

BNL Snowmass Retreat

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US High Energy Physics Future Planning

- The field of high energy physics developed approach how to decide “what to do next”
- Step 1
 - Groups of scientists develop proposals for future facilities/experiments
- Step 2
 - “Snowmass” community wide process discusses proposals, evaluates strong and weak points, physics reach and costs and summarizes outcome in a written form
 - Organized by the Division of Particles and Fields (DPF) – professional organization, not laboratories or funding agencies
- Step 3
 - P5 committee (Particle Physics Projects Prioritization Panel) is formed (by NSF and DOE) consisting of ~25 scientists representing all areas of high energy physics
 - The committee, within about a year, sets priorities based on available funding and on the expected cost of the proposals
 - Recommendation's cover ~10 years time span
- Step 4
 - HEPAP (High Energy Physics Advisory Panel) appointed by NSF/DOE reviews the proposal and recommends it to be considered by DOE
- Step 5
 - NSF/DOE fund recommended projects, assuming funding is available

Previous Snowmass was in 2013



Snowmass on the Mississippi a.k.a CSS 2013

Log in ▾

Quick Links

- ▼ [TWiki registration](#)
- ▼ [Pre-meetings](#)
 - [Community Planning Meeting](#)
 - [All pre-Snowmass Meetings](#)
- ▼ [Colloquium questions](#)
- ▼ [Big Questions \(Quantum Universe\)](#)

Groups

[Energy Frontier](#)
[Intensity Frontier](#)
[Cosmic Frontier](#)
[Frontier Capabilities](#)
[Instrumentation](#)
[Frontier](#)
[Computing Frontier](#)
[Education and Outreach](#)
[Theory Panel](#)

Google Search



snowmass2013.org

WWW

Community Summer Study 2013

(Snowmass on the Mississippi) Minneapolis, 7/29 - 8/6 2013

The American Physical Society's Division of Particles and Fields is pursuing a long-term planning exercise for the high-energy physics community. Its goal is to develop the community's long-term physics aspirations. Its narrative will communicate the opportunities for discovery in high-energy physics to the broader scientific community and to the government.

Minnesota Information and Registration webpage

Follow [this link !\[\]\(84f47badaad7772cd95667a7c387a639_img.jpg\)](#) to a preliminary agenda

Conveners, to request room for parallel sessions use [this link Request rooms](#)



COLLOQUIUM QUESTIONS

BIG QUESTIONS FOR OUR UNIVERSE.

LATEST NEWS

- July 24 update: list of questions for the colloquia at CSS2013 are posted
- May 7 Update: The [Snowmass Young Physicists Career and Science Aspirations Survey !\[\]\(94c04a5e8e7b3269dd6cea1792ca5aaf_img.jpg\)](#) is now online. Please encourage students and postdocs to respond. [http://tinyurl.com/snowmassyoung !\[\]\(4dc0bbe5b1208e18f61682bfe6794074_img.jpg\)](http://tinyurl.com/snowmassyoung)

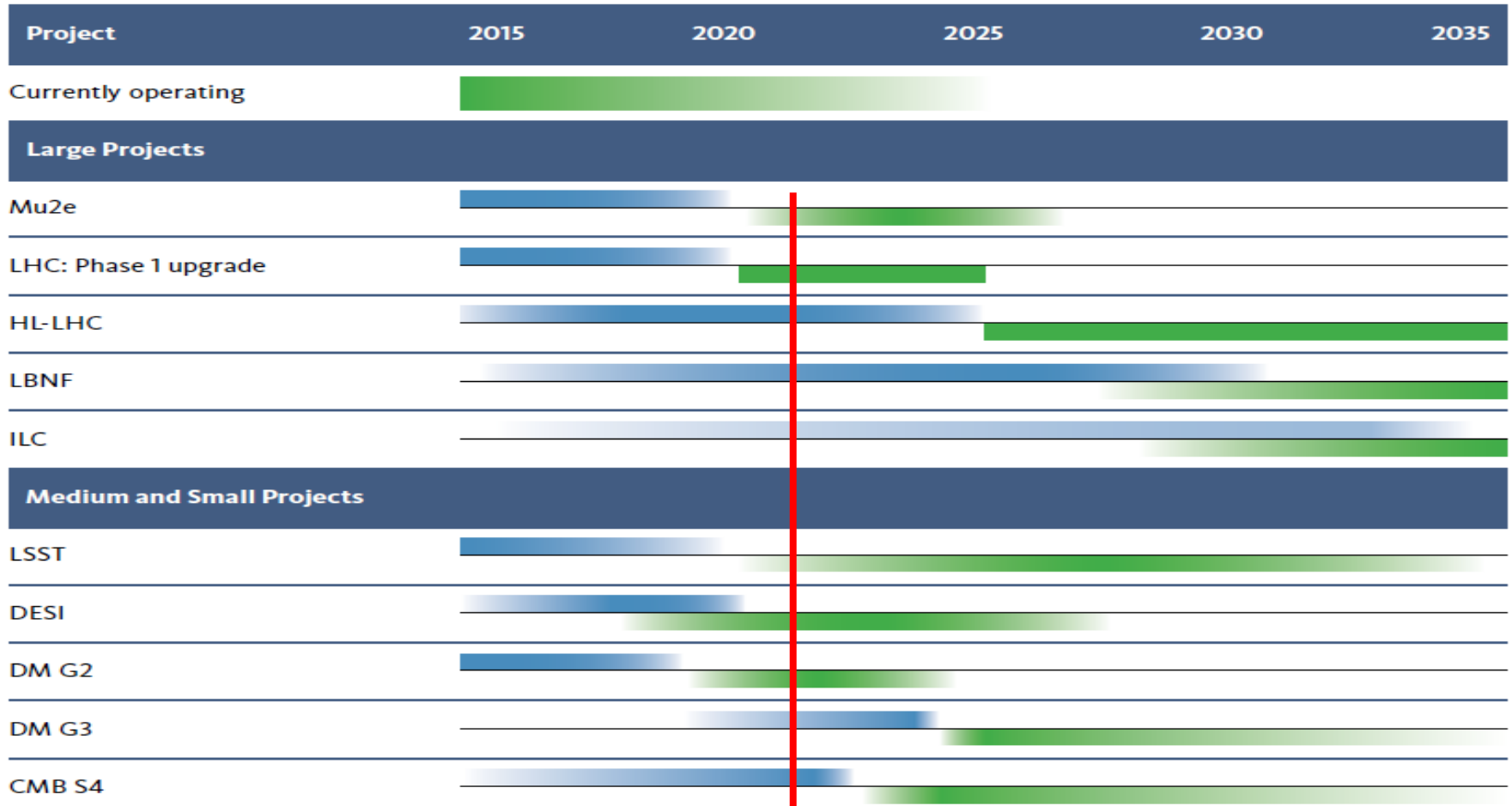
Main Challenge of the 2013 Snowmass/P5

Project	M\$
Near-term Projects (Mu2e, g-2, muon campus)	350
LBNE	900
Project-X through stage 3 (w/o expts)	1,700
Project-X stage 1 experiments	485
Project-X stage 2 and 3 experiments	500
NuSTORM	400
ORKA	80
LSST	175
Other Cosmic (G2-DM, CMB, DESI)	170
Near-term LHC detector upgrades	60
G3 Dark Matter	200
LHC Accelerator Upgrades	250
CMS+ATLAS Upgrades	600
ILC-250 GeV (US contribution)	1,700
ILC Detector (US contribution)	300
R&D for future Intensity Frontier accelerator	100
R&D for future colliders	300
Total	8,270

2013 Table

- Funding required to do “new programs” was well above “available”
- Even more serious challenge is that some estimates of the costs were well below actual

How 2013 Snowmass/P5 Plan Stands Today



Snowmass 2021/2022



Why next Snowmass

- New science and technological developments accumulated over past ~8 years
- Beyond 2026 funding in HEP is *expected* to become available for “next large/medium/small projects”
- We, as a community, must plan our future

Proposals must be developed in advance

Good proposal includes

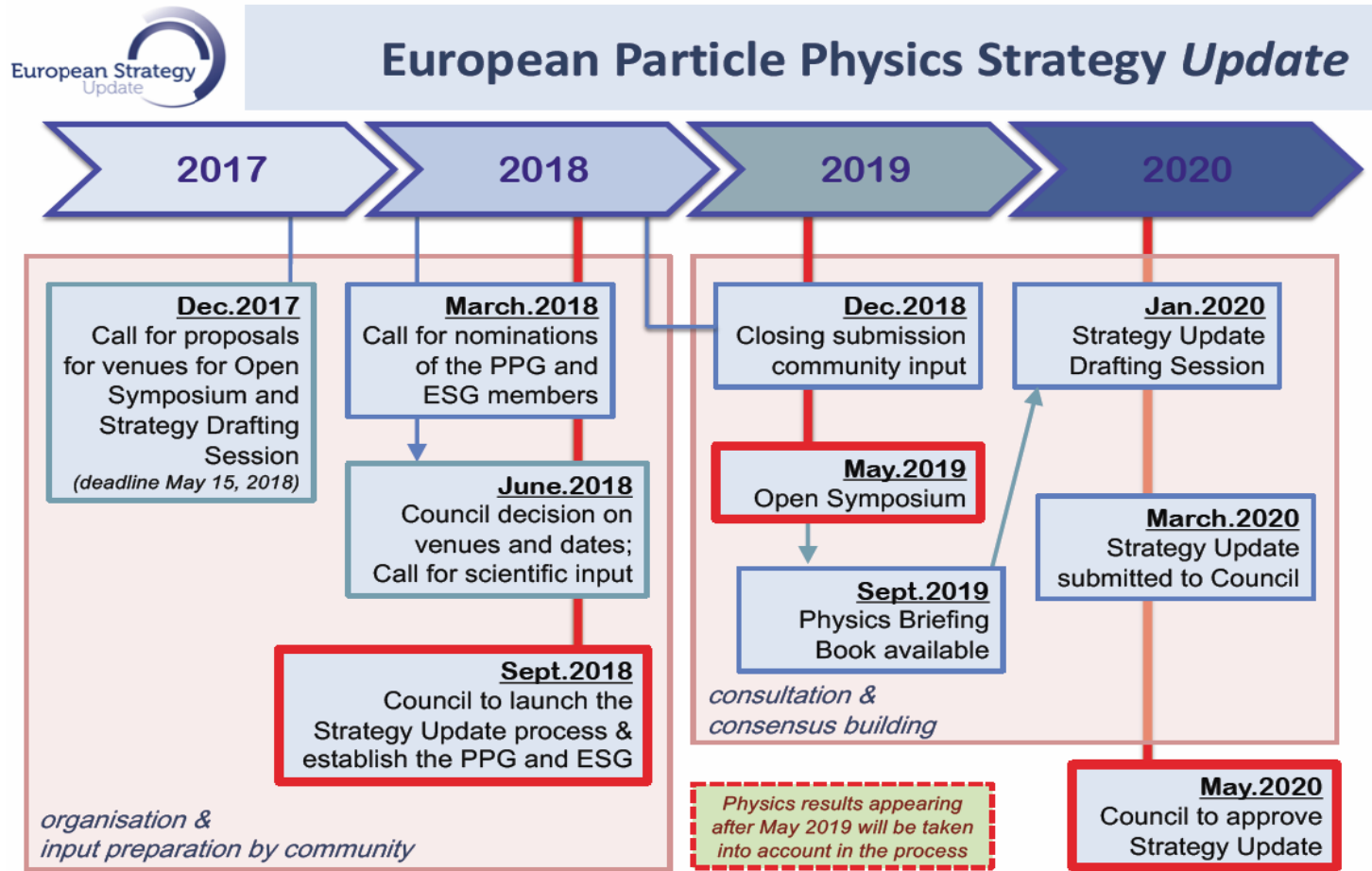
- Excellent physics goals
- Technical implementation description
- Cost estimate and schedule

To develop a proposal concentrated effort is required

What is included or not in the Snowmass/P5 discussions

- Projects already listed in previous P5 plan and under execution are not *expected* to be part of the discussion
- While substantial upgrades, such as Mu2e-II, DUNE upgrades, LHC upgrades beyond HL-LHC and others are naturally to be discussed

HEP is Highly International



Europe, Japan, other countries/regions are developing plans which we monitor closely and, in many cases, active participants

Snowmass Frontiers and Conveners

Energy Frontier



Meenakshi Narain
(Brown U)



Laura Reina
(FSU)



Alessandro Tricoli
(BNL)

Accelerator Frontier



Steve Gourlay
(LBNL)



Tor Raubenheimer
(SLAC)



Vladimir Shiltsev
(FNAL)

Frontiers in Neutrinos



Patrick Huber
(Virginia Tech)



Kate Scholberg
(Duke U.)



Elizabeth Worcester
(BNL)

Instrumentation Frontier



Phil Barbeau
(Duke)



Petra Merkel
(FNAL)



Jinlong Zhang
(ANL)

Frontiers in Rare & Precision



Marina Artuso
(Syracuse U.)



Alexey Petrov
(Wayne State U.)



Bob Bernstein
(FNAL)

Computational Frontier



Steven Gottlieb
(Indiana U.)



Ben Nachman
(LBNL)



Oliver Gutsche
(FNAL)

Cosmic Frontier



Aaron Chou
(Fermilab)



Marcelle Soares-Santos
(U.Michigan)



Tim Tait
(UC Irvine)

Underground Facilities and Infrastructure Frontier



Laura Baudis
(U. Zurich)



Jeter Hall
(SNOLAB)



Kevin Lesko
(LBNL)



John Orrell
(PNNL)

Theory Frontier



Nathaniel Craig
(UCSB)



Csaba Csaki
(Cornell)



Aida El-Khadra
(UIUC)

Community Engagement Frontier



Kétévi Assamagan
(BNL)



Breese Quinn
(Mississippi)

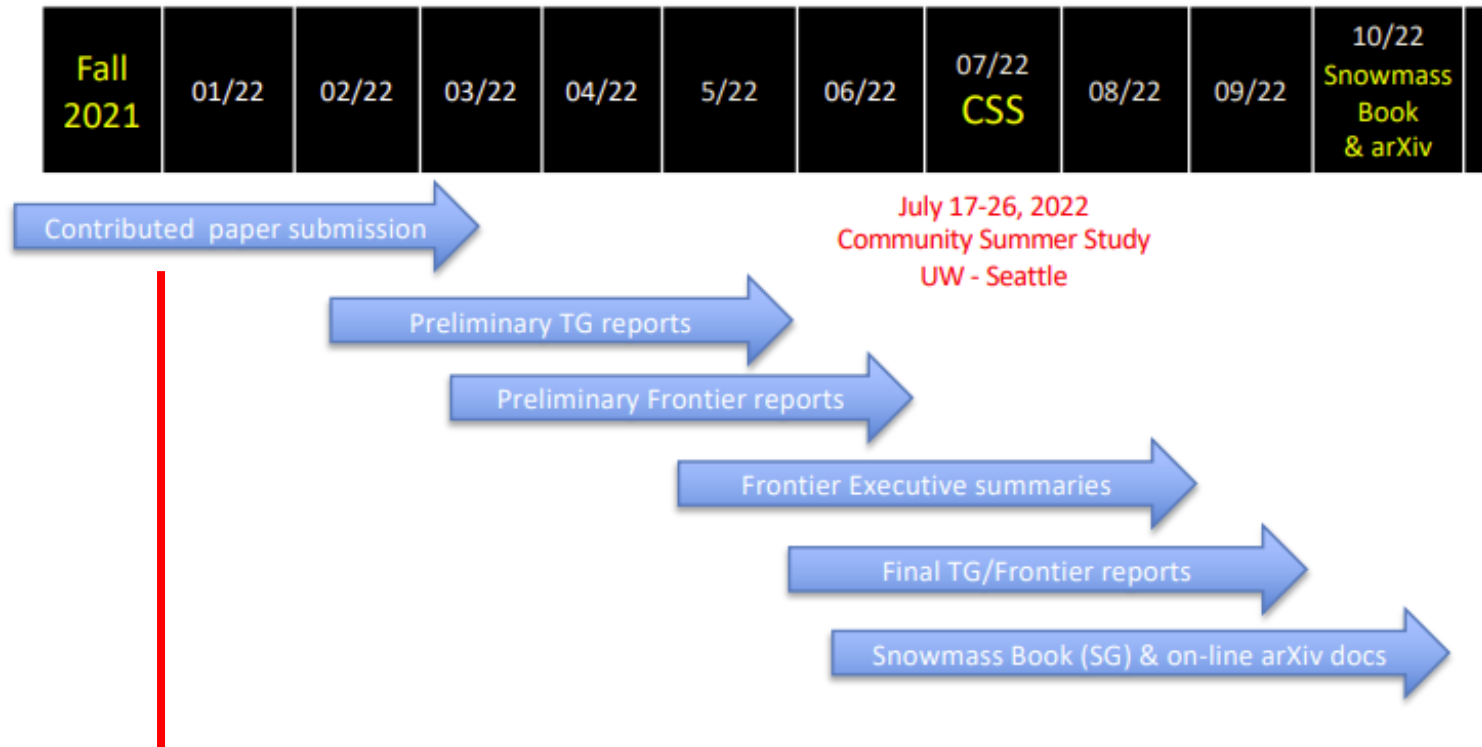
Topical groups with ~250 conveners, ~3000 community members

Timeline for the Progressing Snowmass/P5

- snowmass21.org
- Started at April 2020 APS meeting
- Development of proposals, workshops, interactions inside the community
 - Between April 2020 and July 2022 (delayed by a year due to COVID)
 - Organized by conveners of various study groups
- “Snowmass Meeting”
 - July 2022 at the University of Washington, Seattle
- Snowmass written summary
 - By late 2022
- P5 process
 - During 2023
- P5 outcome and guidance to the funding agencies
 - By late 2023 early 2024

Timeline

Snowmass Timelines



Critical milestones

March 15th, 2022 – white papers submission deadlines

July 17-27, 2022 – Snowmass meeting at the University of Washington

Importance of the White Papers

- The process of submission is well described on the Snowmass web site
- If you don't submit whitepaper with your proposal, it will hardly be mentioned in the Snowmass report and considered by P5
 - In addition to science and technology provide clear "ask": what funding is required over 5-10 years and for what, R&D, construction...
- With HL-LHC, LBNF/DUNE and CMB-S4 still to be completed and more expensive due to COVID
 - No new large scale project starts are expected in the coming ~5 years
 - Consider asking for R&D funding in such cases
 - Medium and small-scale projects (below about \$0.5 billion total) might fit into currently expected budget after FY26
- If you need any help or feedback
 - Talk to your colleagues, group and department leaders or myself

Concluding Remarks

- Today we will concentrate on
 - Review of all 10 Snowmass frontiers activities
 - Not too late to join their activities!
 - Go over 16 Snowmass proposals, expected to become white papers, under development by BNL staff
- We plan to have another (potentially not full day) BNL Snowmass retreat in the second half of January
 - Please, plan on presenting your studies and plans!

It is exciting time to develop future for high energy physics!