Fermilab's Preparation for the Snowmass Process

PAC January 2020 Meeting
January 15th, 2020
Bo Jayatilaka, Brendan Kiburg, Louise Suter, for the Scientific Advisory Council

Outline Overview

PAC Charge and Community Planning

Composition of SAC and Working Group Leaders

Integration with Lab Strategic Planning

2019 Pre-Snowmass Activities

Planned 2020 Activities

Outlook

PAC Charge

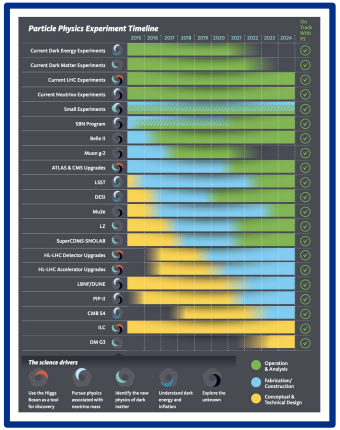
The SAC is invited to report on the Fermilab's plans for contributions to the Snowmass process

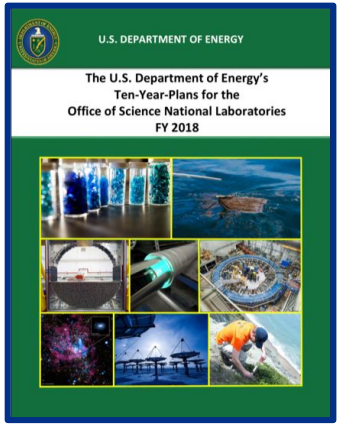
(pre-Snowmass workshop, organization of internal working groups, White Papers, availability of resources).

Lab and Community Planning

2012 2013 2014 2015 2016 2017 2018 2019 2020

Plan → Prioritize → Continually Execute and Communicate





Workshops/Studies Discussions → **Snowmass** Community Planning

P5 (Particle Physics Project Prioritization Panel)

Execute plan, communicate progress

Annual Lab Plan (5-10 year outlook)

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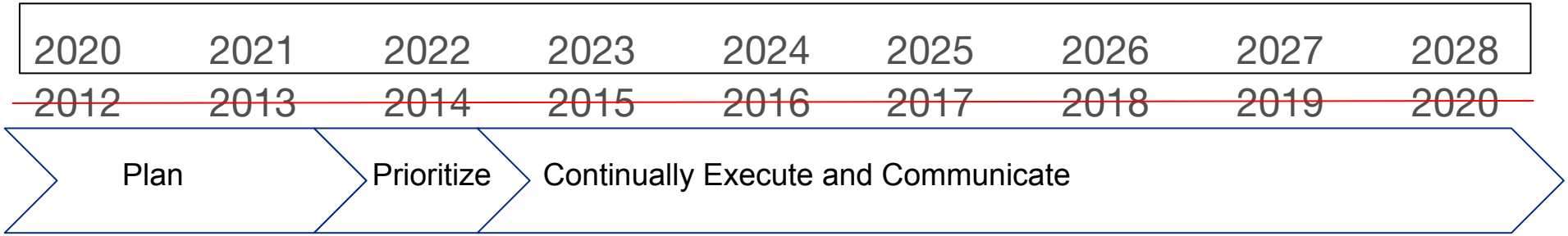
Lab and Community Planning



Identify the most compelling and important science for the 10+ year period starting in 2026

Develop community collaboration and consensus and prioritize the plan

Communicate, support, and execute the plan within the laboratory, community, funding agencies, public, etc..

Efforts Within Fermilab

Scientific Advisory Council (SAC) & Working Group Leaders (WGL)

Integrated Planning and Performance Management (IPPM)

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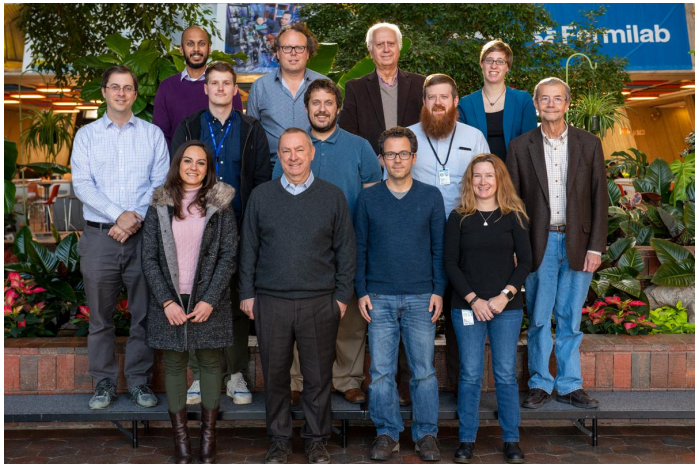
What is the SAC?

- Diverse scientific expertise
- Founded in 2013, group of 16 scientists with diverse expertise
- Meet ~weekly with members of directorate to discuss matters of relevance to staff, including short- and long-term scientific planning
- Ongoing activity regarding Snowmass planning



<u>Continuing through Oct 2020:</u>

Karie Badgley (APS-TD / Muon)
Daniel Elvira (SCD / CMS)
Zoltan Gecse (PPD / CMS)
Brendan Kiburg (PPD / Muon, co-chair)
Petra Merkel (PPD / CMS)
Diktys Stratakis (AD / Muon)
Louise Suter (ND / NuMI, past-chair)
Matt Toups (ND / MicroBooNE)

<u>New Members (Oct 2019 to Oct 2021):</u>

Robert Ainsworth (AD / MI)
Stefan Hoche (PPD / Theory)
Jeremiah Holzbauer (PIP-II Division / PIP-II)
Bo Jayatilaka (SCD / CMS, co-chair)
Gordan Krnjaic (PPD / Astro Theory)
Anne Schukraft (ND / SBN)
Andrew Sonnenschein (PPD / Astro)
Tiziana Spina (APS-TD / Magnets)

Current or previous IPPM Strategic Planning Group Leaders

Working Group Leaders

Frontier Physics Groups:

Precision - Chris Polly, Ron Ray

Energy - Pushpa Bhat, Anadi Canepa, Paddy Fox, Sergo Jindariani, Sergei Nagaitsev

Cosmic - Brad Benson, Gordan Krnjaic, Albert Stebbins, Alex Drlica-Wagner

Neutrinos - Minerba Betancourt, Zarko Pavlovic, Joseph Zennamo, Peter Shanahan

Technology Groups:

Accelerator Science - Jonathan Jarvis, Nikolay Solyak, Sasha Valishev, Sam Posen, Tiziana Spina

Quantum Science - Roni Harnik, Panagiotis Spentzouris

Detectors - Juan Estrada, Angela Fava, Petra Merkel, Vadim Rusu

Computational Science - Chris Jones, Adam Lyon

Current or previous IPPM Strategic Planning Group Leaders

Good alignment with proposed 2021 Snowmass Frontiers
Rare Process/Precision
Energy
Cosmic
Neutrino
Theory
Underground Facilities
Accelerator Science/Tech
Instrumentation
Computing
Community Involvement

Comparison of Planning Groups

SAC Working Group Leaders	IPPM Strategic Planning Group Leaders
Periodic Working Group Meetings	Annual Strategic Planning Workshops
Prepare to contribute to the next Community Planning Exercise (Snowmass, P5)	Formulate Lab's strategic plan and contribute to DOE/SC Annual Lab Plan
Long-term strategic planning (2026+)	Near-term strategic planning (5-10 years)
Open exploration to identify experiments, facilities to achieve broad physics goals	Update existing and propose new lab goals and lab objectives
Internal strategic planning activity that will solicit input from the community and contribute to the broader HEP planning process (Snowmass/P5)	**Internal strategic planning activity** that communicates the lab's strategic plan to multiple external audiences

By 2022, both groups will be focusing on developing and executing the strategy for the same time period

Continued Interactions Between SAC and IPPM

July 2019 PAC Recommendation: the PAC recommended to better integrate the grass roots SAC exercise with Annual Lab Strategic Planning process (organized by IPPM)

- IPPM leadership has presented at SAC meetings in July and October 2019
- SAC presented to IPPM concerning our Snowmass efforts at the Annual Strategic Planning workshop Jan 10th, 2020
- Continue to align SAC/IPPM working group leaders to improve consistency
- Many ongoing activities of Working Groups (some examples)
  - Collider/Energy Frontier holds regular working group meetings
  - Accelerator Science and Technology has defined five working groups to develop white papers for Snowmass
  - Neutrino has defined working group advocates for several topics
  - Accelerator planning a Physics Opportunities workshop for a 2.4MW PIP-III machine in spring of 2020
  - Precision is involved in a community effort for a muon campus workshop in fall 2020

Working Group Charge

Working groups established in 2019 prior to Fermilab Retreat

Retreat focused on Parts I and II -- Scientific Interest Level / Resource Identification

Overall goal was to ensure Fermilab is ready to contribute to community planning!

Part III Charge for All Working Groups: Fermilab input to the Community
Timescale: Continuous efforts pre and post retreat with report in Fall

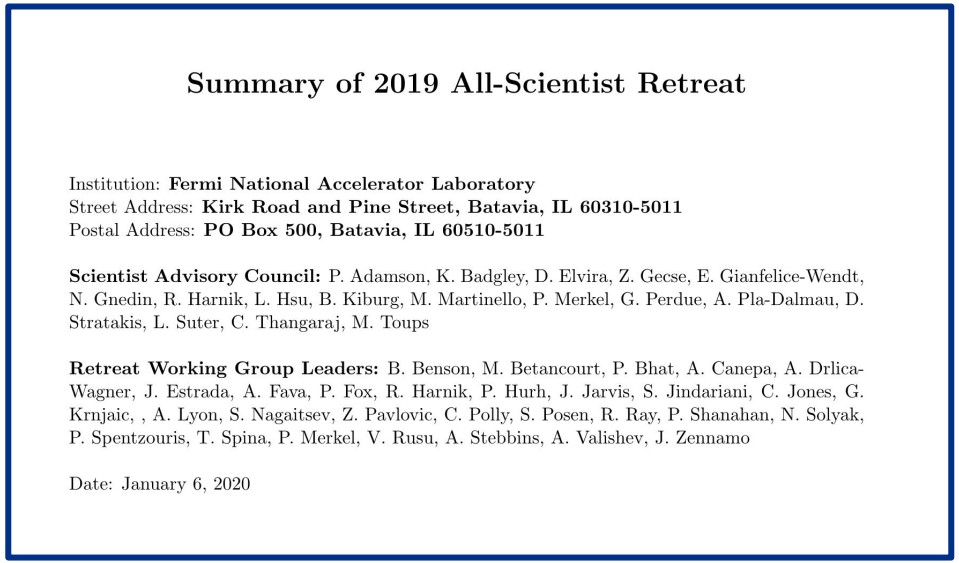
For high interest items identified in Parts I & II, discuss what is needed to engage the larger community. Consider what process or metrics will be used to determine whether these are the best projects for the future and/or to decide between different high interest options. How can we enable Fermilab to take part in these efforts?

As examples, consider setting up monthly meetings, organizing working groups, defining specific studies, writing a white paper, taking part in community planning efforts such as Snowmass, etc.

2019 Pre-Snowmass Activities

Final report from Fermilab internal retreat 2019

- About 35 page summary document
- Plenty of vibrant discussion to be captured in written documents
- Basis for generating white papers and studies for the community planning exercise



Summary of 2019 All-Scientist Retreat

Institution: **Fermi National Accelerator Laboratory**
Street Address: **Kirk Road and Pine Street, Batavia, IL 60310-5011**
Postal Address: **PO Box 500, Batavia, IL 60510-5011**

Scientist Advisory Council: P. Adamson, K. Badgley, D. Elvira, Z. Gecse, E. Gianfelice-Wendt, N. Gnedin, R. Harnik, L. Hsu, B. Kiburg, M. Martinello, P. Merkel, G. Perdue, A. Pla-Dalmau, D. Stratakis, L. Suter, C. Thangaraj, M. Toups

Retreat Working Group Leaders: B. Benson, M. Betancourt, P. Bhat, A. Canepa, A. Drlica-Wagner, J. Estrada, A. Fava, P. Fox, R. Harnik, P. Hurh, J. Jarvis, S. Jindariani, C. Jones, G. Krnjaic, , A. Lyon, S. Nagaitsev, Z. Pavlovic, C. Polly, S. Posen, R. Ray, P. Shanahan, N. Solyak, P. Spentzouris, T. Spina, P. Merkel, V. Rusu, A. Stebbins, A. Valishev, J. Zennamo

Date: January 6, 2020

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2019/2020 Pre-Snowmass White Paper Survey

In Snowmass 2013 Cycle:

- While the workshops were being held in the 12 months before Snowmass, calls for white papers went out to the community

Goals for Snowmass 2021 Cycle:

We are trying to stimulate plans of Fermilab scientists ahead of the pre-snowmass meetings

- Mature some of the ideas in preparation for the workshops
- Estimate resources needed to perform studies for white papers

Incomplete list from first Wave: 29 topics identified, nearly all plan to be joint Fermilab+Community efforts

	Frontier	Topic	Contact Author Identified	Author Scope
2	Cosmic	Axion Dark Matter	YES	Fermilab + Community
3	Cosmic	AI/Cosmology	YES	Fermilab + Community
4	Cosmic	Joint Cosmology Analysis of Late-Time Cosmic Structure Formation Probes	YES	Fermilab + Community
5	Cosmic	21 cm Cosmology opportunites in next decade	YES	Fermilab + Community
6	Cosmic	Astrophysical Probes of Dark Matter		Fermilab + Community
7	Cosmic	Dark Matter Direct Detection		Fermilab + Community
8	Cosmic	Cosmic Microwave Background		Fermilab + Community
9	Cosmic	Dark Energy		Fermilab + Community
10	Neutrino	Tau Neutrino Appearance in Accelerator-Based Neutrino Beams		Fermilab + Community
11	Neutrino	Using the DUNE Opportunity Module as a Neutrinoless Double Beta Decay Platform		Fermilab + Community
12	Neutrino	An H2+D2 Detector in the LBNF Neutrino Beam		Fermilab + Community
13	Neutrino / Precision+Rare Processes	Searches for new light weakly interacting particles using proton beam dumps at FNAL		Fermilab + Community
14	Energy	Dark Matter Searches		Fermilab + Community
15	Energy	VBS in dibosons - Precise Exploration of SM	YES	Fermilab + Community
16	Energy	VBS in dibosons - Study of Longitudinal Polarization		Fermilab + Community
17	Energy	Precision Higgs		Fermilab + Community
18	Energy	Higgs cubic and quartic couplings	YES	Fermilab + Community
19	Energy	Strong SUSY/BSM for pp machines		
20	Energy	Higgsino in SUSY	YES	Fermilab + Community
21	Computing	Computing Challenges for HEP	YES	Fermilab + Community
22	Detectors	Technology Review Paper		
23	Precision+Rare Processes	Redtop	YES	Fermilab + Community
24	Precision+Rare Processes	Mu2e-II / CLFV		Fermilab + Community
25	Precision+Rare Processes	Precision muons / lepton Universality		
26	Accelerator Science	Targetry	YES	
27	Accelerator Science	Magnets / Cavities		-
28	Accelerator Science	Cryogenics		
29	TBD	EDI Challenges and solutions in HEP		Fermilab + Community
30	TBD	Ethics of AI development by scientists		Fermilab + Community

2019/2020 Pre-Snowmass Community Town Halls

Hosted a remote connection to April 13th, 2019 DPF Town Hall meeting in WH1W

- Early in the Snowmass Process, Small distribution lists

For Upcoming Snowmass Town Halls at DPF/APS

- Plan to offer remote participation (w/ microphone connection) at Wilson Hall for employees and users unable to travel
- Increases participation of scientists in the community at all levels
- Increases awareness of Snowmass developments with our user base

Based on April 2019 experience, we plan to

- Advertise to All Scientists and All Users
- Advertise jointly with the UEC Chairs
- Send notifications with plenty of lead time

2019/2020 Pre-Snowmass Internal Quarterly Meetings

Started Quarterly Meetings with All-Scientists

- Focus on issues relevant to SAC, including Snowmass topics
- Open dialogue channels
- Example: Encouraged lab scientists to identify and nominate their peers (laboratory, users, and other community members) for the Snowmass convenership process
- Meeting dates: May 2019, Nov 2019, Jan 31 2020

Communicate status updates and opportunities from Frontier/Topical conveners

Discuss best ways to participate in Snowmass, distribute information

Encourage and track white papers, cross-pollinate ideas between different Frontiers

2020 Snowmass Planning

There will likely be several Frontier Conveners for Snowmass from Fermilab

These Snowmass conveners will serve as natural points of contact between DPF/SAC/FNAL. Additional topical converships are expected.

We will invite these conveners to our quarterly meetings to establish open channels of communication between these conveners, the working group leaders, and the scientific staff in general.

2020 Snowmass Planning: Propose to help facilitate Pre-Snowmass Study

July 2019 PAC Recommendation: “The PAC recommends that the Laboratory consider organizing a timely workshop dedicated to Snowmass which the HEP community is invited, as proposed by the SAC”

Begin process of evolving from internal planning to community planning

Proposal: SAC and UEC plan to jointly write to DPF to offer to facilitate a pre-snowmass workshop in the Summer of 2020.

Proposal Timing: We intend to wait until frontier conveners are named, as these individuals will serve as the natural points of contact and will have critical input.

Workshop Timing: We intend to target the Summer/Fall of 2020, potentially adjacent to Neutrino 2020 in the Chicagoland area

Topical Areas: We foresee this workshop to be broadly focused with multiple Frontiers participating, if possible

Program Leadership: This proposal is to facilitate and coordinate the workshop, with the DPF appointed Frontier and Topical conveners driving the scientific program

2020 Snowmass Lab Resources

Scientific Snowmass preparation - Lab is strongly supportive of allocation of scientific time and resources for Snowmass studies, and will provide budget code guidance for scientific staff

White Papers - Lab has encouraged white papers requested that the authors of estimate the non-scientific resources needed (e.g. engineers) and communicate this for budget allocation planning purposes

LDRD - Lab directed R&D is funding several new initiatives aimed at providing input to the Snowmass workshops

Pre-Snowmass Workshop - Lab plans to help facilitate a community-wide pre-snowmass workshop at Fermilab led by DPF topical conveners

Outlook

The 2013 Snowmass cycle led to a very productive and vibrant research cycle in the subsequent decade

Fermilab has continued internal efforts to develop new and relevant research programs both internally and in concert with the HEP community

- The SAC has led efforts to prepare to contribute to Snowmass via an all-scientist retreat and scientific poll, retreat report, white paper survey, participation in DPF Town Hall, quarterly meetings
- The lab supports scientific participation via convenerships, white paper authorship, LDRD project funding, and the offer to host several smaller workshops and facilitate a major pre-snowmass workshop

Fermilab scientists intend to continue to work with the HEP community to develop a high-impact, well-developed plan that will lead to another vibrant Snowmass-P5 cycle in the early 2020s

Backup

Fermilab Scientific Advisory Council (SAC) Charter

The Scientist Advisory Council is a group of approximately 15 members of the Fermilab scientific staff. The composition of the group is diverse in areas of expertise and experience. Terms are for a two-year period, with half of the group rotating out each year. At the beginning of September each year, the laboratory director solicits nominations via the "all-scientists" distribution list. The demographics being sought will be announced (i.e. number from each organizational unit). Self-nominations are accepted. Following the open nomination period, new council members are selected by the current council in consultation with the director. New terms begin October 1.

The council will meet regularly (approximately weekly) with the director. The charge to the council is to engage in open discussion on topics of interest for both short- and long-term plans for the laboratory's research program. The council will also discusses issues related to careers and professional development of the Fermilab scientific staff.

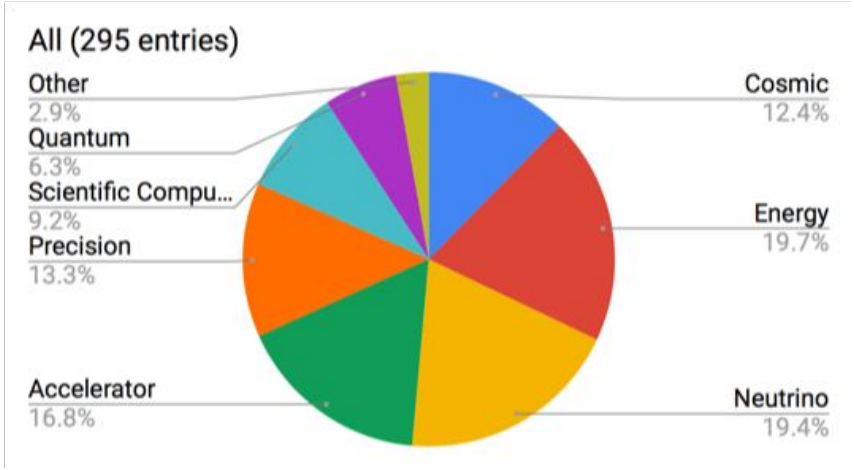
Members of the council are encouraged to share the discussion topics within their respective organizations to gather feedback and input from the broader scientific staff that the council can then share with the director. On occasion, the outcome of discussions may lead to the council initiating a sub-committee study of a theme or convening an all-scientist retreat to engage broader discussion of the topic.

Last updated August 29, 2014

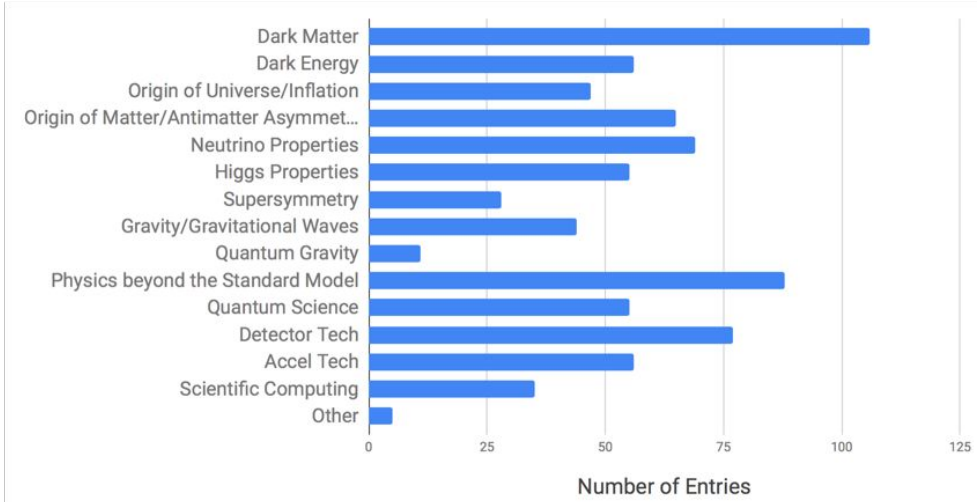
From the SAC public webpage

Example 2019 Poll Result

What do you work on?



What are you excited to investigate post-2026?



- Poll represents a “snapshot” of the staff when administered. Retreat itself generated enough discussion that likely some results would change if administered again today. Results reflect current knowledge of scientific staff and highlight importance of making sure people are well informed.
- Poll very helpful in generating discussions both in and across working group boundaries and has helped to focus discussion on topics of highest interest.

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