
- **2015-2017 Priority science questions topics, five community workshops convened by FES:**
  - Transients
  - Simulations for magnetic fusion energy
  - Plasma-materials interactions
  - Frontiers of plasma science (two workshops)



- **2017-2019: NAS Reports commissioned and supported by FES and other Federal Agencies**
  - Opportunities in Intense Ultrafast Lasers (2017)
  - Strategic Plan for US Burning Plasma Research (2018)
  - Decadal Assessment of Plasma Science (2019)

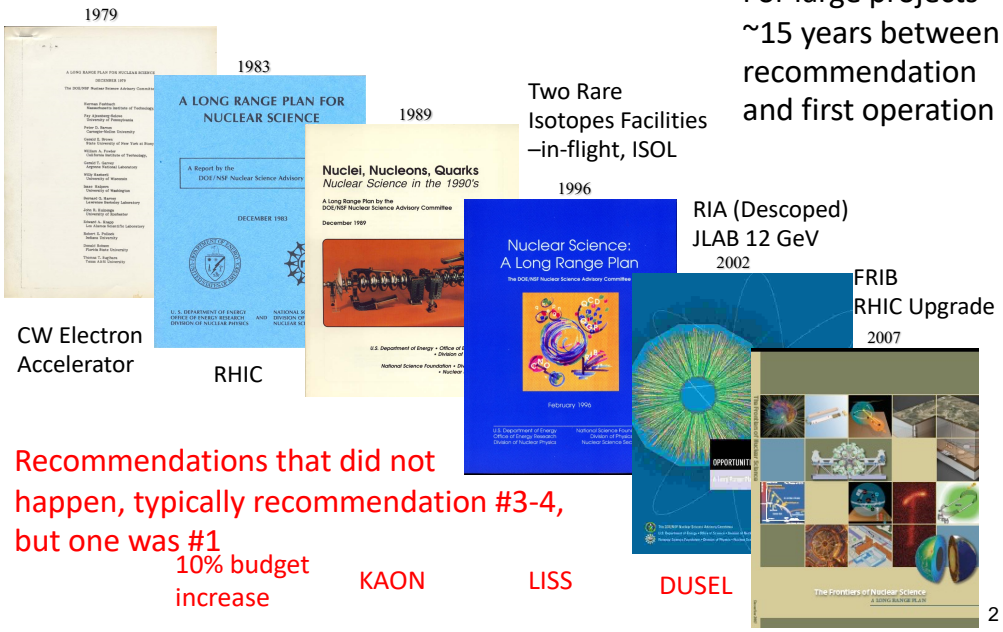
Example from Nuclear Physics colleagues and DOE Office of Science Nuclear Physics leadership

Nuclear Physics Long Range Plan Process: FESAC Meeting 3/12/19
Courtesy: Don Geesaman (Argonne National Lab)



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



CW Electron Accelerator

RHIC

Two Rare Isotopes Facilities –in-flight, ISOL

RIA (Descoped) JLAB 12 GeV

FRIB
RHIC Upgrade

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

10% budget increase

KAON

LISS

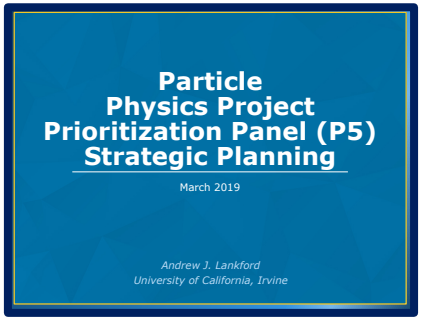
DUSEL

2

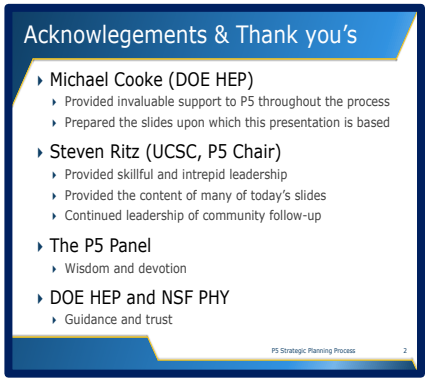
Nuclear Physics planning for 40 years (started by Herman Feshbach!) resulted in successful new projects, including Nobel Prizes from intermediate facilities (SnoLab) as well as large facilities (Alternating Gradient Synchrotron).

Guidance from our High Energy Physics (HEP) colleagues and DOE Office of Science HEP leadership

HEP P5 Process:
FESAC Meeting 3/11/19
Courtesy: Andrew Lankford (UC, Irvine)



- **Charge: A strategic plan, executable over 10 years, in the context of a 20-year global vision**
- **US community has come together to make a plan.**
  - Driven by the science
  - Meets fiscal constraints
  - Considers the global context
  - Resolves key issues for the field
  - Provides a continuous flow of results while making essential investments for the future
- **Snowmass Community Process:** Organized by APS Division of Particles and Fields
- **Snowmass / P5 Interface**: P5 built on the investment in the Snowmass process and outcomes
  - P5 used the Snowmass reports and white papers as its starting point for prioritization
  - Community input & interaction did not stop with Snowmass



FES and FESAC requests to the American Physical Society

- Community and APS-DPP are undertaking the challenge of long-range planning for the national program, starting with Roger Falcone (APS President) and David Newman (DPP Executive Committee Chair) in mid 2018.
- FES was here to help: Discussions with/among FES, DPP Ex Comm leadership, Coordinating Committee leadership, and FESAC chair–Funding to support community activities.
- APS DPP led organization of community-led activities, e.g., discussions, town halls, workshops, webinars, initiative deadlines, joint meetings, and proposal submissions.
- FES and FESAC want the community actively involved.

Phase 1: APS-DPP Community Planning Process (CPP)
Co-Chairs selected by community nominations

Scott Baalrud	*University of Iowa*
Nate Ferraro	*Princeton Plasma Physics Laboratory*
Lauren Garrison	*Oak Ridge National Laboratory*
Nathan Howard	*Massachusetts Institute of Technology*
Carolyn Kuranz	*University of Michigan*
John Sarff	*University of Wisconsin*
Earl Scime (emeritus)	*West Virginia University*
Wayne *Solomon*	*General Atomics*

Phase 1: APS-DPP Community Planning Process (CPP)
Co-chairs initial activities

- Consultation with organizers of the High Energy Physics and Nuclear Physics planning processes
- Announced the basic outline of this process and solicited nominations for program committee members
- Chose and contacted program committee members
  - Approved by APS subcommittee
  - Most members accepted
- Planned the organization of the Community Planning Process (DPP-CPP)
- Planned events
- Asked for, and received commitments from, several institutions for logistical support

Phase 1: APS-DPP Community Planning Process (CPP) Goals

- Produce strategic recommendations for each of four topical areas and four cross-cutting areas from community input.
- Provide both near-term actionable recommendations and a long-term strategic outlook (strategic plan), highlighting opportunities for US leadership.
- To the extent possible, prioritize among these recommendations with community consensus.
- Deliver these recommendations to FESAC by March, 2020.
- We fully recognize the opportunity that this activity represents for FES, and we are enthusiastic to make this process successful!

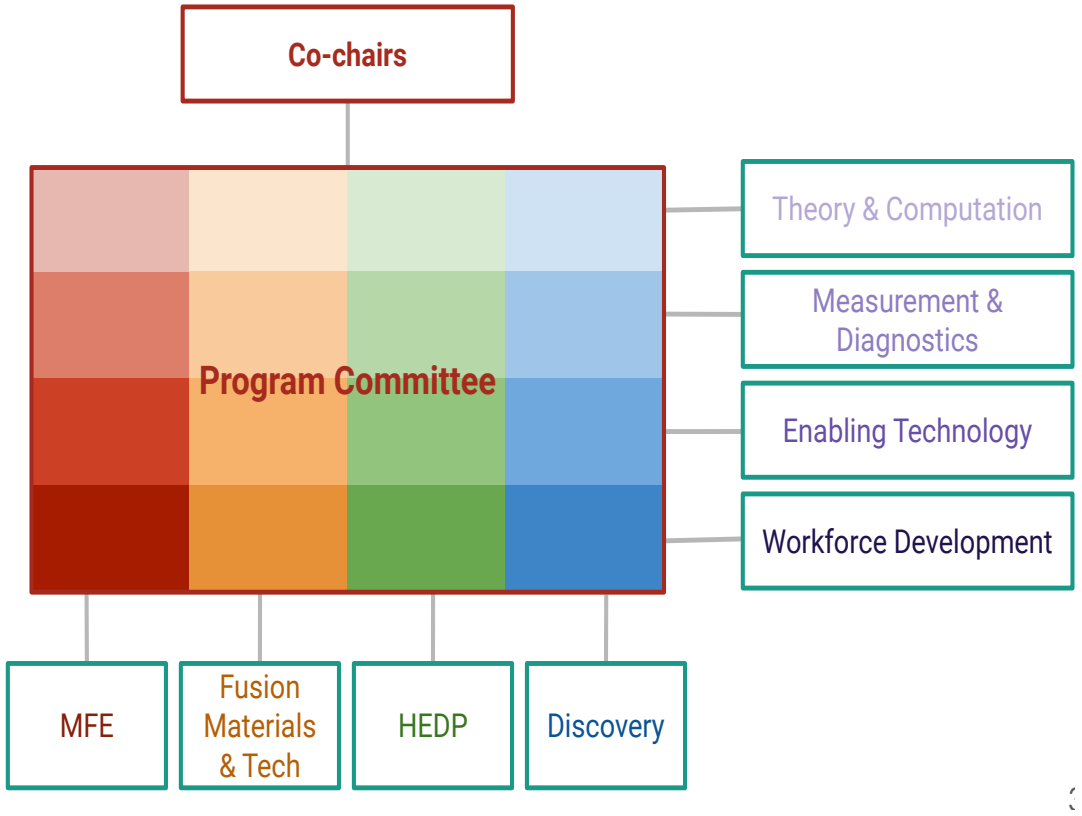
Phase 1: APS-DPP Community Planning Process (CPP)

Community Outreach

- Announcement describing process and seeking program committee nominations: Sent to APS-DPP, ANS, IEEE, HEDSA, UFA, ECFS, and USBPO mailing lists
- Google group: Acts as mailing list for interested individuals: https://groups.google.com/forum/#!forum/dpp-cpp
- Website: https://sites.google.com/pppl.gov/dpp-cpp

Phase 1: APS-DPP Community Planning Process (CPP)
Organization Structure

The **Program Committee** is organized in subgroups to produce **recommendations** in eight topical and cross-cutting areas



DPP-CPP Relation to the NAS Burning Plasma Report: Continuity of planning

- MFE planning process as a continuation of the Madison / Austin process
- NAS Burning Plasma Report strongly informs to serve as the framework for MFE strategic planning
  - Planning consistent with main recommendations of NAS report
  - Initiatives proposed to contribute to the goals laid out in the NAS report
- Assess community reaction to this approach at CPP Town Halls and webinars

DPP-CPP Relation to the NAS Decadal Survey

- It is critical that the DPP-CPP and Decadal Survey processes yield consistent results!
- Communication and collaboration is ongoing
  - Invited presentation by Earl Scime to decadal survey committee
- Joint events (e.g., Planning joint event at decadal survey meeting at PPPL on April 18, 2019)

Process for Choosing Program Committee of the DPP CPP

- Broad representation among stakeholder institutions: Universities, National Labs, Private Industry
- Representation among subfields in topical areas: In MFE: core plasma, power handling, materials, alternate confinement concepts
- Representation among cross-cutting areas in each topical group
- Range of seniority
- Avoid having strong advocates on program committee
  - Allow people to be able to present their cases at the workshops
  - No one will be excluded from the process!
- People who will be enthusiastic, involved, inclusive, and work well together
- Chose among nominated individuals except where gaps were found
- Smallest group that could check all these boxes and do the job
- Names were vetted by APS-DPP subcommittee

Responsibilities of the Program Committee

- Program Committee Members
  - Organize and lead workshops
  - Recruit people for sub-groups etc. as needed
  - Solicit white papers
  - Synthesize community input into reports
- PC members in different topical areas will work in parallel or together to organize topical workgroups
- PC members work together across topical areas to provide input for cross-cuts
- Some PC members focus on organizing topical areas; others focus on organizing cross-cuts

Program Committee Selections: Magnetic Fusion Energy and Fusion Materials & Technology

Magnetic Fusion Energy

Ted Biewer, ORNL
Dan Brunner, CFS
Cami Collins, GA
Brian Grierson, PPPL
Walter Guttenfelder, PPPL
Chris Hegna, Wisconsin
Chris Holland, UCSD
Jerry Hughes, MIT
Aaro Jarvinen, LLNL
Richard Magee, TAE
Saskia Mordijck, William & Mary
Gerald Navratil, Columbia
Craig Petty, GA
Matt Reinke, ORNL
Uri Shumlak, Washington

Fusion Materials and Technology

John Caughman, ORNL
David Donovan, UTK
Ken Hammond, Missouri
Paul Humrickhouse, INL
Robert Kolasinski, Sandia
Ane Lasa, ORNL
Richard Nygren, Sandia
Wahyu Setawan, PNNL
Steven Zinkle, UTK
George Tynan, UCSD

Program Committee Selections: High Energy Density Physics and Discovery Plasma Science

High Energy Density Physics

Alex Arefiev, UCSD
Todd Ditmire, UT Austin
Forrest Doss, LANL
Sean Finnegan, LANL
Arianna Gleason, Stanford/SLAC
Stephanie Hansen, SNL
Louisa Pickworth, LLNL
Jorge Rocca, Colorado State
Derek Schaeffer, Princeton
Cliff Thomas, LLE

Discovery Plasma Science

Daniel Den Hartog, Wisconsin
Dan Dubin, UCSD
Hantao Ji, Princeton
Yevgeny Raitses, PPPL
David Schaffner, Bryn Mawr
Steven Shannon, NC State
Dan Sinars, SNL
Stephen Vincena, UCLA

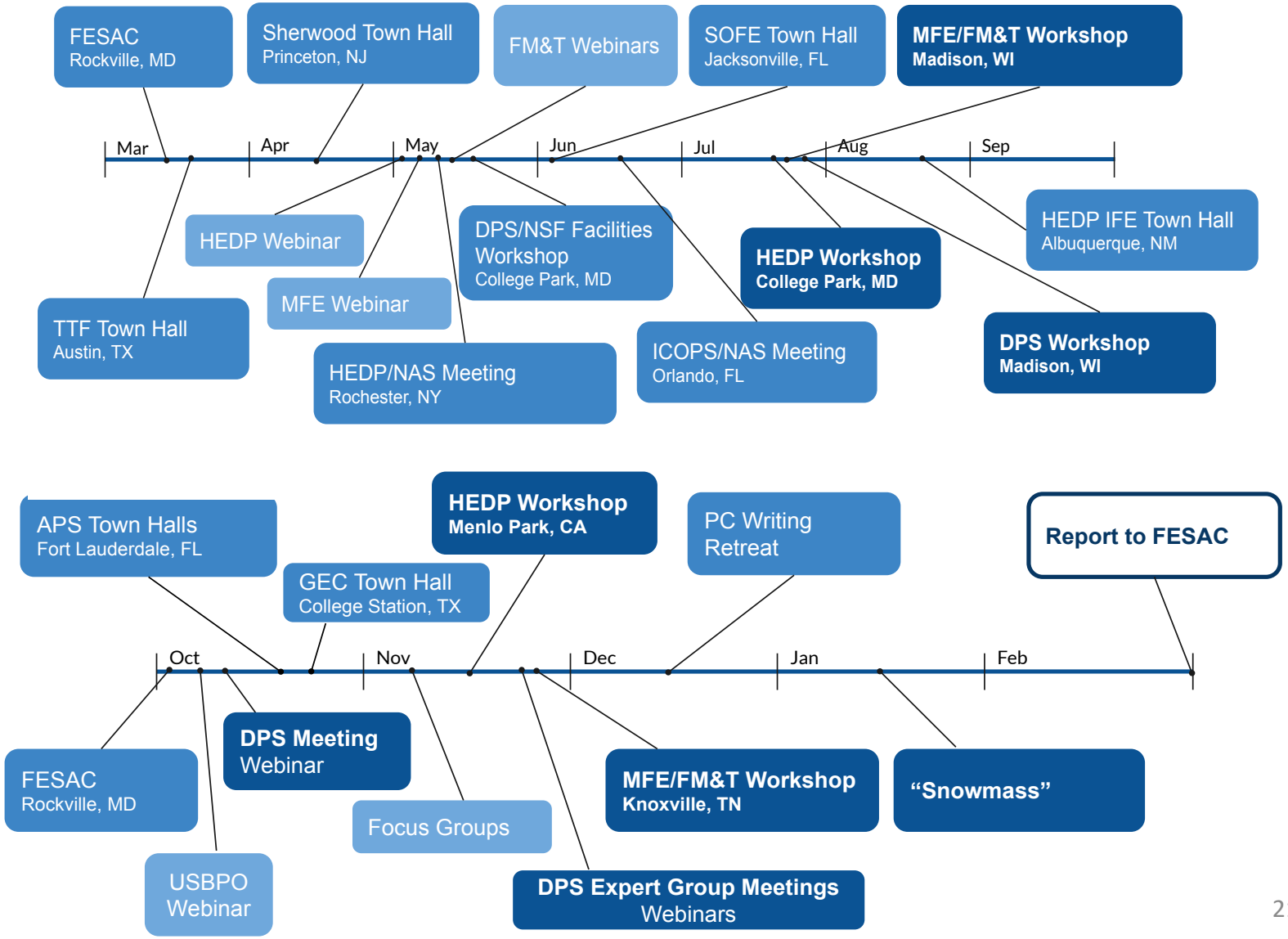
Balancing Energy and Science

- MFE and FM&T areas driven by an energy goal.
  - underscored by the recent National Academies report.
  - strong desire within community that recommendations reflect energy mission of MFE/FM&T. We will strive to address the scientific and technological challenges inherent to that mission.
- HEDP and DPS more driven by scientific exploration, but also have significant practical application.
- The CPP will not cross-prioritize among MFE/FM&T, HEDP, and DPS.
  - areas have distinct goals
  - prioritization among these goals should be set by DOE or Congress.

Phase 1: APS-DPP Community Planning Process (CPP) meetings on April 2019 – Jan 2020

- **MFE-March 19, 2019 Town Hall, Austin**
- **MFE-April 17, 2019 Town Hall, Princeton**
- **MFE - May 15, USBPO webinar: Planning Process for MFE: How to Get Involved**
- **FM&T-April 15, 2019 Community Webinar**
- **FM&T-May 9, 11 am EST-NAS Burning Plasma Report Webinar**
- **FM&T-May 13, 1 pm EST-Webinar and Discussion on DPP-CPP Expert Groups and Proposal Submission**
- **MFE - May 15, USBPO webinar: Planning Process for MFE: How to Get Involved**
- **FM&T-May 20, 1 pm EST-Webinar for Proposal Preparation**
- **FM&T-Jun 3-4, 2019 Town Halls at SOFE, Ponte Vedra Beach, FL**
- **MFE and FM&T- *UPDATED* July 1, 2019 Initiative Deadline**
- **First Joint MFE and FM&T Workshop, July 22-26, 2019, Madison**
- **FM&T-Plasma Material Interaction and High Heat Flux Expert Group weekly meeting-Wednesdays**
- **FM&T-VLT Conference Call to discuss Measurements and Diagnostics September 19**
- **FM&T-VLT Conference Call to discuss Magnets and Technologies September 17**
- **MFE/FM&T Community Planning Process Webinar Series, Oct 16**
- **MFE/FM&T Community Planning Process Webinar Series, Nov 7**
- **Second Joint MFE and FM&T Workshop, Nov 18-22 2019, Knoxville TN**
- **DPS-April 18, 2019 Joint Workshop with the NAS Decadal Assessment of Plasma Science, Princeton, NJ**
- **DPS-May 20-21, 2019 Workshop on Opportunities, Challenges, and Best Practices for Basic Plasma Science User Facilities**
- **DPS- July 1, 2019 Initiative Deadline**
- **DPS First Workshop, July 23-25, 2019, Wisconsin**
- **DPS-Sep 26, 2019 Town Hall at Laser Aided Plasma Diagnostics**
- **DPS Town Hall at APS-DPP Meeting, Oct 22, 2019, Ft. Laud**
- **DPS Webinars: Create Disruptive Technologies (Nov 22), Understand the Plasma Universe (Nov 25), Advance the Foundational Frontier (Nov 26, 2019)**
- **HEDP-May 2, 2019 Community Webinar**
- **HEDP-May 16, 2019 NAS-CPP joint meeting, Rochester, NY**
- **HEDP-July 1, 2019 Initiative Deadline**
- **HEDP-First Workshop, July 16-17, 2019**
- **HEDP-the IFE Townhall at the Z Fundamental Science Workshop, Aug 14, Albuquerque**
- **HEDP Community Planning Process First Webinar, Oct 29**
- **HEDP Community Planning Process Second Webinar, Nov 4**
- **HEDP Second Workshop, Nov 12-14, 2019, Menlo Park, CA**
- **DPP-CPP co-chairs presenting overview, updates, presentation to FESAC, Oct 2, 2019 by.**

Phase 1: APS-DPP Community Planning Process (CPP) meetings on April 2019 – Jan 2020



DPP-CPP Houston Meeting, Jan 13-17, 2020

- The goal of the CPP-Houston Meeting will be to converge on a coherent, consensus plan for fusion and plasma science, encompassing the areas Magnetic Fusion Energy, Fusion Materials & Technology, High Energy Density Physics, and Discovery Plasma Science. We anticipate delivering this input to FESAC by March 1, 2020. The CPP-Houston meeting will be the final major meeting of the community planning process before our report is delivered to FESAC.
- Community-wide meeting to combine input from topical areas into a coherent plan for FES and to get community feedback and buy-in. Topical areas are expected to have well-formed plans coming into the CPP-Houston Meeting.
- Dates: Jan. 13 - 17, 2020 to facilitate participation by avoiding conflicts with other major conferences and academic calendars, and to remain on track to deliver report to FESAC before March, 2020
- Program committee will likely have a retreat in December to set agenda and prepare input
- Different from previous Snowmass meetings—the CPP Houston Meeting will (probably) not be for down-selecting among proposals for new facilities.
- The DPP-CPP (American Physical Society, Division of Plasma Physics Community Planning Program) is pleased to announce that a community-wide meeting for strategic planning will be held from 8:00 am Jan 13 to noon Jan 17 at the Omni Houston Hotel Westside in Houston, TX. Hotel rooms can be reserved using the following link: https://www.omnihotels.com/hotels/houston-westside/meetings/aps-dppcpp-snowmass-meeting-01112020 . Additional details, including how to register and a detailed agenda, will be provided in subsequent announcements.

Phase 2: Draft FESAC Planning – may be changed after the subcommittee has been formed.

- The subcommittee will build upon the investments from the CPP process and outcomes. For example: Use DPP-CPP Houston Meeting reports and white papers as the starting point for prioritization.
- Consider any gaps (e.g., recent and relevant NAS studies).
- Consider the future budgetary constraints and the three scenarios, as well as the technical readiness and feasibility for any activity to proceed.
- Consider appropriate balance of small, mid-scale, and large experiments.
- Request assistance from expert project managers associated with DOE Office of Science, Office of Project Assessment for proposal verification of cost and schedule.
- Articulate the scientific opportunities that can and cannot be pursued.
- Engage with the Community, e.g.,
  - Maintain a website with information of frequent news, meetings, and a submissions portal with a public archive.
  - Several physical and virtual town meetings.
  - Outreach to younger colleagues, with emails associated with the DPP-CPP Houston Meeting, with their mailing lists, and to PIs urging them to inform their students and post-docs about the process and perhaps even use a Twitter feed.
- Panel will be working by consensus. P5 had full-panel phone calls approximately weekly throughout the process, as well as many subgroups to work on tasks in parallel. Additional face-to-face meetings as needed, when needed (P5 had four such meetings). All P5 discussions were held confidential until the report rollout.
- Peer review of the subcommittee report sent out confidentially to about half a dozen distinguished scientists. This would-be the final version of the report.
- FESAC vote and report transmittal
- Stakeholder briefings to FES community, OMB, OSTP, Congress, and International partners