

Maintaining Visibility of the P5 Report

HEPAP

March 2016

**(follow-up from December
presentation)**

S. Ritz

Building for Discovery

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



Report of the Particle Physics Project Prioritization Panel (P5)

May 2014



A Fine Start!

- **Thanks to the efforts of many:**
 - **Community letter organized by DPF and Users Organizations, >2000 signatures gathered in 1st week**
 - **an important message given our earlier reputation as a “fractious” community**
 - **A sustained sequence of rollout activities:**
 - **interactions with decision makers and outreach to other fields**

During the late summer of 2013, the DOE and NSF charged the High Energy Physics Advisory Panel (HEPAP) to constitute a new Particle Physics Project Prioritization Panel (P5) with a goal of developing a 10-year strategic plan for U.S. particle physics in the context of a 20-year global vision. P5 recently completed its work and its report was unanimously endorsed by HEPAP on May 22, 2014. As scientists, engineers, and students from 144 U.S. universities and laboratories, we write to express our strong support for the P5 Report.¹ This plan describes a world-leading program of discovery and we urge that it be incorporated into the plans of the DOE and the NSF.

The report proposes a compelling and balanced strategy of exploration and discovery. The funding profile is realistic. By following it, we will maintain our historic position as a global leader and reliable international partner in this exciting science. The plan invests in the strengths of the US Particle Physics Community, optimizing our resources to address the five critical and intertwined science drivers identified by P5: to exploit the Higgs boson as a new tool for discovery; to pursue the physics associated with neutrino mass; to identify the physics of dark matter; to understand cosmic acceleration, dark energy and inflation; and to explore the unknown, new particles, new interactions, and the principles that govern them.

The P5 report relies on the work of an extensive community study (“Snowmass”) commissioned by the Division of Particles and Fields of the American Physical Society, our professional society of particle physics. Over the course of a year a thousand members of our community, organized in dozens of far-flung working groups, considered the scientific opportunities in depth covering all areas of our field. This work culminated in a 10-day meeting in August 2013 where the comprehensive documentation for P5’s deliberations was completed. Then over the subsequent nine months, P5 held multiple face-to-face and virtual community meetings, and maintained an active website for community input. The resulting P5 report distilled the accumulated wealth of scientific opportunities into those that best serve the science drivers, while also making hard choices among many outstanding scientific programs. Support among our community has solidified behind this exciting report as witnessed by our attached **2095 signatures gathered in seven days**: we stand behind the P5 plan.

Now that our community has reached consensus, we look to you for the necessary support to execute this plan that will enable us to maintain and enhance our position as global leaders in this exciting program of discovery science and technological innovation.

Sincerely,
The U.S. Particle Physics Community

cc: Dr. France A. Córdova, Director, National Science Foundation
Dr. Patricia Dehmer, Director, U.S. Department of Energy Office of Science
Dr. Denise Caldwell, Director, Physics Division, National Science Foundation

¹ <http://usparticlephysics.org/p5/>




Maintaining Visibility (from December talk)

- There is a growing sense that now is a good time to do more.
- **An improved brief brochure with clear messages:**
 - **Maintain effectiveness and community coherence, in the context of the full P5 report.**
 - **Support and build upon the hard work that our colleagues are already doing, visiting decision makers with clear and effective messages.**
 - **Continue to make the case for particle physics.**

These are all important and challenging to do well!



Brochure (from December talk)

- Brief (2 pages, based on P5 report and earlier brochures):
 - The wonder and excitement of particle physics
 - The field has a clear direction and plan: an affordable program of great impact in the international context. A track record of success.
 - Building for discovery: clear and inspiring questions can be addressed with tools we know how to build now. The importance of sustained R&D.
- **An insert (2 sides) frequently updated:** 
 - Recent advances
 - Asked DPF for inputs (experiment and theory). DPF also contacting sibling divisions of APS (DPB, DAP, DNP)
 - It has been a very productive year programmatically as well!
 - What's important to accomplish in the coming year
 - In close consultation with the agencies
- Circulate widely in the community for comments and suggestions (DPF et al., HEPAP, agencies, community meetings, users groups, labs, projects, target audiences,...). Also seeking advice from other fields that already do this well.
- Discussed this approach at August DPF meeting.



Two-page Insert

- Followed the plan
 - Discussed the draft with HEPAP, very helpful feedback
 - More pictures, fewer words
 - Some wording improvement suggestions
 - Circulated to DPF Exec, various community members for feedback
 - Coordinated with Users Groups, as this is meant as a tool for them.
- Many thanks especially to Michael Cooke, Jim Dawson (general audience writing expert), Michael Branigan (Sandbox), the agencies, community interactions for the great efforts and support.
- By design, the Insert can be updated easily, as needed.
 - Benefit from the experiences using it.



The Insert...which goes into...



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usparticlephysics.org

The P5 Report provides a strategy and the priorities for U.S. investments in particle physics for the coming decade.

The top four priorities this year

Start the High-Luminosity LHC (HL-LHC) accelerator and detector upgrade projects so the U.S. can deliver its critical contributions on time. This is P5's highest priority near-term large project.

Solidify international partnerships to establish the Long-Baseline Neutrino Facility (LBNF) and Deep Underground Neutrino Experiment (DUNE), and move forward with the engineering design, construction site preparation, and long-lead procurements. This is the highest priority large project in its time frame.

Complete the existing construction projects that will enable the next major discoveries in particle physics, including the ATLAS and CMS upgrades, LSST, DESI, Mu2e, Muong-2, LZ, ADMX-G2, and SuperCDMS-SNOLAB.

Balance scientific research with facility operations and the carefully selected portfolio of small, medium, and large projects that together facilitate the success of the community's strategic vision.

These carefully chosen investments will enable a steady stream of exciting new results for many years to come and will maintain U.S. leadership in key areas.



Particle Physics is both Global and Local. Scientists, engineers, and technicians at more than 160 universities, institutes, and laboratories throughout the U.S. are working in partnership with their international colleagues to build high-tech tools and components, conduct scientific research, and train and educate the next generation of innovators. Particle physics activities in the U.S. attract some of the best scientists from around the world.

Recent results

Higgs boson exploration. The Large Hadron Collider (LHC) experiments measured the Higgs boson mass to amazing precision (0.19%), along with many other results. The LHC is further expanding its great potential for discovery with higher-energy (13 TeV) operations.

Hints of neutrino mass ordering. Early results from the NOvA long-baseline neutrino experiment give intriguing hints about the arrangement of neutrino masses, a key question in neutrino science.

Cosmic dark matter opportunities. The Dark Energy Survey discovered 17 dwarf galaxy candidates that provide valuable new venues to search for clues about the nature of dark matter using ground- and space-based instruments.

New configurations of matter. The LHCb experiment found evidence for exotic pentaquark states, postulated but never before observed.

Program advances in 2015

The historic bilateral U.S.-CERN agreement was signed in May 2015, ensuring smooth continuation of this highly successful collaboration and, for the first time, enabling CERN to invest in facilities in the U.S.

The community moved rapidly toward a new era of neutrino physics. Development of the Long-Baseline Neutrino Facility (LBNF) and the Deep Underground Neutrino Experiment (DUNE) became truly international, providing a worldwide focus of scientific research at Fermilab. A coordinated set of short-baseline neutrino experiments designed to answer perplexing questions raised by earlier experiments is proceeding.

Next-generation direct-detection dark matter experiments were selected and are moving toward construction.

Next-generation dark energy experiments began construction. The Large Synoptic Survey Telescope (LSST), led by the NSF, with a massive 3.2 gigapixel camera provided by DOE and international partners, was given final approval for start of construction. The Dark Energy Spectroscopic Instrument (DESI) is moving forward on final design and into fabrication.

Accelerator R&D program priorities were identified for the coming decade in a new High Energy Physics Advisory Panel report, following the P5 strategic plan.

Looking forward

All eyes are on the LHC as it begins the second year of higher-energy searches for new physics.

Eagerly anticipated new data from operating experiments will advance the understanding of the intertwined Science Drivers.

Japan is considering hosting the International Linear Collider (ILC), which would provide new opportunities for discovery beyond the LHC.

The vibrant U.S. particle theory community will continue to play key roles interpreting results from current experiments, motivating future experiments, and pursuing the deepest questions about the foundations of particle physics.



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...the Brochure/Folder (trifold)...



U.S. Particle Physics

Particle Physics

*Strategic Plan for
U.S. Particle Physics
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Global Context*



Building for Discovery

Building for Discovery



A Vision for the Future

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A Vision for the Future



Building for Discovery





Particle physics is a dynamic, successful, and global field. The U.S. particle physics community has come together to develop a clear vision for the future. These carefully chosen investments will enable discovery and maintain U.S. leadership in key areas.

...and which is available on the updated website:

usparticlephysics.org

(includes photo captions and credits)

The Science Drivers

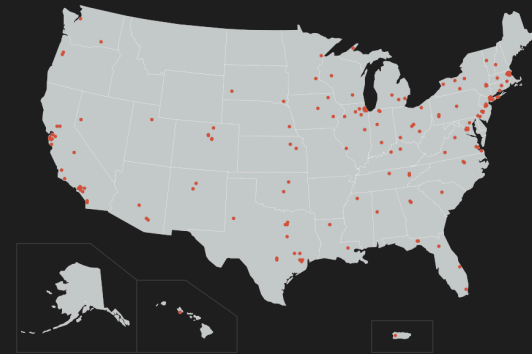
Use the Higgs boson as a new tool for discovery.

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.



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Discussion
