



U.S. DEPARTMENT OF  
**ENERGY**

Office of  
Science

## **New Charges for HEPAP**

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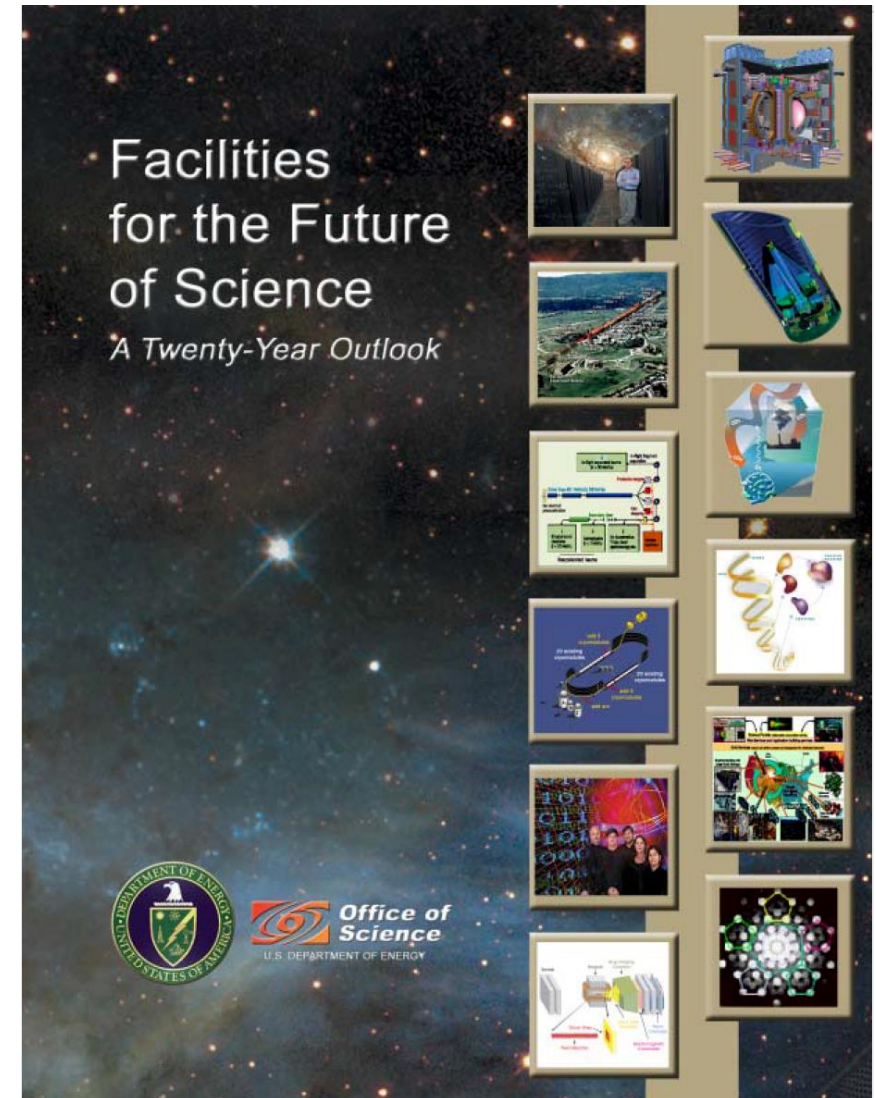
# Outline

- ▶ Charge to Office of Science Advisory Committees – Facilities Construction Projects
- ▶ A Committee of Visitors for the HEP Facilities Division



# Charge to Office of Science Advisory Committees – Facilities Construction Projects

- ▶ A charge was issued to all SC federal advisory committees on December 1, 2023 to provide input to an SC wide facility prioritization.
- ▶ This is a follow-up to a process first conducted by Ray Orbach when he was the Director of the Office of Science in 2003.



# Results of the 2004 Facilities Prioritization

Based on the input from all advisory committees this was the result developed by SC management.

The facilities were prioritized on science and divided up by readiness to proceed.

Several facilities on the list are still being developed and constructed today.

There were multiple ties in priority.

Priority	Program	Facility	Outcome
1 FES	ITER		Under construction
2 ASCR	UltraScale Scientific Computing Capability		Become ExaScale
3 HEP	Joint Dark Energy Mission		ESA built the Euclid mission and NASA is building the Nancy Grace Roman Telescope
3 BES	Linac coherent Light Source		Built and operating
3 BER	Protein Production and Tags		Part of the Bioenergy Research Centers
3 NP	Rare Isotope Accelerator		Built and operating as FRIB
7 BER	Characterization and Imaging		Part of the Bioenergy Research Centers
7 NP	CEBAF Upgrade		Built and operating
7 ASCR	ESNet Upgrade		Built and operating
7 ASCR	NERSC upgrade		Built and operating
7 BES	Transmission Electron Achromatic Microscope		Built and operating
12 HEP	BTeV		Canceled
13 HEP	Linear Collider		Never built
14 BER	Analysis and Modeling of Cellular Systems		Part of the Bioenergy Research Centers
14 BES	SNS 2.4 MW Upgrade		Under development
14 BES	SNS Second target Station		Under development
14 BER	Whole Proteome Analysis		Part of the Bioenergy Research Centers
18 NP/HEP	Double Beta Decay Underground Detector		Under development
18 FES	Next-Step Spherical Torus		Not built
18 NP	RHIC II		A simpler upgrade was done that still achieved the goal.
21 BES	National Synchrotron Light Source Upgrade		Built and operating
21 HEP	Super Neutrino Beam		Became LBNF/DUNE
23 BES	Advanced Light Source Upgrade		Under construction
23 BES	Advanced Photon Source Upgrade		Under construction
23 NP	eRHIC		Became EIC
23 FES	Fusion energy Contingency		Not built
23 BES	HFIR Second Cold Source and Guide Hall		Built and operating
23 FES	Integrated Beam Experiment		Not built
Near Term		Mid Term	Far Term

# The 2013 Facility Prioritization

- ▶ Charge issued by William Brinkman, Director of the Office of Science, to all SC Federal Advisory Committees on December 20, 2012.
- ▶ Requested a 10-year prioritization covering 2014-2024.
- ▶ Criteria for prioritization were:
  - ▶ Ability to contribute to world leading science
  - ▶ Readiness for construction.
- ▶ The deadline for the report was March 22, 2013.
- ▶ HEPAP prepared and submitted the requested report.
- ▶ No SC wide report was issued.

# The New Charge

- ▶ Issued on December 1, 2023 by Dr. Berhe.
- ▶ The deadline is May 2024.
- ▶ The work should be carried out by a subpanel of HEPAP.
- ▶ Similar criteria to the previous charges.
  - ▶ The potential to contribute to world-leading science in the next decade.
  - ▶ The readiness for construction.
- ▶ A list of projects will be supplied by HEP.
  - ▶ Only projects over \$100 million will be considered.
- ▶ “In its deliberations, the subcommittee should reference relevant strategic planning documents and decadal studies.”
- ▶ The short deadline and the existence of the P5 report suggests relying on the P5 report as much as possible.

# Science Categories and Readiness

- ▶ Each facility should be ranked on its scientific impact:
  - ▶ absolutely central
  - ▶ important
  - ▶ lower priority
  - ▶ don't know enough yet
- ▶ Each facility should be ranked on its readiness
  - ▶ ready to initiate construction
  - ▶ significant scientific/engineering challenges to resolve before initiating construction
  - ▶ mission and technical requirements not yet fully defined.

# The Projects

- ▶ HEP was aware of what P5 was discussing, so we developed a list based on that.
- ▶ The charge allows the subpanel to add projects so projects recommended by P5 but not on the HEP list can be added.
- ▶ The HEP list is broken up into near, mid, and far term as the charge requests.
- ▶ Projects past CD-3 aren't on the list nor or projects under \$100 million.



# Near Term

1. Long-Baseline Neutrino Facility/Deep Underground Neutrino Experiment (LBNF/DUNE)
  - ▶ Two subprojects are baselined.
  - ▶ Three more subprojects still need to be baselined.
2. CMB-S4
  1. Project is at CD-0.



# Mid Term

1. Accelerator Complex Enhancement Main Injector + Target (ACE-MI+T)
2. Advanced Accelerator Test Facilities (more on next slide)
3. DUNE High Power Far Detector Upgrade
  - ▶ Additional Far Detector(s)



# Advanced Accelerator Test Facilities

- ▶ The General Accelerator R&D program (GARD) supports development of advanced accelerator concepts testing novel approaches to particle acceleration using techniques involving lasers and plasmas.
- ▶ Advanced Accelerator Test Facilities provide venues for testing such techniques, with the aim of demonstrating feasibility to move to larger scale development.
- ▶ Ranked 3<sup>rd</sup> in this phase based on current understanding and rate of progress.
- ▶ HEP kept this generic. Choosing which one to build will require further advice from the community.

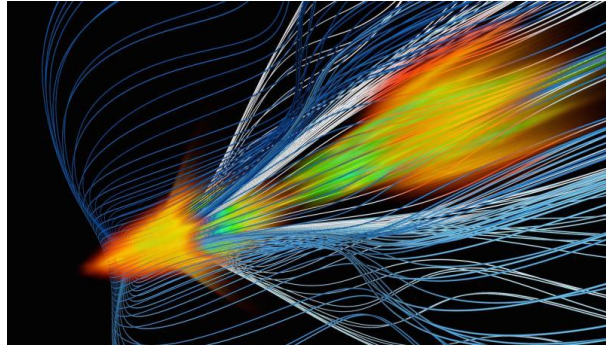
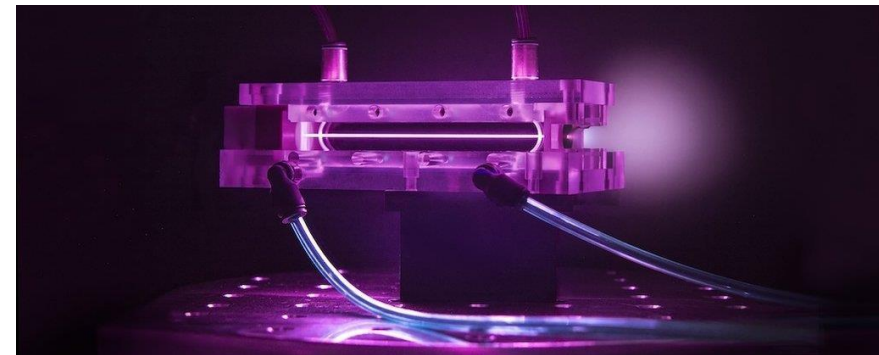
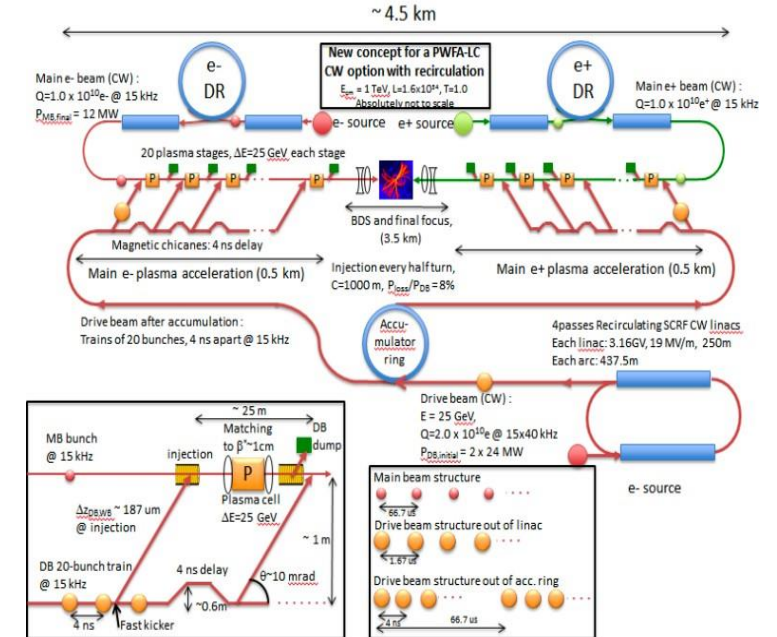


Figure 1: Layout of a 1 TeV PWFA Linear Collider



# Far Term

1. Future Energy Frontier Collider
  - ▶ HEP envisions as a contribution to an offshore collider
  - ▶ An on-shore collider is probably outside the time frame of this exercise.
2. DUNE High Power Near Detector Upgrade
  - ▶ Enhancing the Near Detector to reduce systematic errors.
3. Stage 5 Spectroscopic Survey Instrument
4. Accelerator Complex Enhancement Booster Replacement (ACE-BR)



# The Procedure

- ▶ The HEPAP Chair sets up subpanel to carry out the work.
  - ▶ Follow the standard procedures for subpanels.
  - ▶ The subpanel can extensively rely on the P5 report for guidance.
  - ▶ The question of readiness of various projects may need some additional investigation.
  - ▶ The subpanel can add projects to the list if they are over \$100 million.
    - ▶ If the HEP generated list missed any important P5 project recommendations, then this subpanel can add them.
  - ▶ The report is in the form of a letter.

# Charge to Create a Committee of Visitors

- ▶ The charge is still in the process of being signed.
  - ▶ The COV is a HEPAP subpanel and follows the rules of subpanels.
  - ▶ The HEPAP Chair and the COV Chair have seen the charge.
- ▶ The Office of Science conducts COV reviews of all of its program offices on a regular basis.
  - ▶ The Office of Science has a guidance document for how COVs should carry out their work.
  - ▶ The normal frequency for a COV is once every three to five years.
  - ▶ The guidance tends to concentrate on the quality of peer reviews of proposals, but also looks at the quality of the office's portfolio of activities.

# Past COVs

- ▶ All past COVs are documented at <https://science.osti.gov/hep/hepap/HEP-COV>.
- ▶ 2020
  - ▶ [HEPAP COV Report on HEP Program](#) (Research and Technology Division only)
- ▶ 2016
  - ▶ [HEPAP COV Report on HEP Program](#)
- ▶ 2013
  - ▶ [HEPAP COV Report on HEP Program](#)
- ▶ 2010
  - ▶ [HEPAP COV Report on HEP Program](#)
- ▶ 2007
  - ▶ [HEPAP COV Report on HEP Program](#)
- ▶ 2004
  - ▶ [HEPAP COV Report on HEP Program](#)

# Current Status

- ▶ The 2016 COV recommended doing the Research and Technology Division separate from the Facilities Division due to the large scope of work for the committee.
- ▶ In 2020 there was a COV for the R&T Division. It was held virtually during COVID.
  - ▶ They delivered a report, but the experience was not optimal.
- ▶ We started planning for a Facilities Division COV last year, but HEP management felt that P5 was top priority for HEP and HEPAP's attention.
- ▶ We are overdue for a COV for the Facilities Division.



# The COV Membership

- ▶ The HEPAP Chair consulted with HEP and selected Prof. Young-Kee Kim of the University of Chicago to chair the COV.
- ▶ The HEPAP and COV chairs in consultation with HEP selected the committee members.

Young-Kee Kim University of Chicago Chair

Sally Dawson	BNL	Allison Lung	JLab
Brenna Flaughner	Fermilab	Ben Nachman	LBNL
Craig Group	University of Virginia	Sergei Nagaitsev	BNL
Alex Habig	University of Minnesota-Duluth	Ritchie Patterson	Cornell
Steve Kahn	UC-Berkeley	Frank Zimmermann	CERN

- ▶ The Committee will meet at Germantown March 11-13, 2024.
- ▶ Additional Zoom meetings are being planned before and after the visit.

# Projects to Be Covered

- ▶ All projects during the period 2017–2023.

## Completed Projects

1. BELLE II – completed July 2016
2. DESI – completed May 2020
3. FACET II – completed September 2021  
(oversight delegated to SLAC)
4. LSSTcam – completed September 2021
5. LZ – completed September 2020
6. Muon g-2 – completed January 2018
7. US ATLAS Upgrade – completed August 2019
8. US CMS Upgrade – completed June 2019
9. SuperCDMS-SNOlab – completed March 2023  
(oversight delegated to SLAC)

## Active Projects

1. ACORN – CD-0
2. CMB S4 – CD-0
3. HL-LHC Accelerator Upgrade Project (AUP) - CD-3
4. HL-LHC ATLAS – CD-3
5. HL-LHC CMS – CD-3c
6. LBNF/DUNE – CD-1RR with two subjects at CD-3.
7. LUSec-Night – PD-3 (oversight delegated to BNL)
8. Mu2e – CD-3
9. PIP II – CD-3

The Committee can choose to concentrate on several projects or treat them all equally.

# Operations Programs

- ▶ Fermilab Accelerator and Detector Operations
- ▶ LHC Operations
- ▶ SURF Operations (Cooperative Agreement)
- ▶ Rubin Observatory Operations
- ▶ FACET II Operations
- ▶ Other smaller operations programs in the Cosmic Frontier and GARD.



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# Center for Accelerator Science and Technology (CAST)

- ▶ This a new building at Fermilab to house both accelerator researchers and facilities control rooms.

