DPF: Recent history of agency/community interactions

Hitoshi Murayama (Berkeley)

DPF/DNP Joint Community Meeting, May 22, 2026

HEPAP

- HEPAP = High-Energy Physics Advisory Panel advised both DOE & NSF
  - Created in 1967, FACA in 1972
  - 2~4 times a year
- HEPAP subpanels made important recommendations for the field in closed meetings
- DPF organizes “Snowmass” meetings
  - used to be three-week long workshop in Snowmass, CO
- Programmatic interests of individual labs have also been a significant driver
- 2002 HEPAP subpanel recommended creation of P5=Particle Physics Project Prioritization Panel (coined by Persis Drell, now SCAC chair)
- 2008, 2013, and 2023 P5

DPF and HEPAP on Planning

- 1982 First Snowmass: Summer Study on Elementary Particle Physics and Future Facilities
  - Responding to the new collider being built in Europe
  - Community came out strong on what will later become SSC
- 1983 HEPAP “New Facilities for the U.S. High Energy Physics Program” recommended SSC
  - 1984, 1988 DPF Summer Studies on SSC
- 1988 DPF Summer Study on High-energy Physics in the 1990s (broader)
- 1990 DPF Summer Study on High-energy Physics: Research Directions for the Decade (broader)
- 1993 Cancellation of SSC by Congress
- 1994 HEPAP “Vision for the Future of High-Energy Physics” recommended LHC
- 1996 Summer Study on New Directions for High-Energy Physics e^+e^-LC vs LHC
- 1998 HEPAP “Planning for the Future of U.S. High-Energy Physics”
  - Recommended R&D for future energy frontier machines: LC, μC, VLHC
- 2001 DPF / DPB Summer Study on the Future of Particle Physics
- 2002 “The Science Ahead, The Way to Discovery” HEPAP long range plan for U.S. high-energy physics in the 21st century, strongly recommended e^+e^- ILC

P5

- Individual small- and medium-scale projects used to be purview of lab PACs
- Around 2000, it was becoming increasingly clear that “projects” have become too big to be handled by lab PACs
- 2001 HEPAP subpanel recommended creation of Particle Physics Project Prioritization Panel (P5)
- 2003 P5
  - CDF/D0 Run II upgrades, BTeV, terminated CKM
- 2004 P5
  - Recommended staging of BTeV
- 2007 P5
  - Tevatron beyond FY09? Deferred decision

DPF and HEPAP on Planning

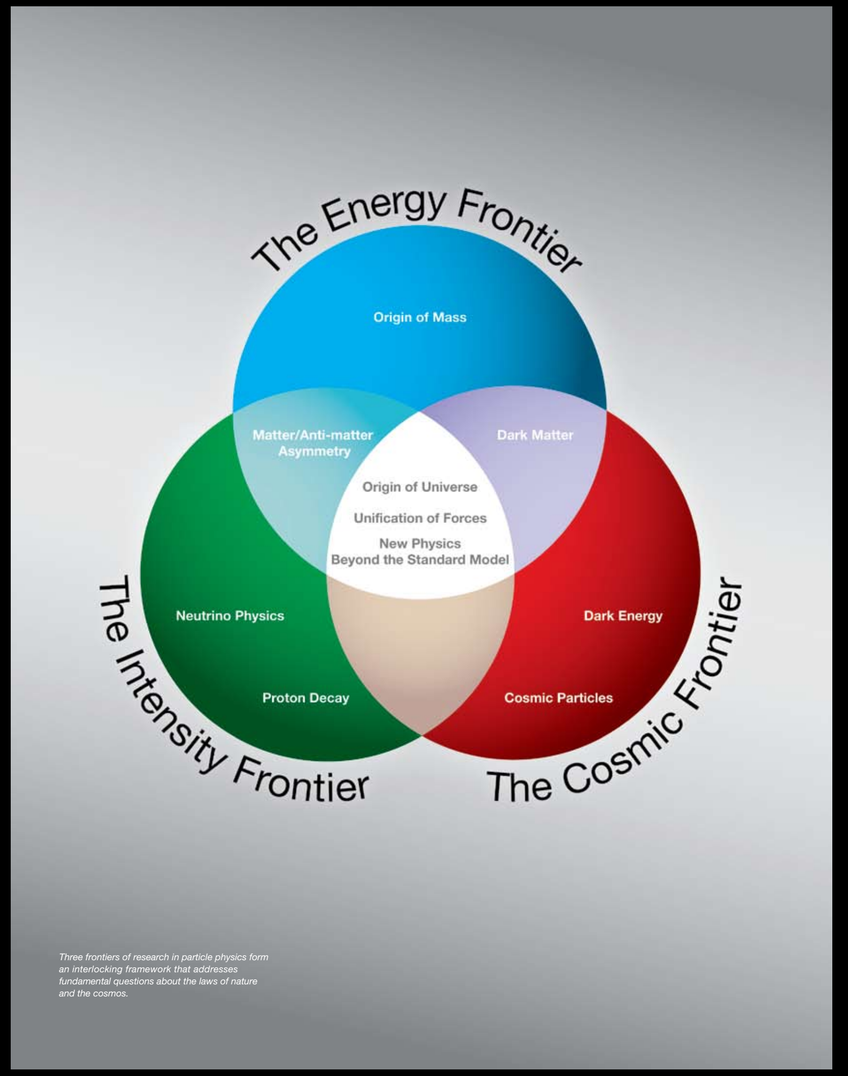
- 2001 DPF / DPB Summer Study on the Future of Particle Physics
- 2002 “The Science Ahead, The Way to Discovery” HEPAP long range plan for U.S. high-energy physics in the 21st century, strongly recommended e^+e^- ILC
- 2007 Cost estimate for the ILC came out too high
- 2008 “US Particle Physics: Scientific Opportunities. A Strategic Plan for the Next Ten Years”
  - Supported Tevatron followed by LHC
  - recommended neutrino, dark matter, dark energy
- 2013 Community Summer Study (concluded in Minneapolis)
- 2014 “Building for Discovery: Strategic Plan for U.S. Particle Physics in the Global Context”
  - recommended HL-LHC, LBNE (later named DUNE/LBNF), embraced CMB
- 2021 Snowmass 2021 (concluded in Seattle)
- 2023 “Exploring the Quantum Universe: Pathways to Innovation and Discovery in Particle Physics”

Procedure

- HEPAP chair recommends the P5 chair in consultation with DOE/NSF
  - HEPAP chair ex officio on P5
- Solicit nominations of P5 members from the community
- P5 and HEPAP chairs appoint P5 members in consultation with DOE/NSF
  - this time Deputy Chair appointed first, and three of us worked together
- A federal employee always present even at closed meetings (FACA)
- Community inputs at closed sessions allowed
- Peer reviews optional (but had them anyway in recent P5)
- Briefing to agencies twice to make sure the recommendations are actionable
- P5 report needs to be approved by HEPAP
  - We also held an after-the-fact town hall to gain community buy-in

2008 P5

- 2008 P5 (Charles Baltay, Yale)
  - First “modern” P5 for the whole program with budget scenarios
  - Tevatron for one to two more years
  - World-class neutrino program
  - Dark matter & dark energy, LSST
- *US Particle Physics: Scientific Opportunities A Strategic Plan for the Next Ten Years*
- Coined Energy, Intensity, Cosmic Frontiers



2014 P5

- 2014 P5 (Steve Ritz, UC Santa Cruz)
  - Use the Higgs boson as a new tool for discovery
  - Pursue the physics associated with neutrino mass
  - Identify the new physics of dark matter
  - Understand cosmic acceleration: dark energy and inflation
  - Explore the unknown: new particles, interactions, and physical principles.
- Recommended LBNE → DUNE/LBNF
- Embraced CMB in HEP
- Finally “got it right”
  - Well received in Washington
  - increased HEP budget by ~30%
  - “*Made many hard choices*”


1800 LoIs
548 White Papers
>1500 people
Final workshop of Snowmass 2021 Community Study
University of Washington, July 2022

Key Elements of a Successful P5

- Well informed by the science community
- Set a grand long-range vision for U.S. particle physics
- Faced budget constraints realistically
  - "Community made tough choices."
- Balanced portfolio
  - Domestic and international
  - Small, mid-scale, and large projects
- Community engagement critical to success
  - "Bickering scientists get nothing."

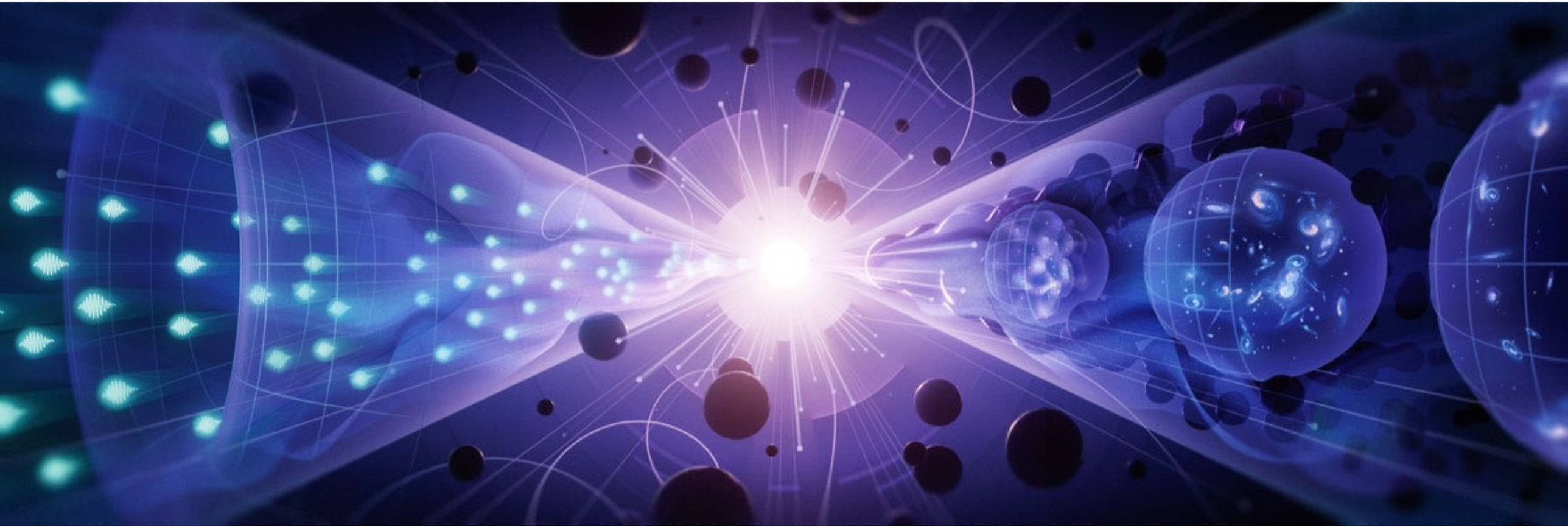
Harriet Kung, Snowmass in Seattle
Then interim director of HEP
Now deputy director for science programs


31 + HEPAP chair (ex officio)
cf. NSAC LRP: 60+2

Exploring the Quantum Universe

Pathways to Innovation and Discovery in Particle Physics

Report of the Particle Physics Project Prioritization Panel 2023



The science drivers are all the more important in 2.5 years since P5

https://www.usparticlephysics.org/2023-p5-report/

Exploring the Quantum Universe

Recommendation 1

Not Rank-Ordered

Reaffirm critical importance of the ongoing projects

As the highest priority independent of the budget scenarios, complete construction projects and support operations of ongoing experiments and research to enable maximum science. We reaffirm the previous P5 recommendations on major initiatives:

a. **HL-LHC** x10 more data d CMS detectors, as well as Accelerator Upgrade Project) to start addressing why the Higgs boson condensed in the universe (reveal the secrets of the Higgs boson, section 3.2), to search for direct evidence for new particles (section 5.1), to pursue quantum imprints of new phenomena (section 5.2), and to determine the nature of dark matter (section 4.1). DOE & NSF PHY

b. **The first phase of DUNE and PIP-II** determines the mass ordering utrinos, a fundamental property and a crucial input to cosmology and nuclear science (elucidate the mysteries of neutrinos, section 3.1). Mostly DOE

c. **The Vera C. Rubin Observatory** scan the whole sky in every few days y Science Collaboration, to understand what drives cosmic evolution (section 4.2). DOE & NSF AST

US leadership in key areas of particle physics

Exploring the Quantum Universe

Recommendation 2

Rank-Ordered

New exciting initiatives

a. **CMB-S4**, which looks back at the earliest moments of the universe to probe physics at the highest energy scales. It reduced to small-scale upgrades m both the South Pole and Chile sites to achieve the science goals (section 4.2).

DOE & NSF AST

b. **Re-envisioned second phase of DUNE** with an early implementation of an enhanced 2.1 MW beam—ACE-MIRT—a third far detector, and an up on hold r-detector complex as the definitive long-baseline neutrino oscillation experiment of its kind (section 3.1).

Mostly DOE

c. **An off-shore Higgs factory**, realized in collaboration with **international partners**, in order to reveal the secrets of the Higgs boson. The current designs of FCC-ee and ILC meet our scientific requirements. The US should actively engage in feasibility and design studies. Once a specific project is deemed feasible and well-defined (see a on hold endation 6), the US should aim for a contribution at funding levels commensurate to that of the US involvement in the LHC and HL-LHC, while maintaining a healthy US on-shore program in particle physics (section 3.2).

DOE & NSF PHY

d. **An ultimate Generation 3 (G3) dark matter direct detection experiment** re on hold neutrino fog, in coordination with international partners and preferably sited in the US (section 4.

DOE & NSF PHY

e. **IceCube-Gen2** for study of neutrino properties using non-beam neutrinos complementary to DUNE and for indirect detection of dark matter cover on hold ass ranges using neutrinos as a tool (section 4.1).

NSF PHY

Congress funds powerful new airlifter on skis for US polar operations

By **SETH ROBSON**
STARS AND STRIPES • February 24, 2026

An LC-130H Skibird takes off from Amundsen-Scott South Pole Station in Antarctica in December 2022. (Air National Guard)

Concern to lose access to the South Pole

n Priorities

U.S. National Science Foundation
GEO Office of Polar Programs

DPF 2024 in Pittsburg
we asked APS to help lobbying for the replacement
APS, Lewis&Burke worked with community
Thanks to Sekhar Chivukula and Amy Bender

decision not to move the CMB-S4 project in
Design Stage at this time. The agency must
structure at the South Pole so that the
ntinue to thrive.

kground science and will continue to
Pole and in Chile. We are in active
ct about the path forward. NSF will work
e options for future CMB science.

Great example that advocacy works!


typically late March, early April
including briefing to DOE

Exploring the Quantum Universe

Recommendation 3

Not Rank-Ordered

Balanced Portfolio from small to large

Create an improved balance between small-, medium-, and large-scale projects to open new scientific opportunities and maximize their results, enhance workforce development, promote creativity, and compete on the world stage.

In order to achieve this balance across all project sizes we recommend the following:

a. Implement a new small-project portfolio at DOE, **Advancing Science and Technology through Agile Experiments (ASTAE)**, across science themes in particle physics with a competitive program and recurring funding opportunity annou some are happening d start with the construction of experiments from the Dark Matter New Initiatives (DMNI) by DOE-HEP (section 6.2).

b. Continue Mid-Scale Research Infrastructure (**MSRI**) and Major Research Instrumentation (**MRI**) programs as a critical component of the NSF research and project portfolio.

c. Support **DESI-II** for cosmic evolution, **LHCb upgrade II** and **Belle II upgrade** for quantum imprints, and **US contributions to the global CTA Observatory** for dark matter (sections 4.2, 5.2, and 4.1).

The Belle II recommendation includes contributions towards the SuperKEKB accelerator.

Exploring the Quantum Universe

Not Rank-Ordered

Recommendation 4

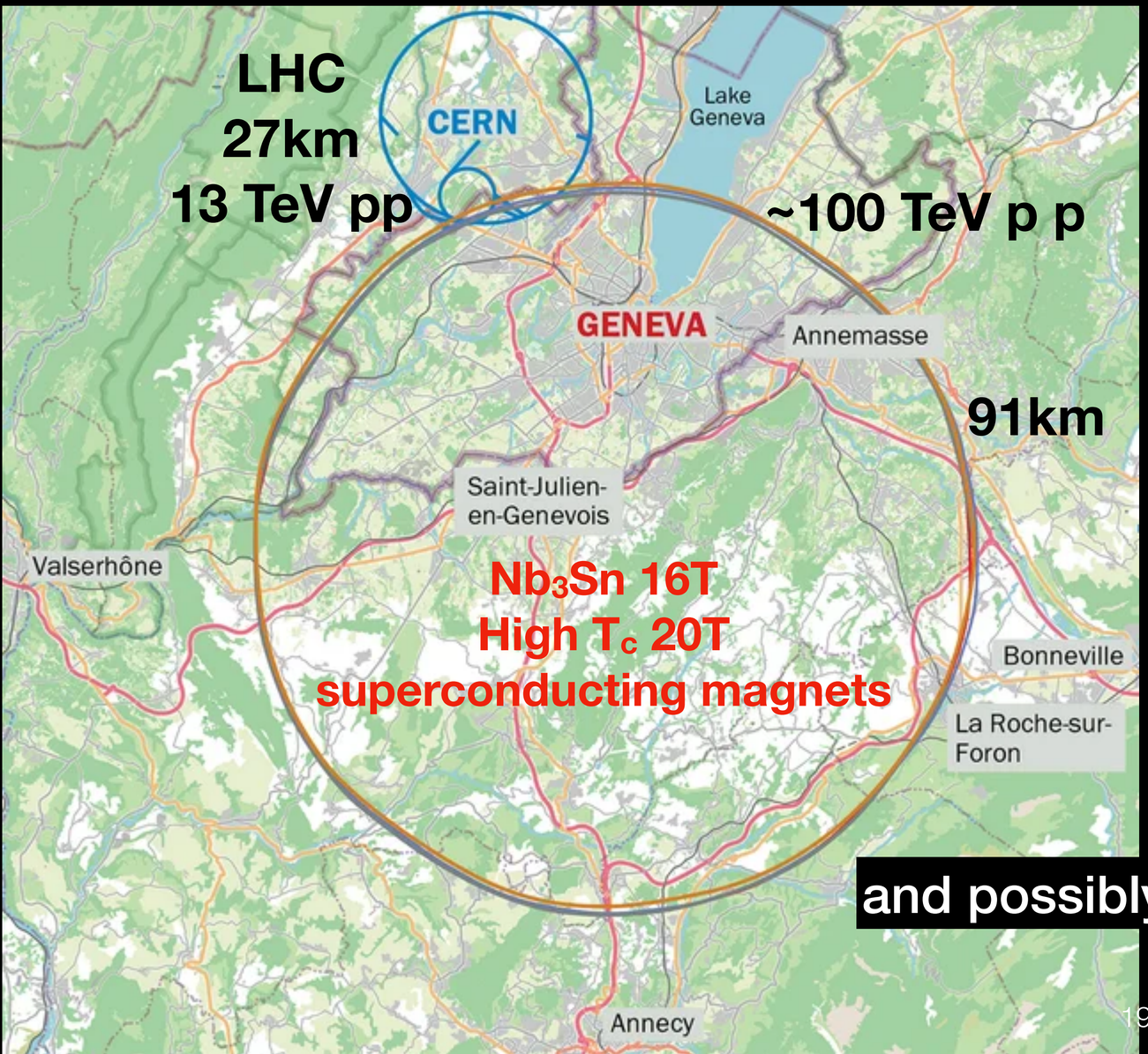
Investment in the future

a. Support **vigorous R&D toward a cost-effective 10 TeV pCM collider** based on proton, muon, or possible wakefield technologies, including an evaluation of options for US siting of such a machine, with a goal of being ready to build **major test facilities and demonstrator facilities within the next 10 years** (sections 3.2, 5.1, 6.5, and Recommendation 6).
b. Enhance research in **theory** to propel innovation, maximize scientific impact of investments in experiments, and expand our understanding of the universe (section 6.1).
c. Expand the **General Accelerator R&D (GARD)** program within HEP, including stewardship (section 6.4).
d. Invest in R&D in **instrumentation** to develop innovative scientific tools (section 6.3).
e. Conduct **R&D** efforts to define and enable new projects in the next decade, including detectors for an e^+e^- Higgs factory and 10 TeV pCM collider, Spec-S5, DUNE FD4, Mu2e-II, Advanced Muon Facility, and line intensity mapping (sections 3.1, 3.2, 4.2, 5.1, 5.2, and 6.3).
f. Support key **cyberinfrastructure** components such as shared software tools and a sustained R&D effort in computing, to fully exploit emerging technologies for projects. Prioritize **computing and novel data analysis techniques** for maximizing science across the entire field (section 6.7).
g. Develop plans for improving the **Fermilab accelerator complex** that are consistent with the long-term vision of this report, including neutrinos, flavor, and a 10 TeV pCM collider (section 6.6).

We recommend specific budget levels for enhanced support of these efforts and their justifications as **Area Recommendations** in section 6.

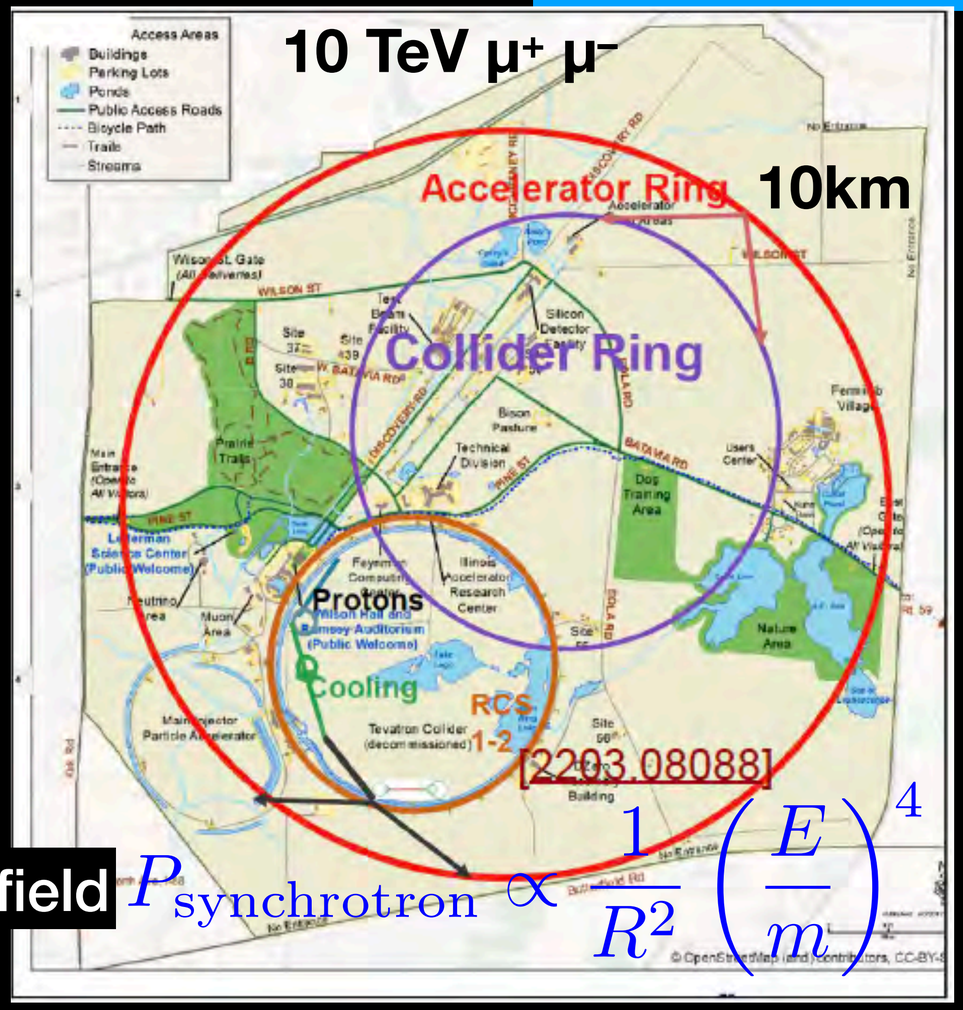
R&D will allow Fermilab to continuously expand the accelerator complex while producing world class science: *our Muon Shot!*

New enabling technologies



5% measurement of Higgs self coupling

Energy 10xLHC
Size 1/3 x LHC
Fits inside the Fermilab site



Muon production and cooling

and possibly wakefield

$$P_{\text{synchrotron}} \propto \frac{1}{R^2}\left(\frac{E}{m}\right)^4$$

DPF Community Meetings

- Since HEPAP was dissolved, we held community meetings
  - July 31-Aug 1, 2025
  - Dec 18-19, 2025
  - May 21, 2025 (yesterday)
- Now joint with DNP today
- hosted by APS. DPF pays for live captioning

Road Ahead

- Agencies and HEP community have been productive partners
- Agencies seek input from the community, community is supported by the agencies
- Questions today:
  - Will HEP and NP have a common funding line?
  - How does the planning process work once merged?
  - NP is concerned to be overwhelmed by LBNL/DUNE
  - HEP is concerned to be held back by EIC
- HEP and NP need to build mutual trust
  - Lots of synergies
  - This time: neutrino interactions, theory, collider detectors, low background/cryogenetic detectors
  - Hope to also cover private foundations in the future

HEP & NP

- We share the same unit system among all physics subareas

$$\hbar = c = 1$$

- I hope we can work together for the advancement of science as a whole