Post-P5 Physics Vision

Aspen Winter Conference
The Future of High Energy Physics: A New Generation, A New Vision
Hitoshi Murayama (Berkeley) March 25, 2024

2014 P5

- **2014 P5** (Steve Ritz)
  - 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”

Building for Discovery

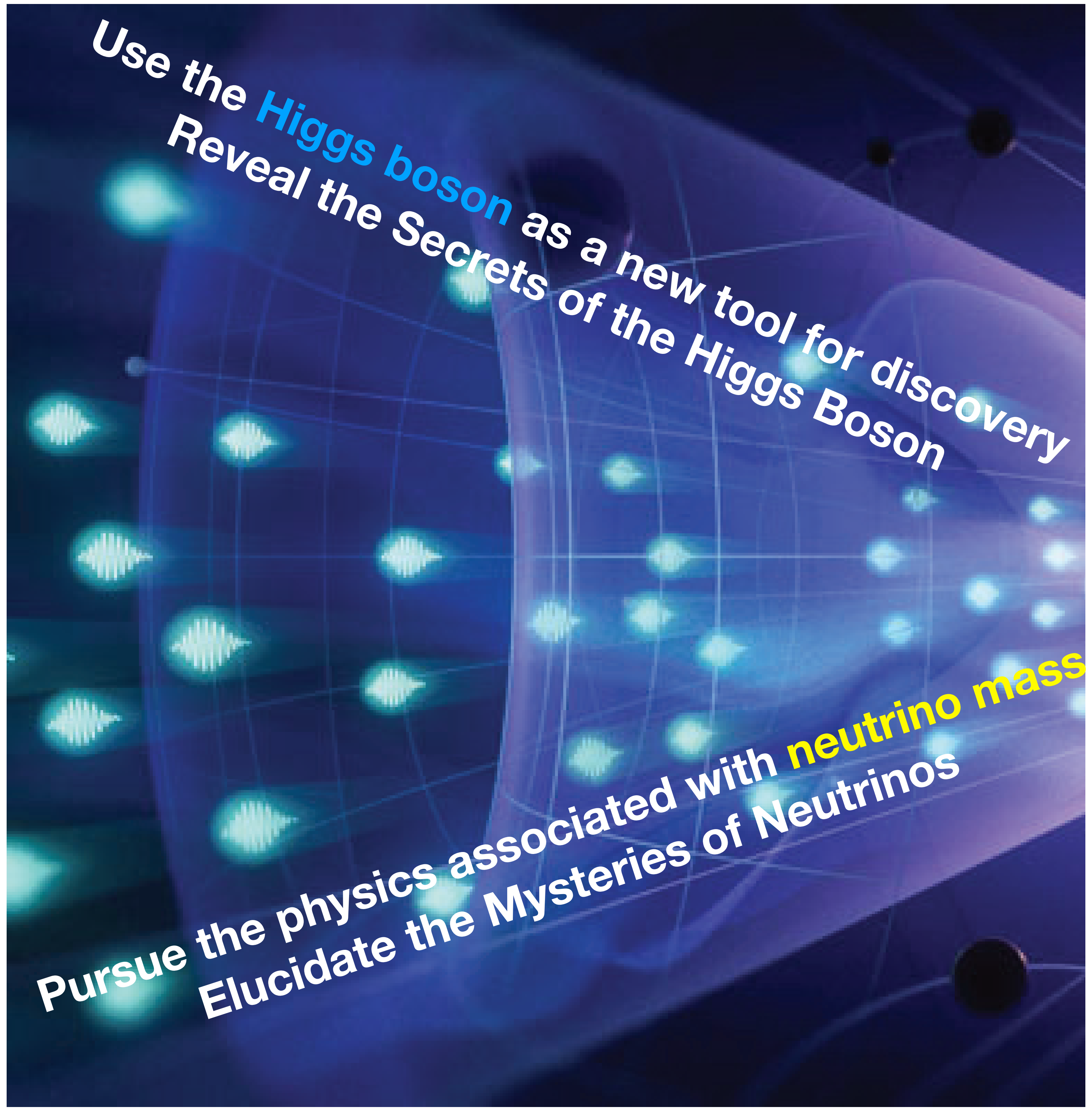
Building for Discovery

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

Report of the Particle Physics Project Prioritization Panel (P5)

May 2014

Explore the Quantum Universe



Use the Higgs boson as a new tool for discovery

Reveal the Secrets of the Higgs Boson

Pursue the physics associated with neutrino mass

Elucidate the Mysteries of Neutrinos

Decipher
the
Quantum
Realm

Search for Direct Evidence
for New Particles

Explore the unknown: new particles,
interactions, and physical principles

Pursue Quantum Imprints
for New Phenomena

Explore
New
Paradigms in
Physics

Identify the new physics of dark matter

Determine the Nature of Dark Matter

Understand cosmic acceleration:
dark energy and inflation

Understand What Drives Cosmic Evolution

Illuminate
the
Hidden
Universe

Not Rank-Ordered

Recommendation 1

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** (including ATLAS and 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** to determine the mass ordering among neutrinos, 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** to carry out the LSST, and the LSST Dark Energy Science Collaboration, to understand what drives cosmic evolution (section 4.2). DOE & NSF AST

US leadership in key areas of particle physics

Not Rank-Ordered

Recommendation 1

Reaffirm critical importance of the ongoing projects

In addition, we recommend continued support for the following ongoing experiments at the medium scale (project costs > \$50M for DOE and > \$4M for NSF), including completion of construction, operations, and research:

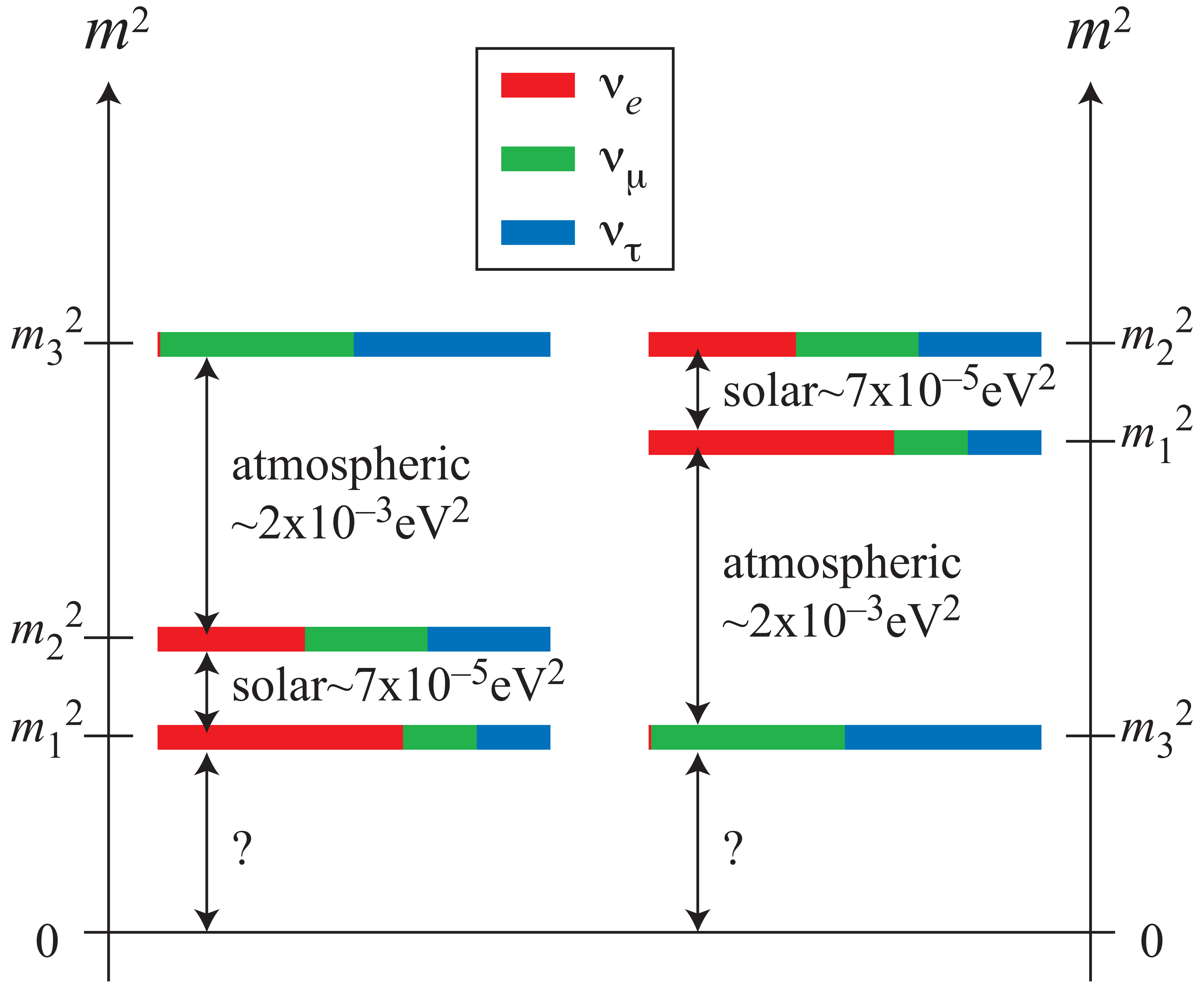
d. **NOvA**, **SBN**, **T2K**, and **IceCube** (*elucidate the mysteries of neutrinos*, section 3.1).
e. **DarkSide-20k**, **LZ**, **SuperCDMS**, and **XENONnT** (*determine the nature of dark matter*, section 4.1).
f. **DESI** (*understand what drives cosmic evolution*, section 4.2).
g. **Belle II**, **LHCb**, and **Mu2e** (*pursue quantum imprints of new phenomena*, section 5.2).

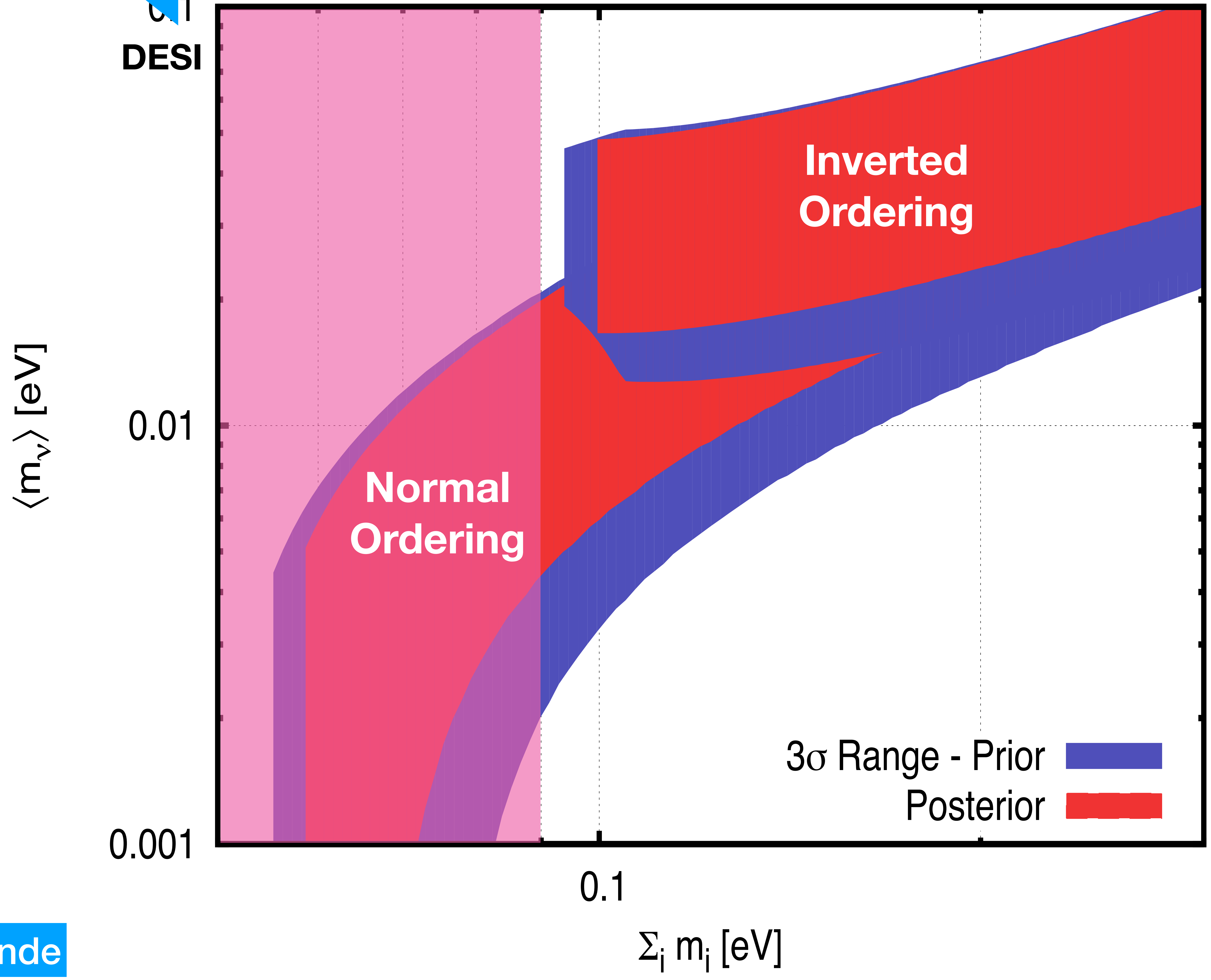
The agencies should work closely with each major project to carefully manage the costs and schedule to ensure that the US program has a broad and balanced portfolio.

Exploring the Quantum Universe

CMB-S4

First test of Early Universe before the BBN





Crucial input to CP Violation search at Hyper-Kamiokande

Shao-Feng Ge and Werner Rodejohann arXiv:1507.05514

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 is critical to install telescopes at and observe from 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 upgraded near-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 also Recommendation 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** reaching the 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 covering higher mass ranges using neutrinos as a tool (section 4.1).

NSF PHY

Table 1
Summary of Scenarios

happening

Project/Activity	Scenarios low Scenario A	 medium Scenario B	 unlimited Scenario C	Science Drivers Higgs	 Neutrinos	 Dark Matter	 Cosm. Accel.	 The Unknown	Technique (Frontier)
Large Projects									
Muon program: Mu2e, Muon g-2	Y, Mu2e small reprofile needed	Y	Y					✓	I
HL-LHC	Y	Y	Y	✓		✓		✓	E
LBNF + PIP-II	Y, LBNF components delayed relative to Scenario B.	Y	Y, enhanced		✓			✓	I,C
ILC	R&D only	R&D, possibly small hardware contributions. See text.	Y	✓		✓		✓	E
NuSTORM	N	N	N		✓				I
RADAR	N	N	N		✓				I
Medium Projects									
LSST	Y	Y	Y		✓		✓		C
DM G2	Y	Y	Y			✓			C
Small Projects Portfolio	Y	Y	Y		✓	✓	✓	✓	All
Accelerator R&D and Test Facilities	Y, reduced	Y, some reductions with redirection to PIP-II development	Y, enhanced	✓	✓	✓		✓	E,I
CMB-S4	Y	Y	Y		✓		✓		C
DM G3	Y, reduced	Y	Y			✓			C
PINGU	Further development of concept encouraged				✓	✓			C
ORKA	N	N	N					✓	I
MAP	N	N	N	✓	✓	✓		✓	E,I
CHIPS	N	N	N		✓				I
LAr1	N	N	N		✓				I
Additional Small Projects (beyond the Small Projects Portfolio above)									
DESI	N	Y	Y		✓		✓		C
Short Baseline Neutrino Portfolio	Y	Y	Y		✓				I

TABLE 1 Summary of Scenarios A, B, and C. Each major project considered by P5 is shown, grouped by project size and listed in time order based on year of peak construction. Project sizes are: Large (>$200M), Medium ($50M-$200M), and Small (<$50M). The science Drivers primarily addressed by each project are also indicated, along with the Frontier technique area (E=Energy, I=Intensity, C=Cosmic) defined in the 2008 P5 report.

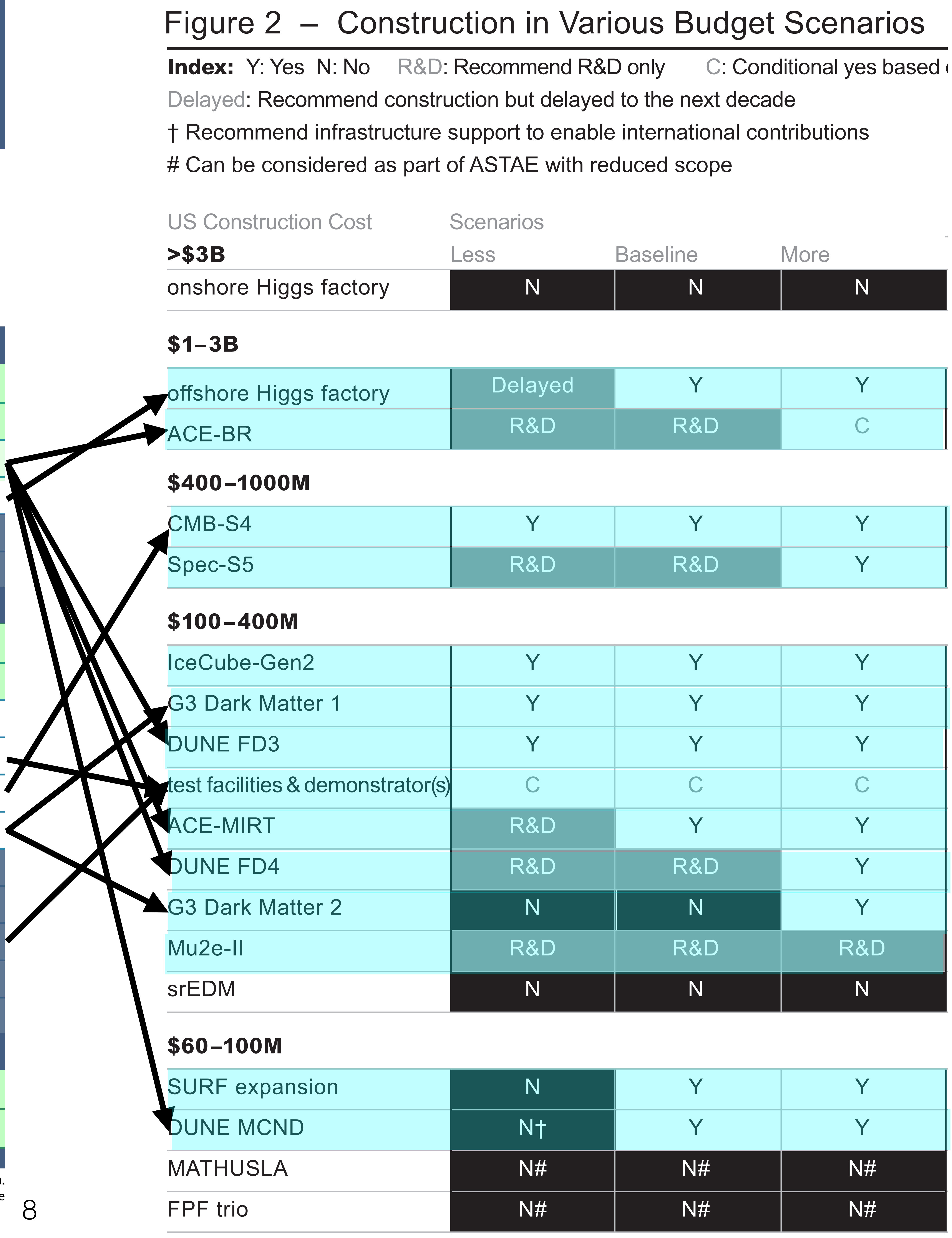


Figure 2 – Construction in Various Budget Scenarios

Index: Y: Yes N: No R&D: Recommend R&D only C: Conditional yes based
Delayed: Recommend construction but delayed to the next decade
† Recommend infrastructure support to enable international contributions
\# Can be considered as part of ASTAE with reduced scope

US Construction Cost	Scenarios Less	 Baseline	 More
>$3B			
onshore Higgs factory	N	N	N
$1–3B			
offshore Higgs factory	Delayed	Y	Y
ACE-BR	R&D	R&D	C
$400–1000M			
CMB-S4	Y	Y	Y
Spec-S5	R&D	R&D	Y
$100–400M			
IceCube-Gen2	Y	Y	Y
G3 Dark Matter 1	Y	Y	Y
DUNE FD3	Y	Y	Y
test facilities & demonstrator(s)	C	C	C
ACE-MIRT	R&D	Y	Y
DUNE FD4	R&D	R&D	Y
G3 Dark Matter 2	N	N	Y
Mu2e-II	R&D	R&D	R&D
srEDM	N	N	N
$60–100M			
SURF expansion	N	Y	Y
DUNE MCND	N†	Y	Y
MATHUSLA	N#	N#	N#
FPF trio	N#	N#	N#

new

more committed

South Pole

South Pole

Decadal Overview of Future Large-Scale Projects		
Frontier/Decade	2025 - 2035	2035 -2045
Energy Frontier	✅ U.S. Initiative for the Targeted Development of Future Colliders and their Detectors	
		✅ Higgs Factory
Neutrino Frontier	✅ LBNF/DUNE Phase I & PIP- II	✅ DUNE Phase II (incl. proton injector)
Cosmic Frontier	✅ Cosmic Microwave Background - S4	Next Gen. Grav. Wave Observatory*
	☑ Spectroscopic Survey - S5*	☑ Line Intensity Mapping*
	✅ Multi-Scale Dark Matter Program (incl. Gen-3 WIMP searches)	
Rare Process Frontier		☑ Advanced Muon Facility

Table 1-1. *An overview, binned by decade, of future large-scale projects or programs (total projected costs of $500M or larger) endorsed by one or more of the Snowmass Frontiers to address the essential scientific goals of the next two decades. This table is not a timeline, rather large projects are listed by the decade in which the preponderance of their activity is projected to occur. Projects may start sooner than indicated or may take longer to complete, as described in the frontier reports. Projects were not prioritized, nor examined in the context of budgetary scenarios. In the observational Cosmic program, project funding may come from sources other than HEP, as denoted by an asterisk.*

The particle physics case for studying gravitational waves at all frequencies should be explored by expanded theory support.

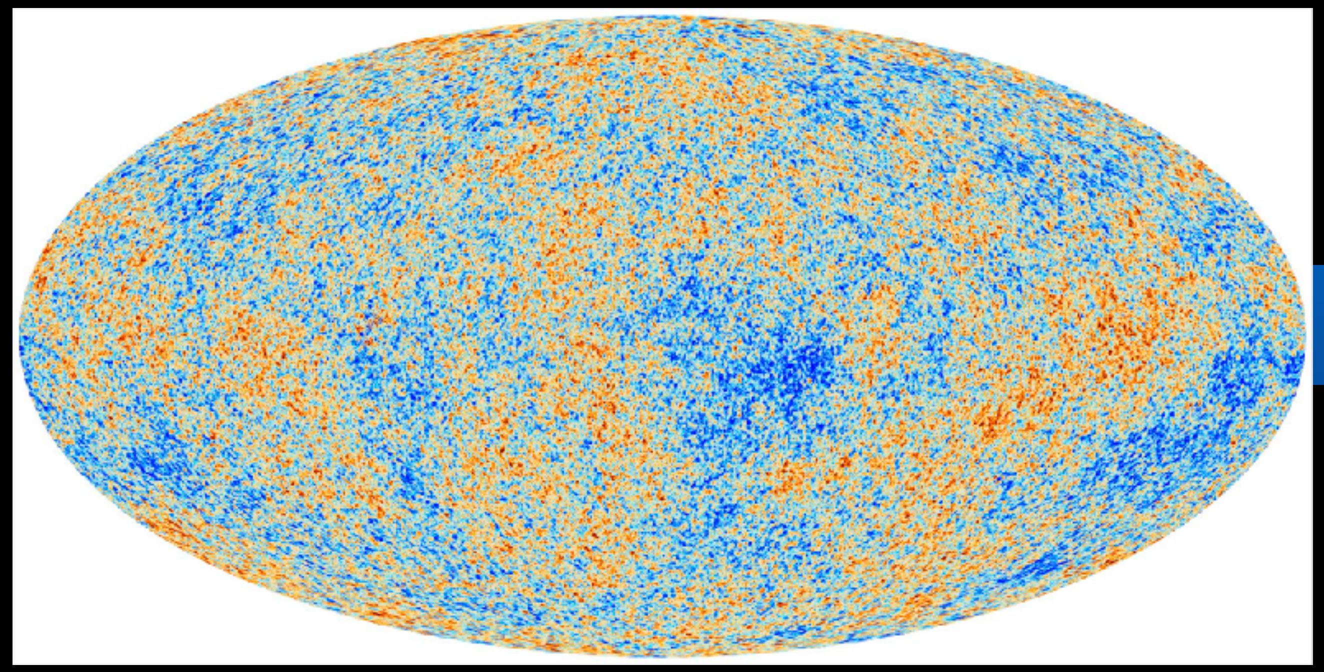
✅ **Recommended**

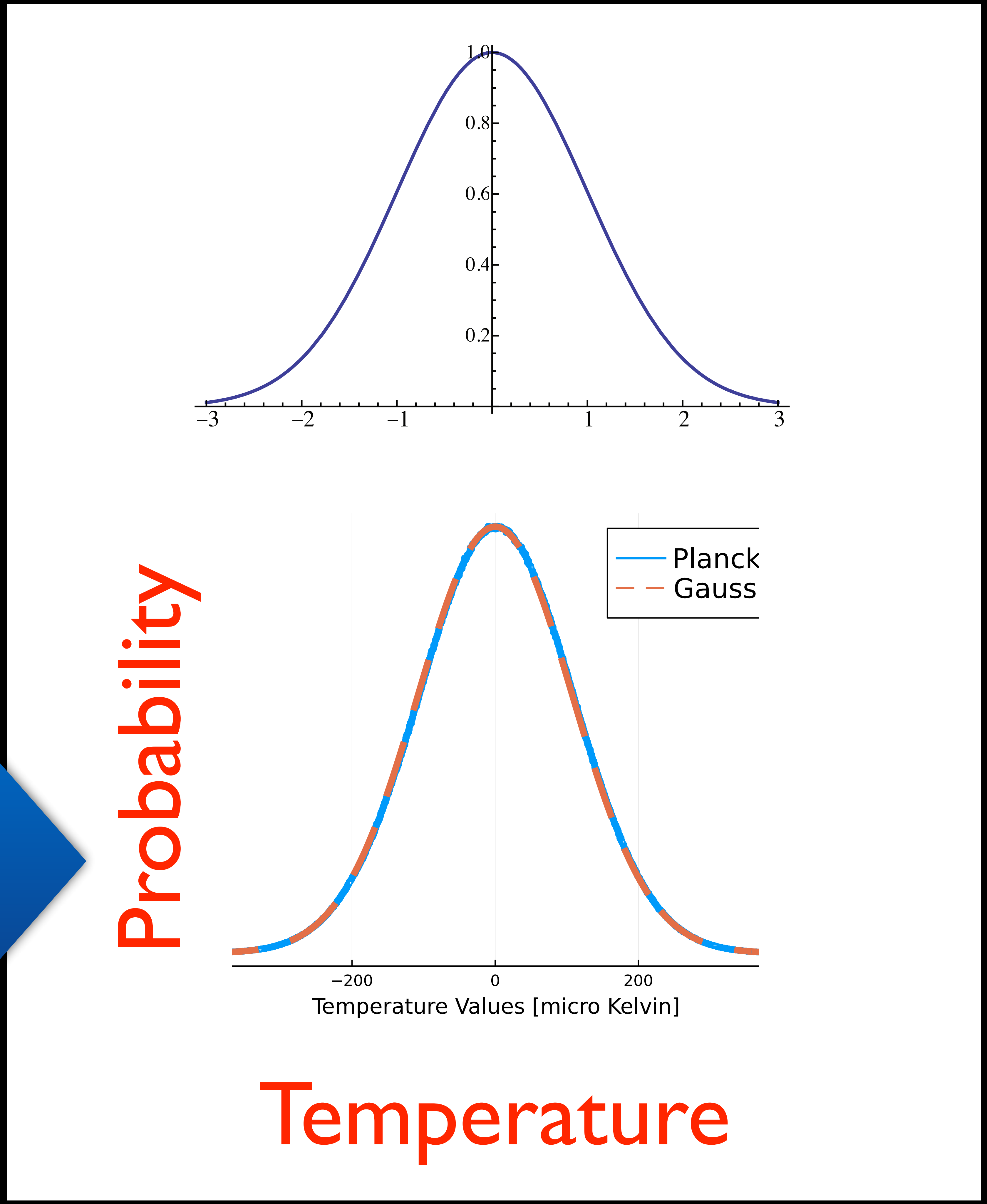
☑ **R&D**

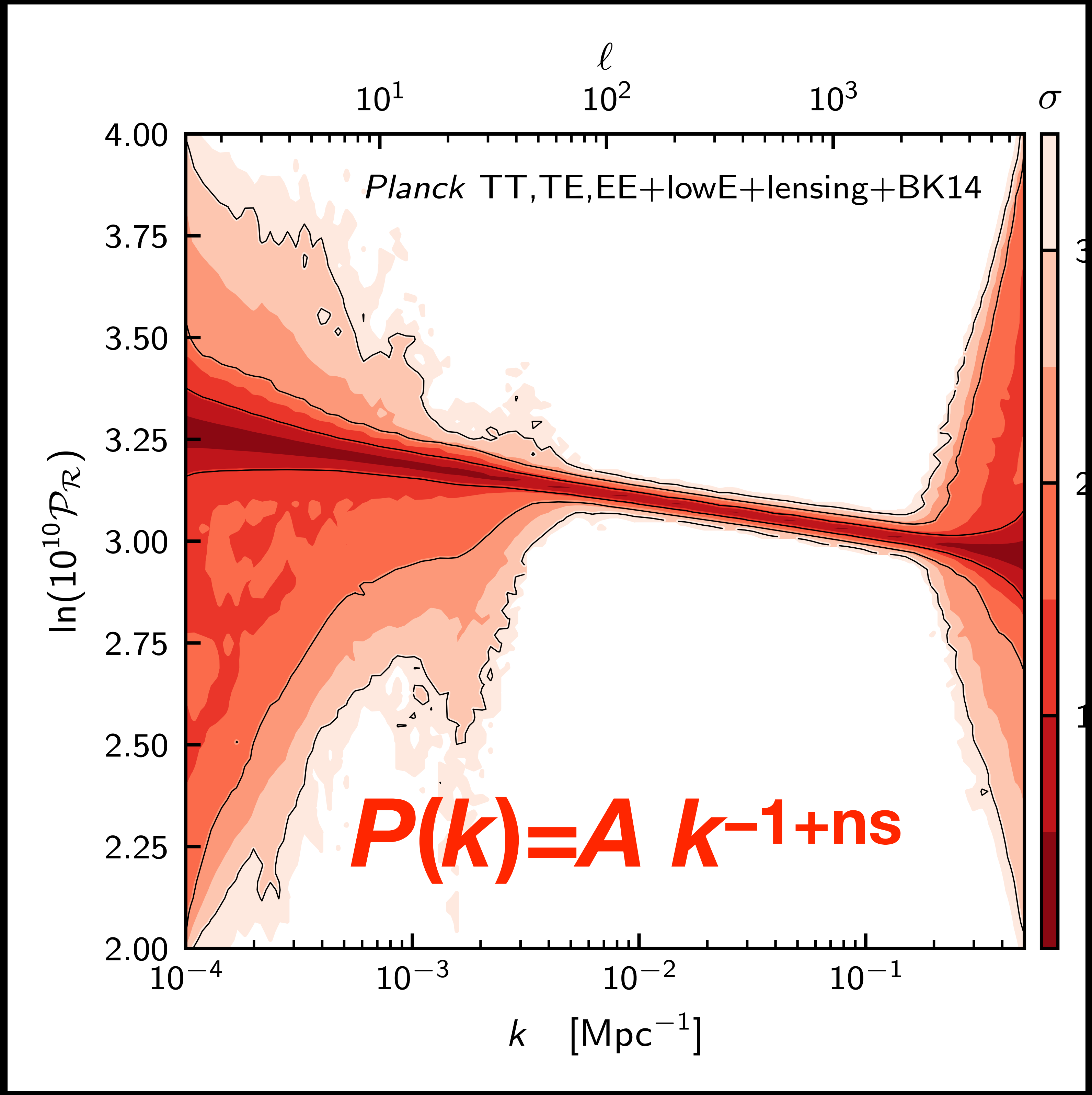
Credit:
Yurie
Murayama

How Universe evolved

Circumstantial Evidence







Credit: Eiichiro Komatsu

National
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<https://www.nsf.gov>

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Ocean Sciences
Office of Polar Programs

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NSF 23-117

Dear Colleague Letter: 2023 Update on Science Suppo Infrastructure in Antarctica

Jur

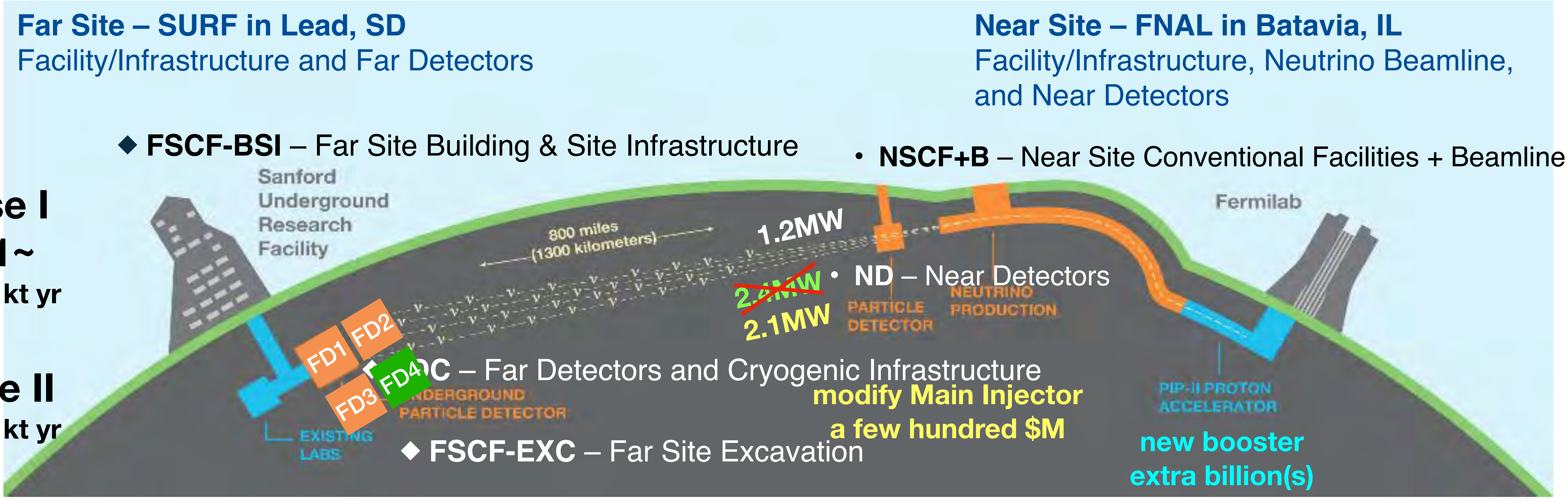
De

*The **South Pole**, a unique site that enables the world-leading science of CMB-S4 and IceCube-Gen2, must be maintained as a premier site of science to allow continued US leadership in these areas. (section 2.4)*

This letter provides information on the status and future of science support and infrastructure recapitalization in Antarctica. Since the last NSF update <https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf22078> in April 2022, the COVID-19 pandemic has continued to severely impact the Office of Polar Program's (OPP) ability to support science on the continent, and those impacts have been exacerbated by increasing constraints on resources arising from inflation and the need for facility renewal.

South Pole Station is saturated with already-funded projects and required critical infrastructure and maintenance activities that cannot be deferred until late in the decade. South Pole Station will continue to host the current suite of large-scale science projects; however, proposers seeking support for new projects at South Pole Station should consult the cognizant program officer to discuss alternative locations to accomplish science goals.

Long baseline neutrino facility (LBNF) and Deep Underground Neutrino Experiment (DUNE)



Far Site – SURF in Lead, SD
Facility/Infrastructure and Far Detectors

Near Site – FNAL in Batavia, IL
Facility/Infrastructure, Neutrino Beamline, and Near Detectors

◆ **FSCF-BSI** – Far Site Building & Site Infrastructure

- **NSCF+B** – Near Site Conventional Facilities + Beamline

- **ND** – Near Detectors

◆ **C** – Far Detectors and Cryogenic Infrastructure

◆ **FSCF-EXC** – Far Site Excavation

Phase I
2031~
120MW kt yr

Phase II
600MW kt yr

1.2MW
~~2.4MW~~
2.1MW

modify Main Injector
a few hundred $M

new booster
extra billion(s)

◆ DUNE is an international science collaboration of more than 1300 scientists from 35 countries plus CERN

- 50 – 50 split between U.S. and non- U.S. collaborators

ffice of Science (TPC = $3.2B)
al particle physics mega-project

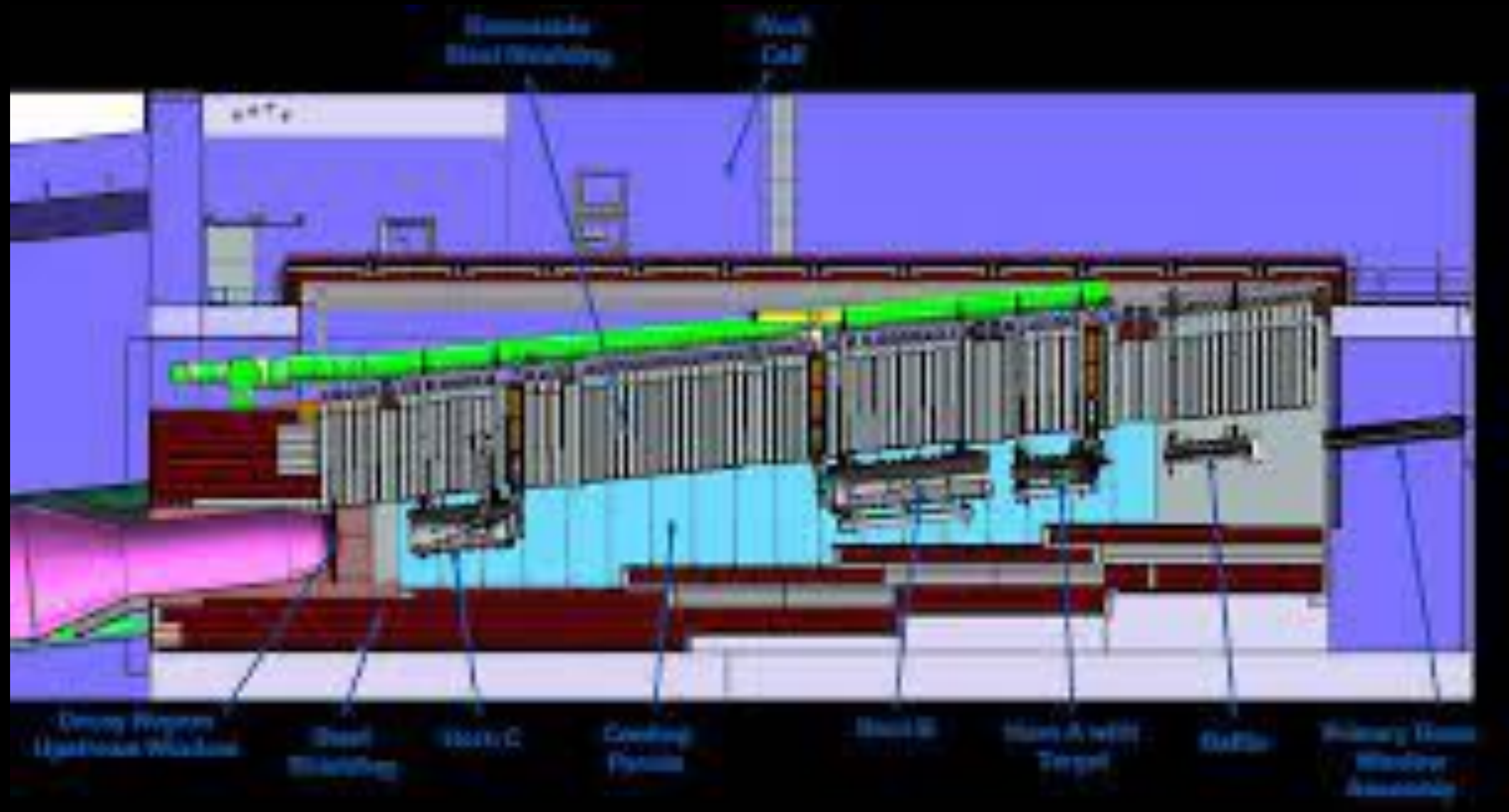
3.1.4 – Future Opportunities: DUNE FD4, the Module of Opportunity

An upgraded detector module will provide excellent prospects for underground physics, including direct dark matter detection, exotic dark matter searches, and expanded sensitivity to solar neutrinos. R&D for advanced detector concepts should be supported.

DUNE Phase II

Science goals

- most precise measurement of the CP phase across a range of possible CP phase space
- covers a broad spectrum of neutrino energies, enabling an in-depth exploration of the quantum mechanics of neutrino oscillation throughout multiple cycles
- comprehensively test validity of 3-neutrino framework with best-in-class precision
- search for signatures of unexpected neutrino interactions
- study direct appearance of tau neutrinos

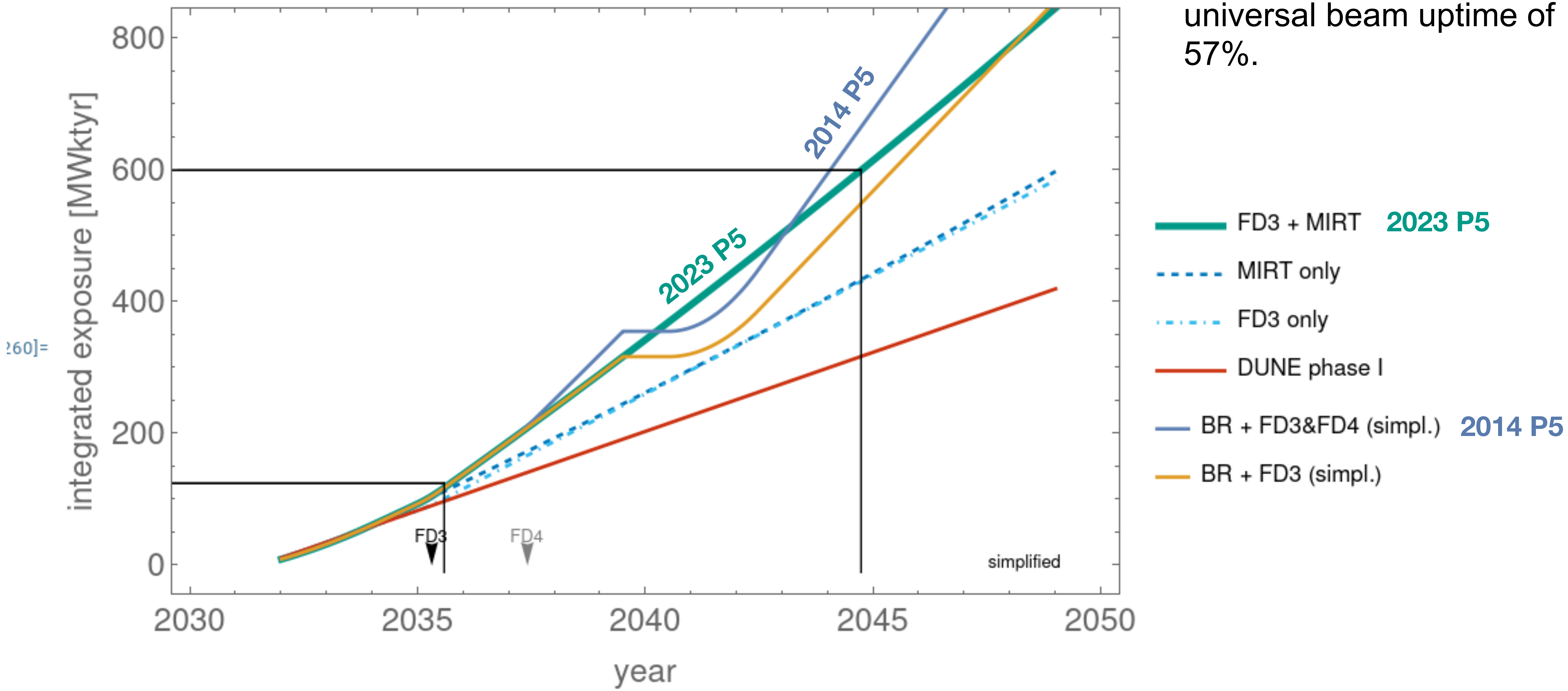


Complementary to the Japanese program Hyper-Kamiokande and J-PARC

Not in the Report

DUNE Exposure plot

This figure is based on the beam profile submitted by FNAL/DUNE assuming a universal beam uptime of 57%.



2.3 The Path to a 10 TeV pCM

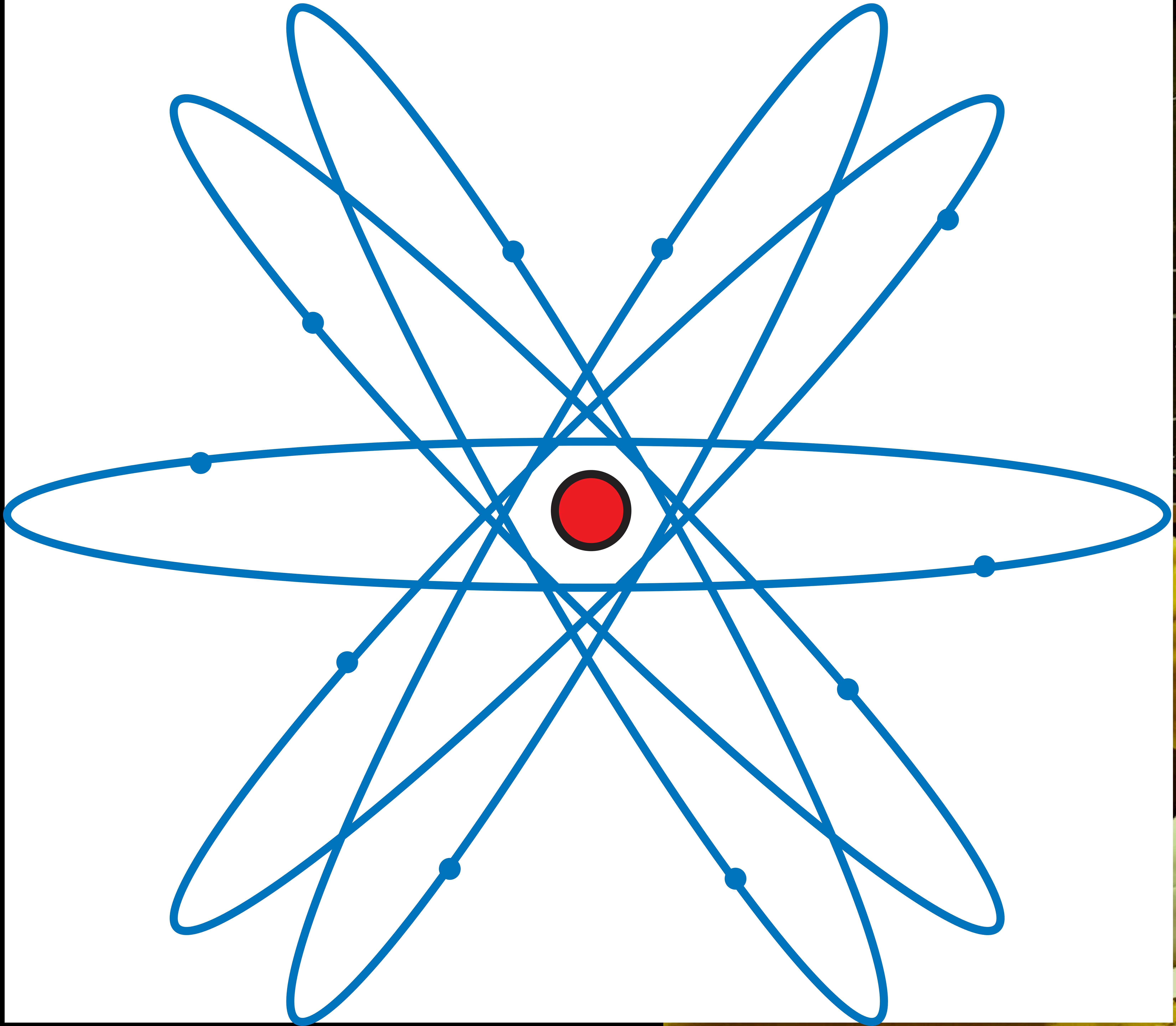
Realization of a future collider will require resources at a global scale and will be built through a world-wide collaborative effort where decisions will be taken collectively from the outset by the partners. This differs from current and past international projects in particle physics, where individual laboratories started projects that were later joined by other laboratories. The proposed program aligns with **the long-term ambition of hosting a major international collider facility in the US, leading the global effort** to understand the fundamental nature of the universe.

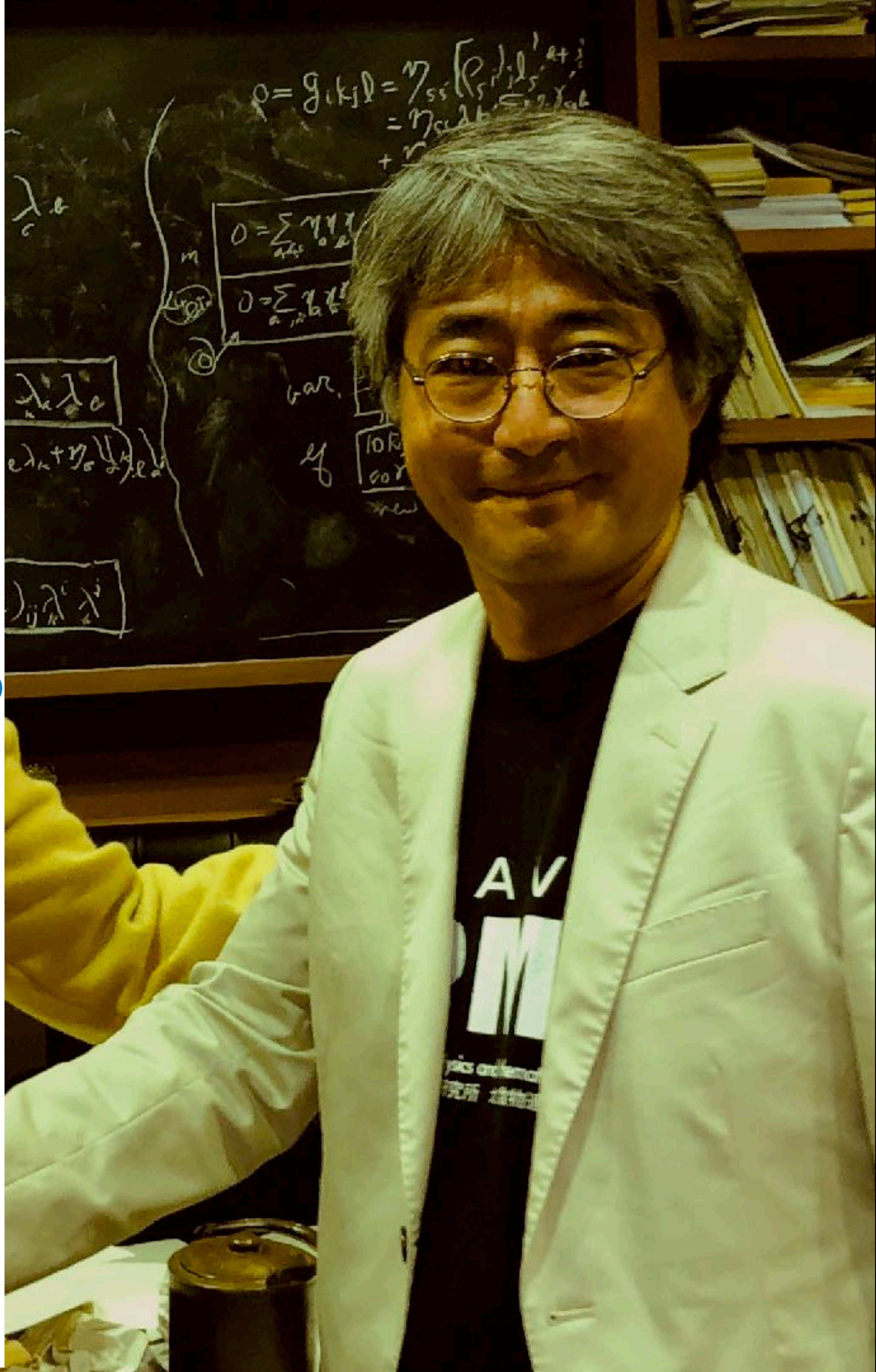
…

In particular, a muon collider presents an attractive option both for technological innovation and for bringing energy frontier colliders back to the US. The footprint of **a 10 TeV pCM muon collider is almost exactly the size of the Fermilab campus**. A muon collider would rely on a powerful multi-megawatt proton driver delivering very intense and short beam pulses to a target, resulting in the production of pions, which in turn decay into muons. This cloud of muons needs to be captured and cooled before the bulk of the muons have decayed. Once cooled into a beam, fast acceleration is required to further suppress decay losses.

…

Although **we do not know if a muon collider is ultimately feasible**, the road toward it leads from current Fermilab strengths and capabilities to **a series of proton beam improvements and neutrino beam facilities**, each producing world-class science while performing critical R&D towards a muon collider. At the end of the path is an unparalleled global facility on US soil. **This is our Muon Shot.**



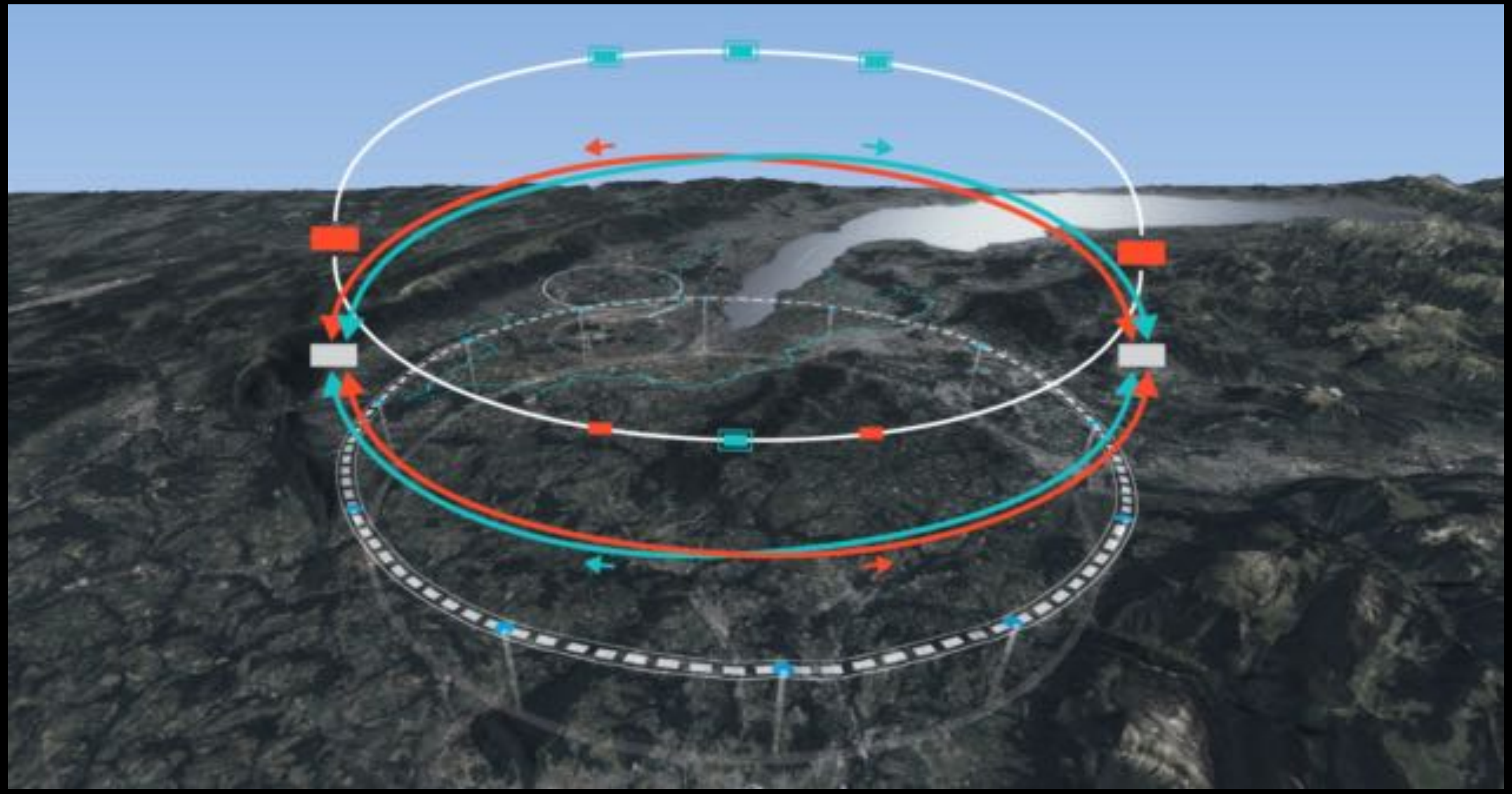


An Offshore Higgs Factory

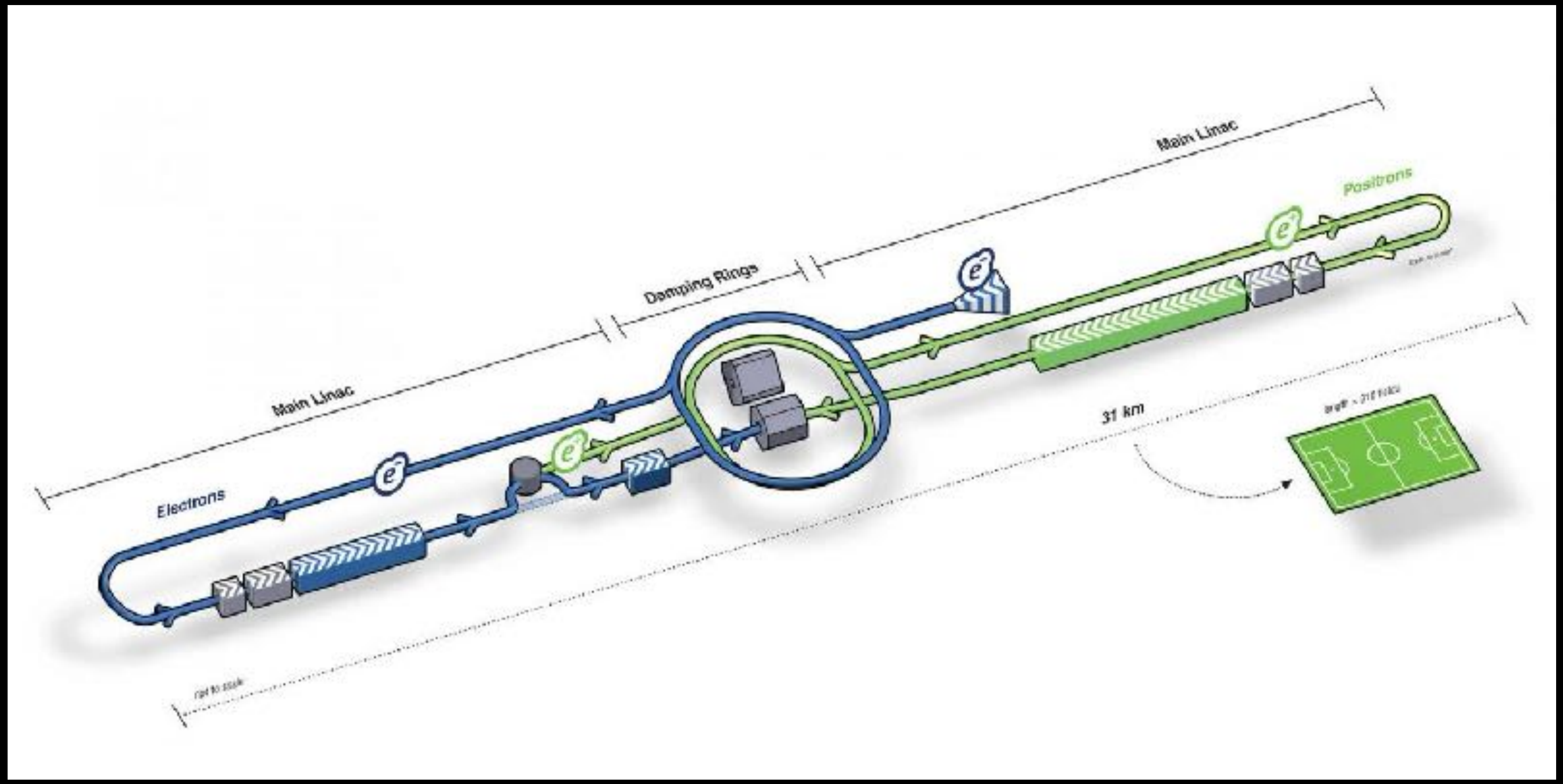
An electron-positron collider covering center-of-momentum energy range 90 - 350 GeV

- Precision measurements of couplings and some production modes
- Order of magnitude improved access to Higgs → invisible decays
- EW sector consistency checks, testing through quantum loops that relate W & Z bosons, the top quark, and the Higgs
- Improve knowledge of coupling to charm quark, potentially provide access to coupling to strange quark

FCC ee

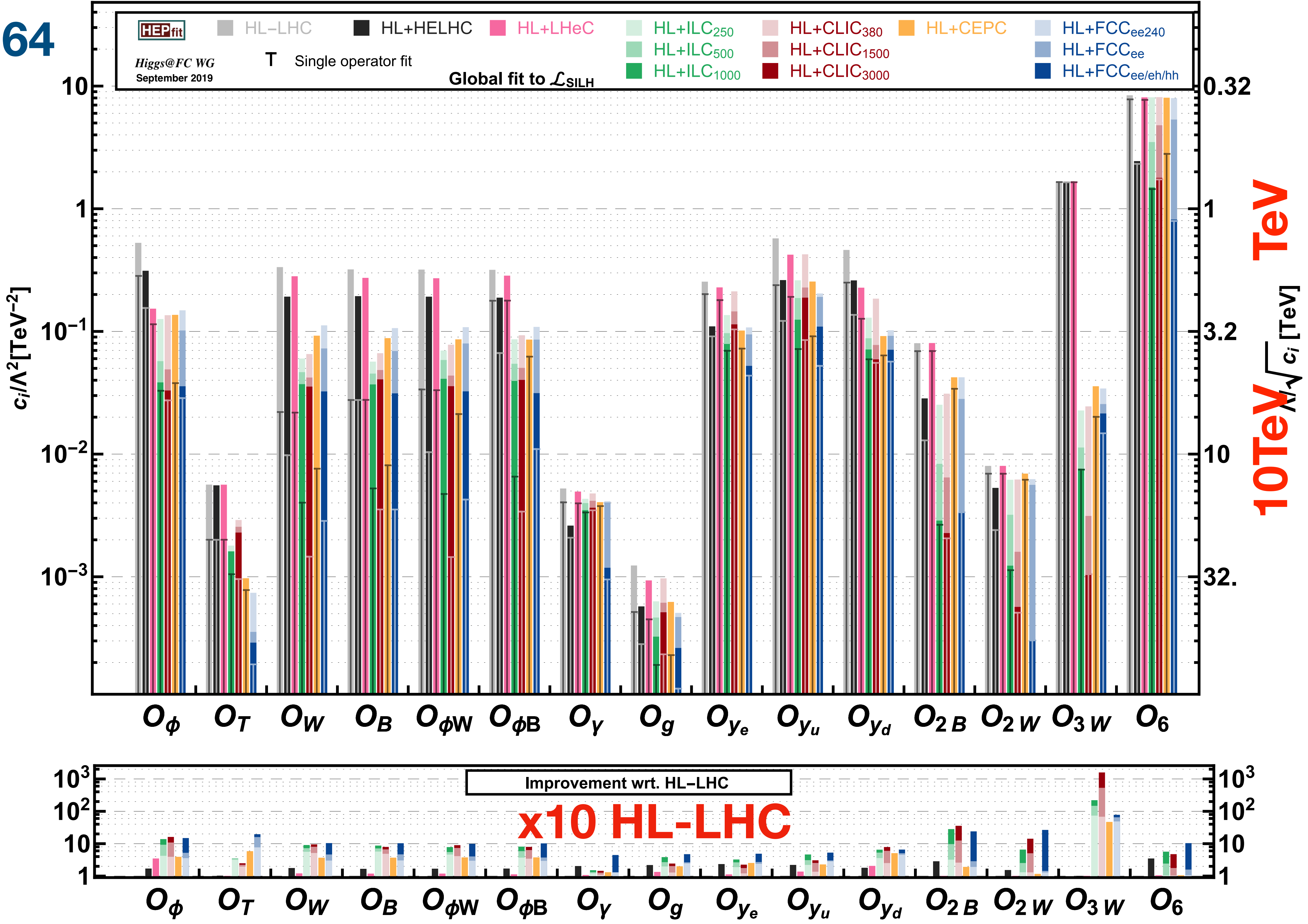


ILC



arXiv:1905.03764

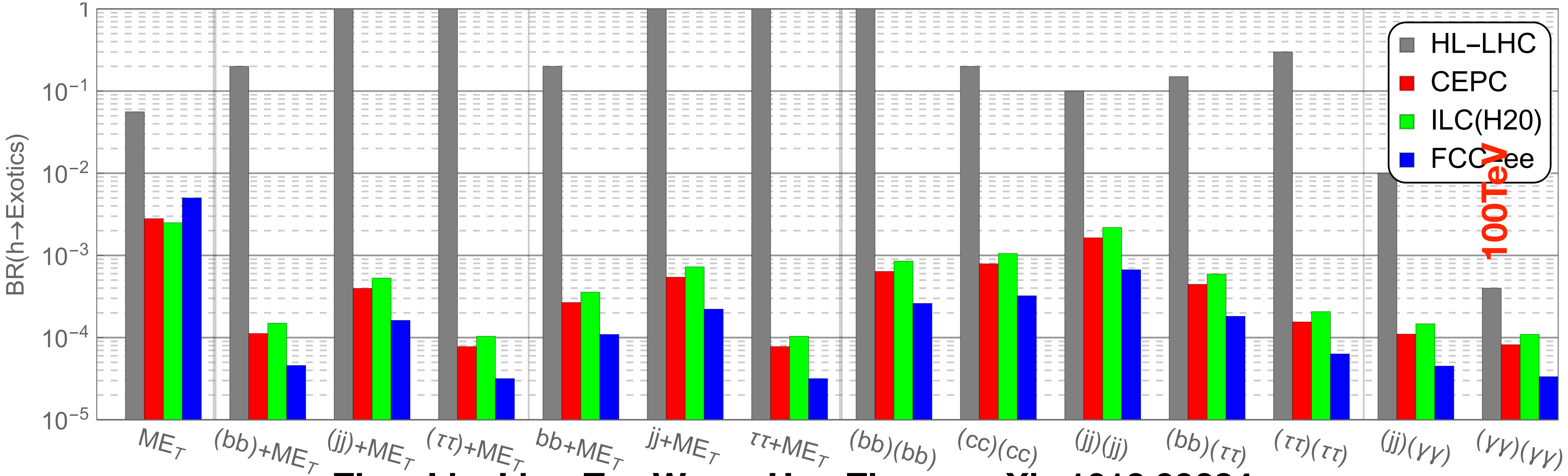
EFT operators



TeV

10TeV

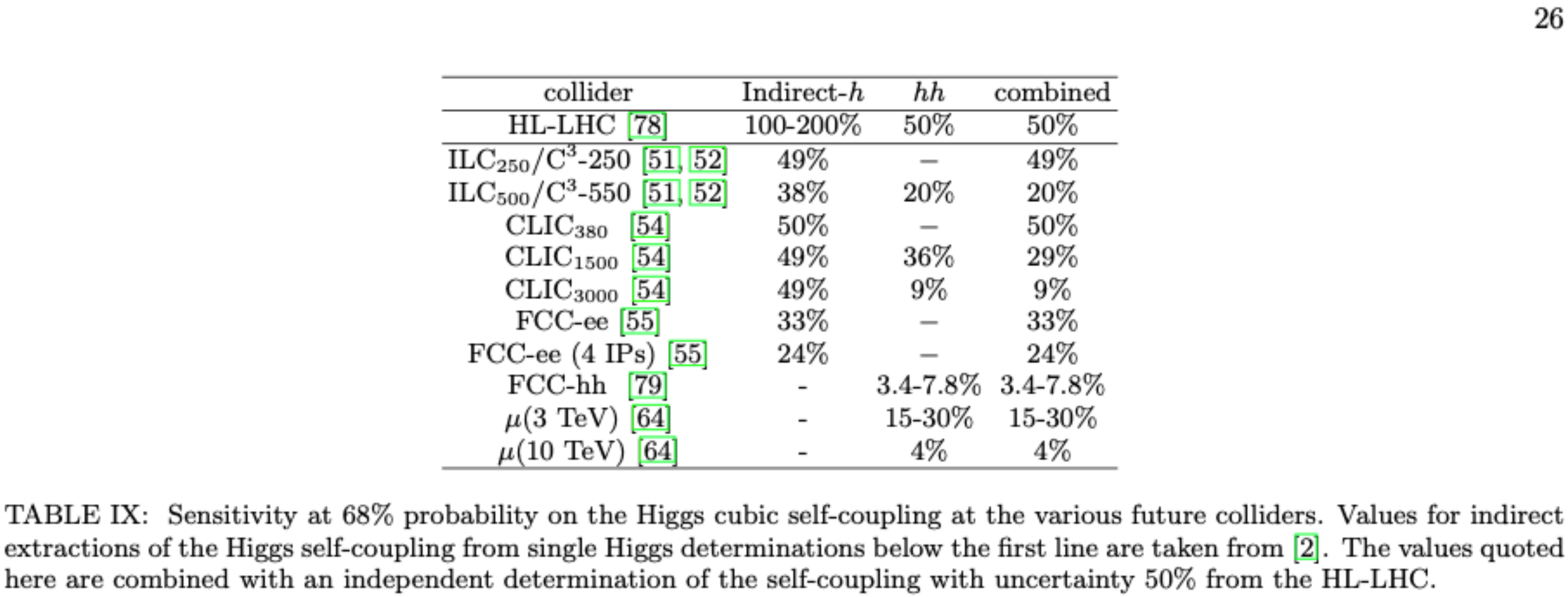
x10 HL-LHC



100TeV

Zhen Liu, Lian-Tao Wang, Hao Zhang, arXiv:1612.09284

self-coupling precision



collider	Indirect-h	hh	combined
HL-LHC [78]	100-200%	50%	50%
$\mathrm{ILC}_{250}/\mathrm{C}^3$-250 [51, 52]	49%	–	49%
$\mathrm{ILC}_{500}/\mathrm{C}^3$-550 [51, 52]	38%	20%	20%
CLIC_{380} [54]	50%	–	50%
CLIC_{1500} [54]	49%	36%	29%
CLIC_{3000} [54]	49%	9%	9%
FCC-ee [55]	33%	–	33%
FCC-ee (4 IPs) [55]	24%	–	24%
FCC-hh [79]	-	3.4-7.8%	3.4-7.8%
μ(3 TeV) [64]	-	15-30%	15-30%
μ(10 TeV) [64]	-	4%	4%

TABLE IX: Sensitivity at 68% probability on the Higgs cubic self-coupling at the various future colliders. Values for indirect extractions of the Higgs self-coupling from single Higgs determinations below the first line are taken from [2]. The values quoted here are combined with an independent determination of the self-coupling with uncertainty 50% from the HL-LHC.

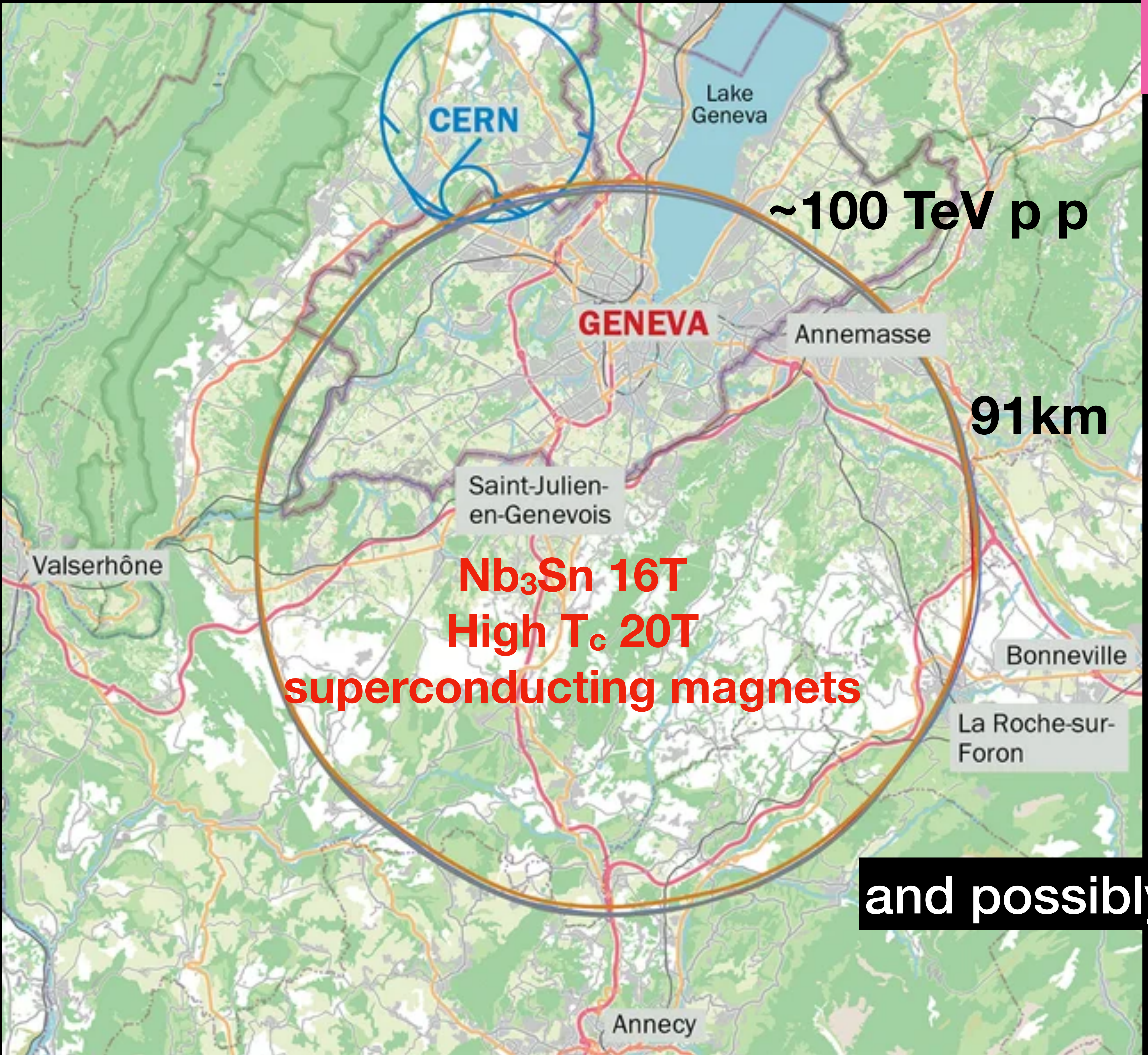
R&D will allow Fermilab to continuously expand the accelerator complex while producing world class science: *our Muon Shot!*

New enabling technologies

5% measurement of Higgs self coupling

full coverage of WIMP

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

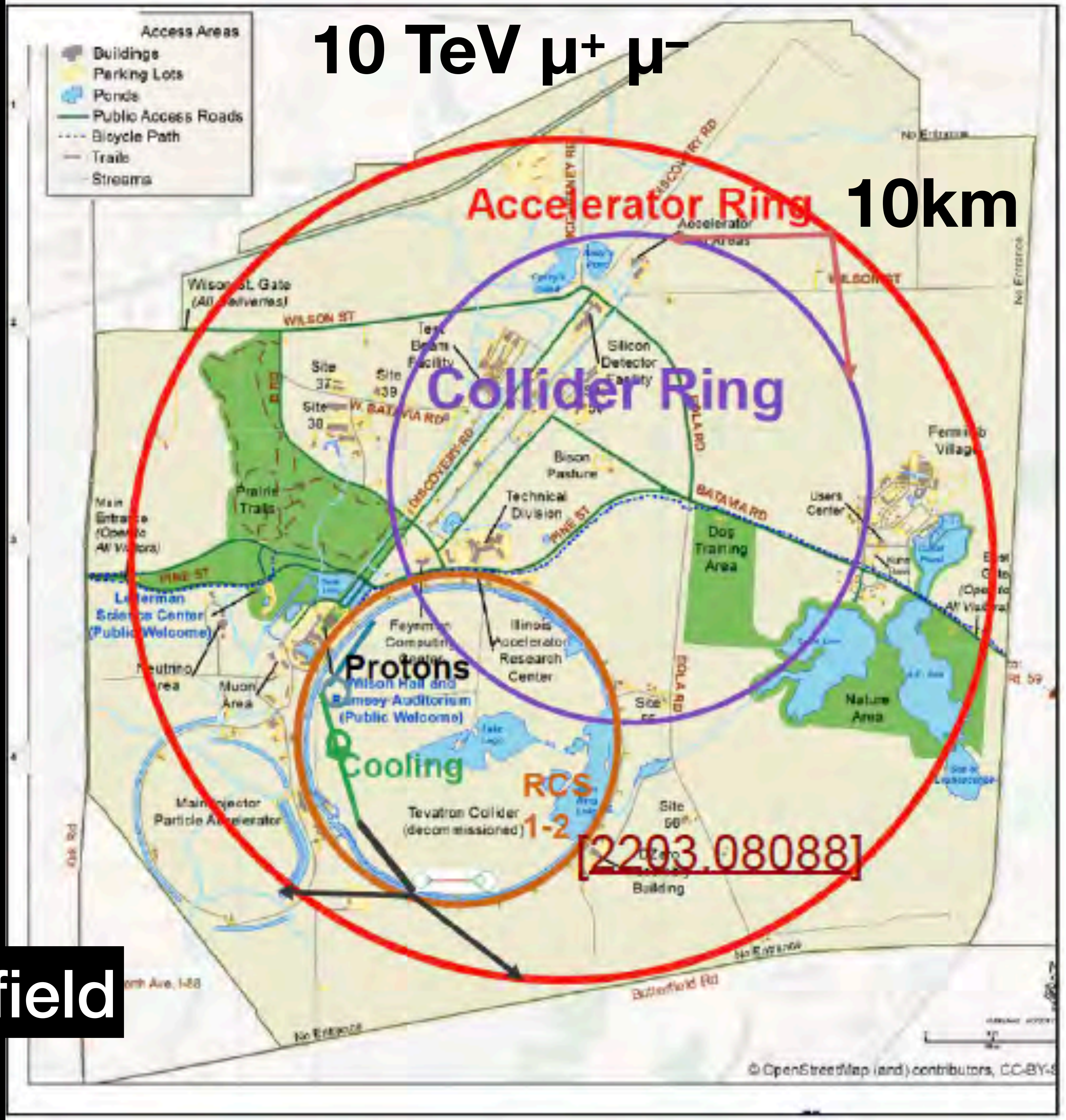


~100 TeV p p

91km

Nb$_3$Sn 16T
High T$_c$ 20T
superconducting magnets

and possibly wakefield



10 TeV μ⁺ μ⁻

10km

[2203.08088]

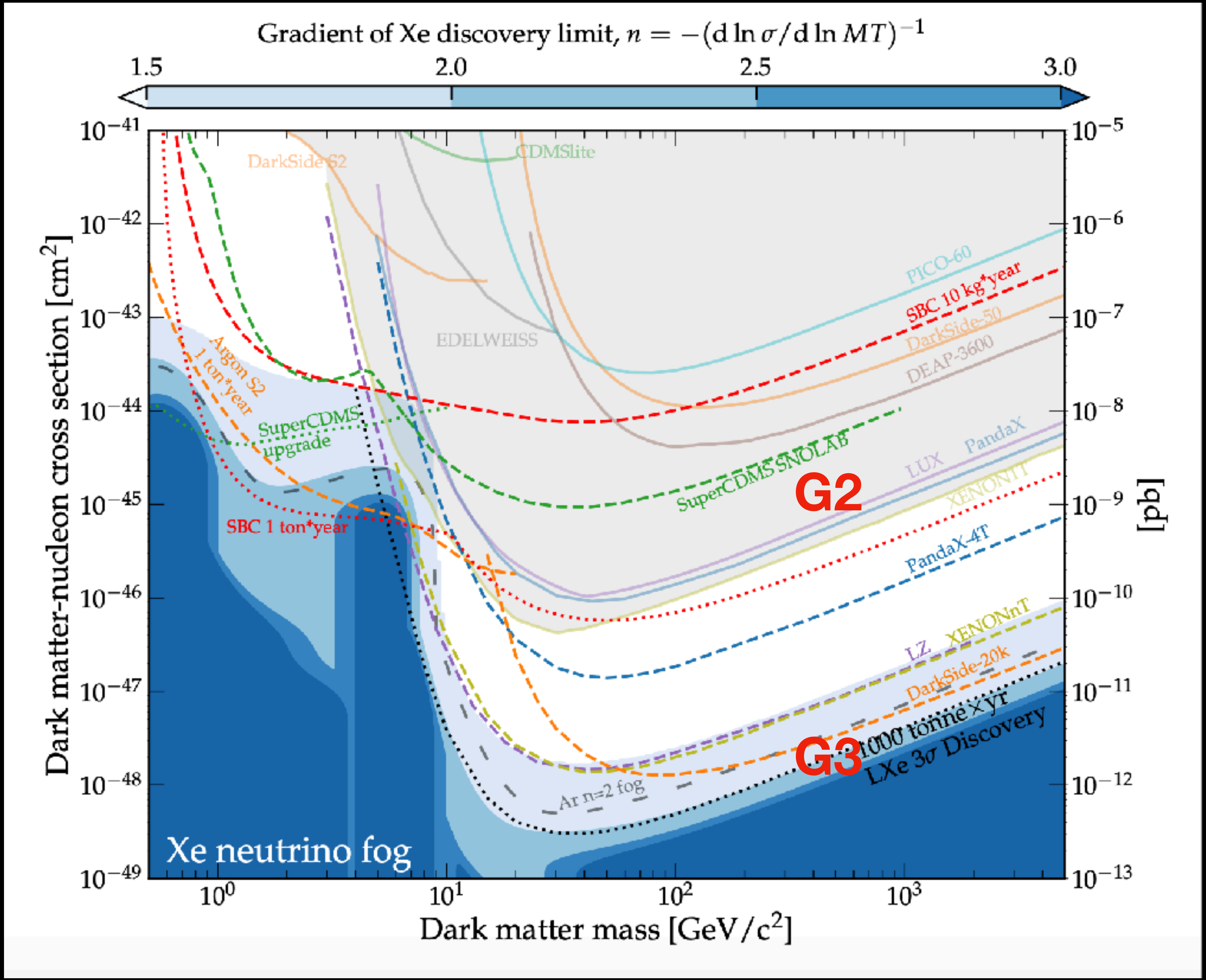
Muon production and cooling

From G2 → G3: Toward the ν fog

We can build on the most successful G2 designs with a G3 experiment to provide sensitivity to dark matter SM interactions small enough that neutrinos become an irreducible BG

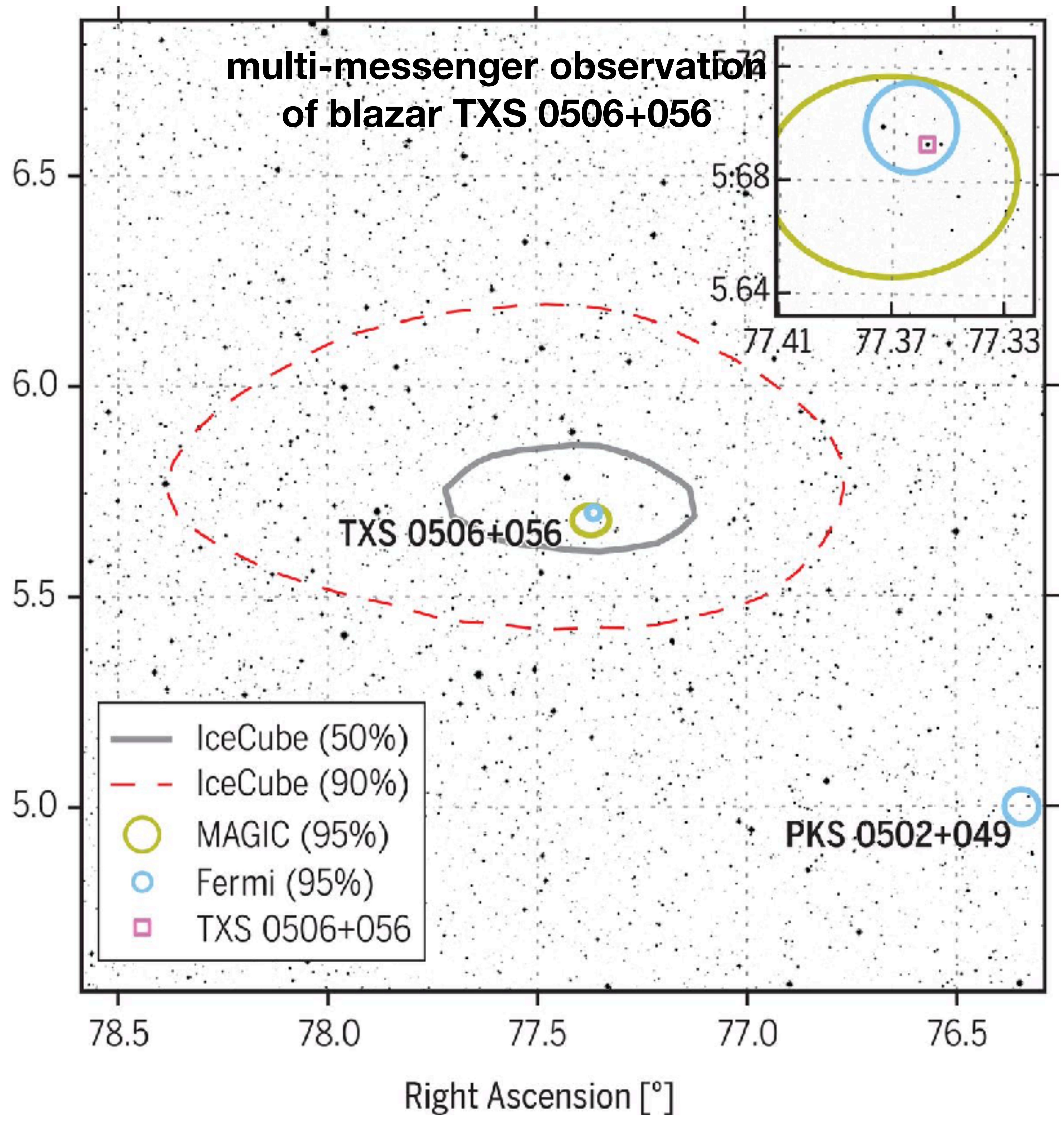
Can be hosted in the cavern made available through the SURF expansion

Sanford
Underground Research Facility
South Dakota Science and Technology Authority



Snowmass2021 Cosmic Frontier
Dark Matter Direct Detection to the Neutrino Fog

IceCube


multi-messenger observation of blazar TXS 0506+056

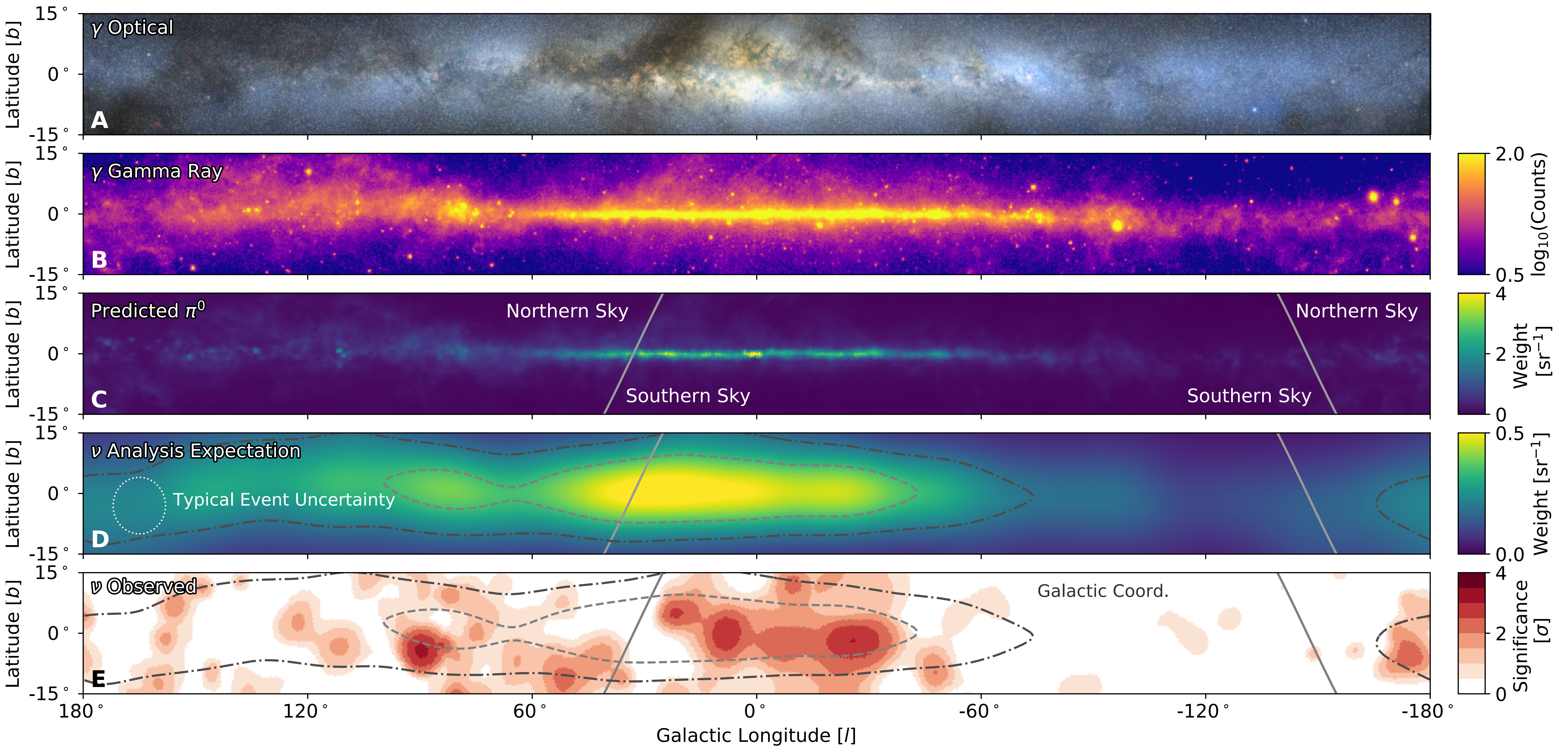


Figure 1: **The plane of the Milky Way galaxy in photons and neutrinos.** Each panel is in Galactic coordinates, with the origin being at the Galactic Center, extending ±15° in latitude and ±180° in longitude. (A) Optical color image (*39*), which is partly obscured by clouds of gas and dust that absorb optical photons. Credit A. Mellinger, used with permission. (B) The integrated flux in gamma rays from the *Fermi* Large Area Telescope (*Fermi*-LAT) 12 year survey (*40*) at energies greater than 1 GeV, obtained from the *Fermi* Science Support Center and processed with the *Fermi*-LAT ScienceTools. (C) The emission template calculated for the expected neutrino flux, derived from the π^0 template that matches the *Fermi*-LAT observations of the diffuse gamma-ray emission (*1*). (D) The emission template from panel (C) including the detector sensitivity to cascade-like neutrino events and the angular uncertainty of a typical signal event (7°, indicated by the dotted white circle). Contours indicate the central regions that contain 20% and 50% of the predicted diffuse neutrino emission signal. (E) The pre-trial significance of the IceCube neutrino observations, calculated from all-sky scan for point-like sources using the cascade neutrino event sample. Contours are the same as panel (D). Grey lines in (C) - (E) indicate the Northern-Southern sky horizon line at the IceCube detector.

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). **$15M/yr increase**

c. Expand the **General Accelerator R&D (GARD)** program within HEP, including stewardship (section 6.4). **$10M/yr increase**

d. Invest in R&D in **instrumentation** to develop innovative scientific tools (section 6.3). **$20M/yr increase**

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). **$8+9M/yr increase**

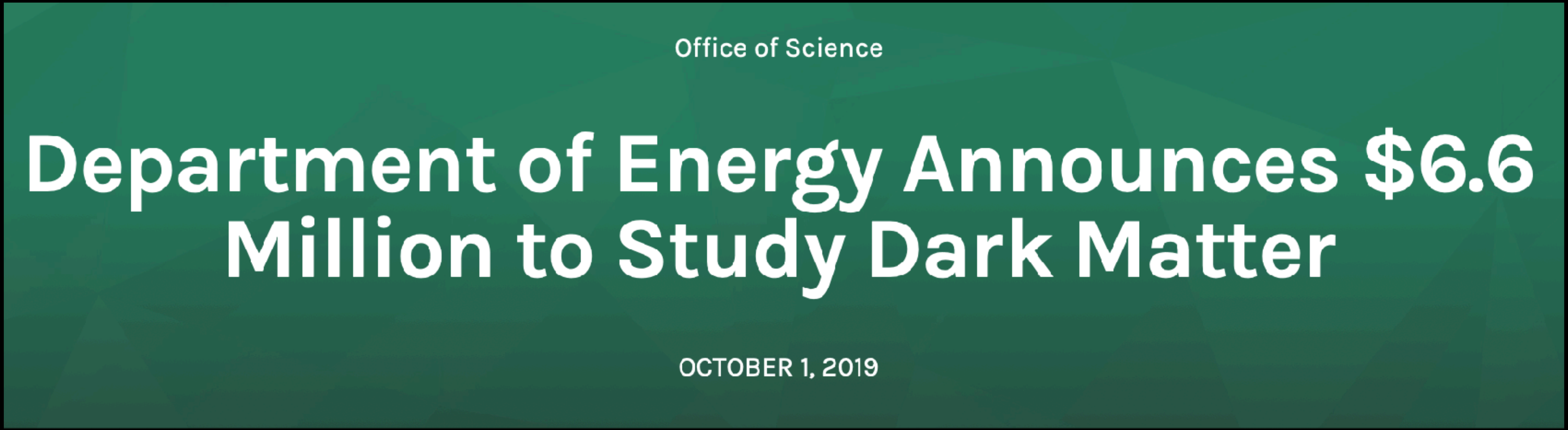
f. Support key **cyberinfrastructure** components such as shared software tools and a sustained R&D effort in computing, to fully exploit emerging technologies for projects. Prioritize **computing and novel data analysis techniques** for maximizing science across the entire field (section 6.7).

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.

Opportunities this Decade: ASTAE

Advancing Science and Technology through Agile Experiments



Office of Science

Department of Energy Announces $6.6 Million to Study Dark Matter

OCTOBER 1, 2019

The Dark Matter New Initiatives (DMNI) Program was a huge success. The successful projects now need construction funding!

H:He ~ 3:1 from Big Bang agrees with observation!

Credit: Particle Data Group

Exploring the Quantum Universe

Not Rank-Ordered

Recommendation 5

Diversity, Inclusion, Equity, Relevance to society

The following workforce initiatives are detailed in section 7:

a. All projects, workshops, conferences, and collaborations must incorporate ethics agreements that detail

The inherent curiosity driving our exploration of the natural world is a universal aspect of human nature. This shared curiosity serves as the driving force behind our commitment to strengthening and expanding this workforce, prompting us to actively seek talent from all corners of society, regions of the country, and on a global scale.

c. Comprehensive **work-climate studies** should be conducted with the support of funding agencies. Large collaborations and national laboratories should consistently undertake such studies so that issues can

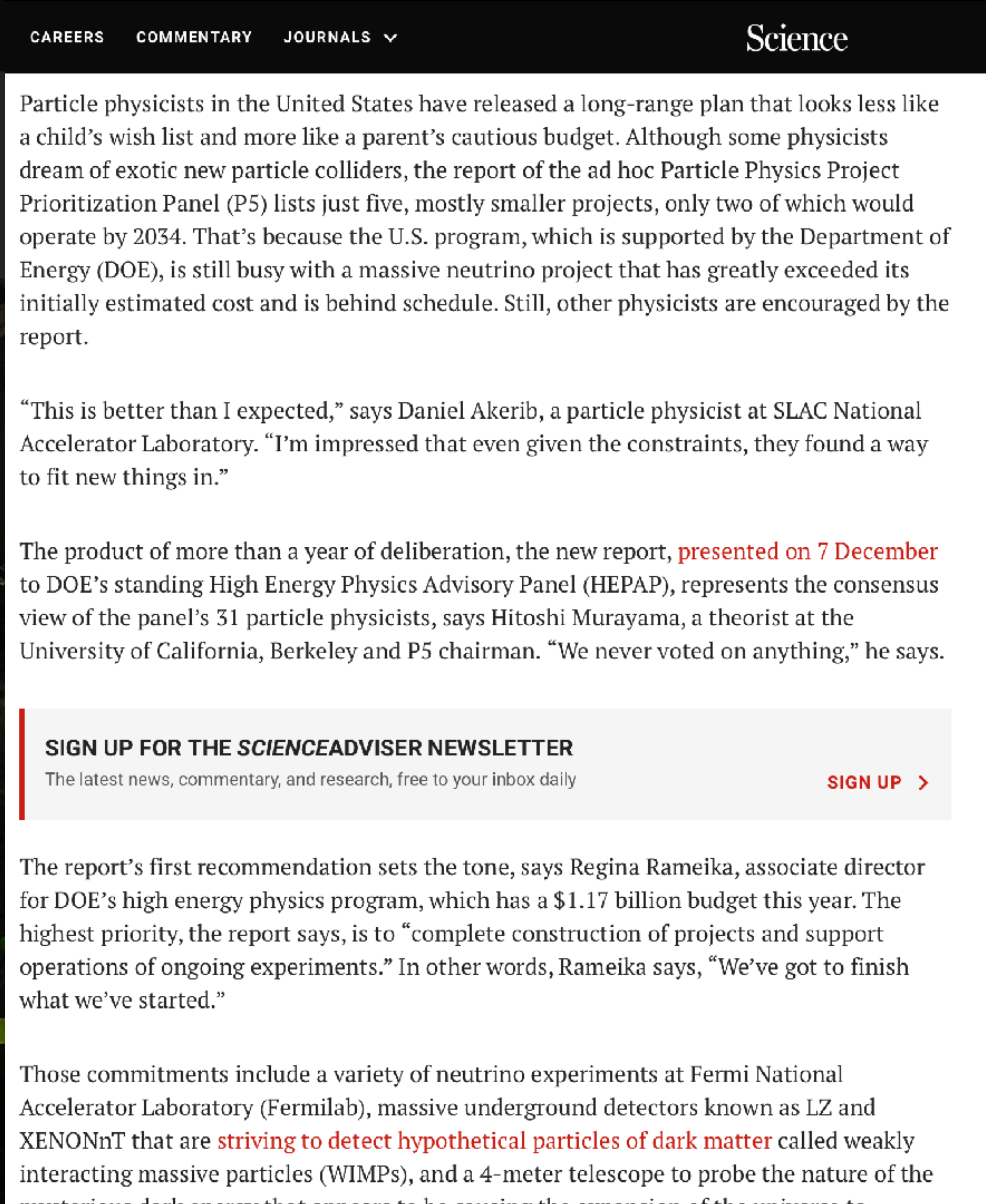
Treating others with respect requires maintaining a professional work environment, free from harassment and abuse. Discrimination, harassment, or bullying within a scientific collaboration harms individuals, disrupts scientific progress, and is therefore scientific misconduct.

operations and research budgets of experiments. The funding agencies should include funding for the dissemination of results to the public in operation and research budgets.

particle physicists dream small

New effort to study the afterglow of big bang heads new decadal to-do list

8 DEC 2023 • 6:10 PM ET • BY ADRIAN CHO



Particle physicists in the United States have released a long-range plan that looks less like a child's wish list and more like a parent's cautious budget. Although some physicists dream of exotic new particle colliders, the report of the ad hoc Particle Physics Project Prioritization Panel (P5) lists just five, mostly smaller projects, only two of which would operate by 2034. That's because the U.S. program, which is supported by the Department of Energy (DOE), is still busy with a massive neutrino project that has greatly exceeded its initially estimated cost and is behind schedule. Still, other physicists are encouraged by the report.

"This is better than I expected," says Daniel Akerib, a particle physicist at SLAC National Accelerator Laboratory. "I'm impressed that even given the constraints, they found a way to fit new things in."

The product of more than a year of deliberation, the new report, presented on 7 December to DOE's standing High Energy Physics Advisory Panel (HEPAP), represents the consensus view of the panel's 31 particle physicists, says Hitoshi Murayama, a theorist at the University of California, Berkeley and P5 chairman. "We never voted on anything," he says.

The report's first recommendation sets the tone, says Regina Rameika, associate director for DOE's high energy physics program, which has a $1.17 billion budget this year. The highest priority, the report says, is to "complete construction of projects and support operations of ongoing experiments." In other words, Rameika says, "We've got to finish what we've started."

Those commitments include a variety of neutrino experiments at Fermi National Accelerator Laboratory (Fermilab), massive underground detectors known as LZ and XENONnT that are striving to detect hypothetical particles of dark matter called weakly interacting massive particles (WIMPs), and a 4-meter telescope to probe the nature of the

The New York Times

Particle Physicists Agree on a Road Map for the Next Decade

A "muon shot" aims to study the basic forces of the cosmos. But meager federal budgets could limit its ambitions.

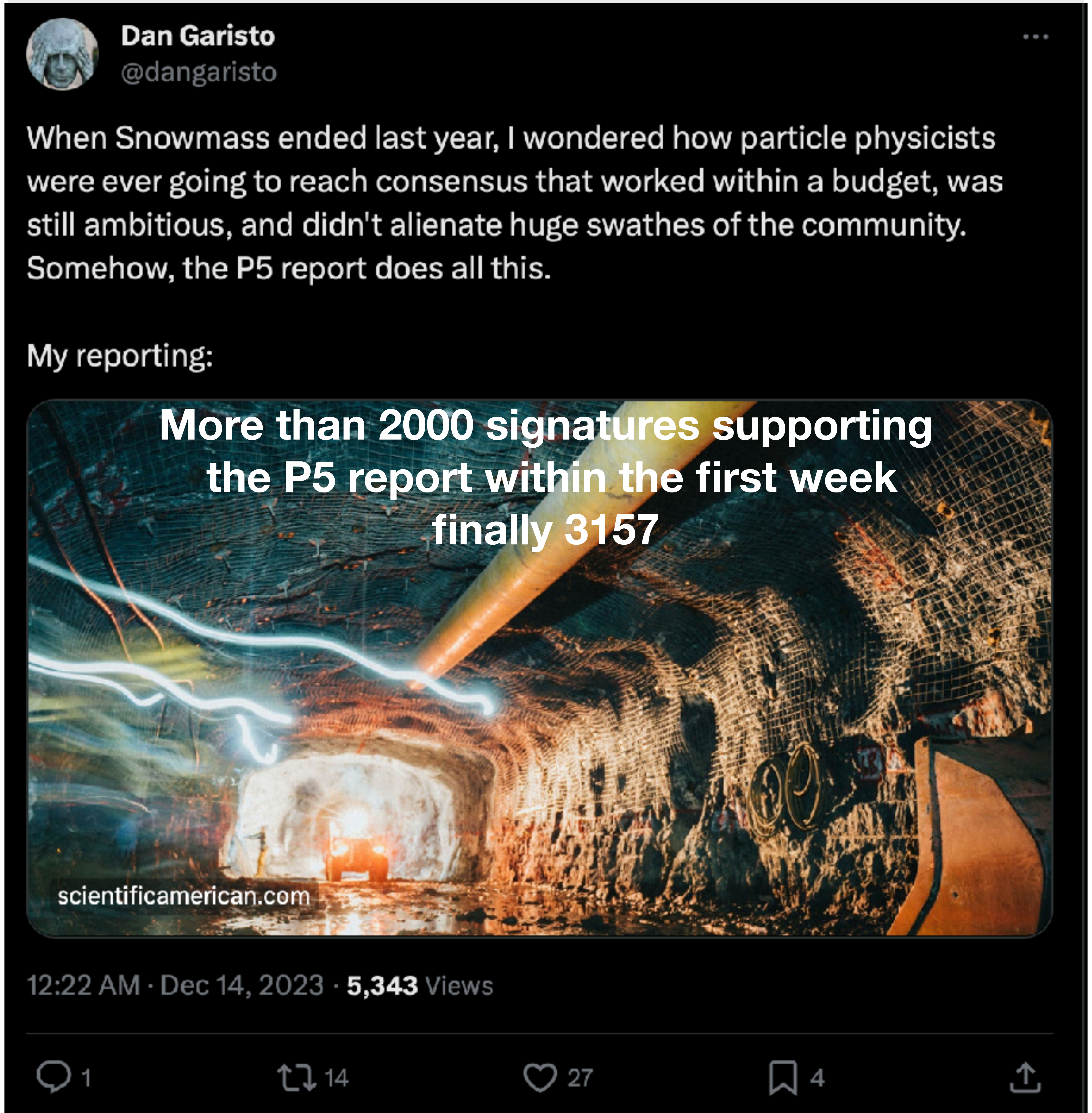
A tunnel of the Superconducting Super Collider project in 1993, which was abandoned by Congress. Ron Heflin/Associated Press

By Dennis Overbye and Katrina Miller

Published Dec. 7, 2023 Updated Dec. 8, 2023

DECEMBER 13, 2023 | 8 MIN READ

Road Map for U.S. Particle Physics Wins Broad Approval



Dan Garisto
@dangaristo

When Snowmass ended last year, I wondered how particle physicists were ever going to reach consensus that worked within a budget, was still ambitious, and didn't alienate huge swathes of the community. Somehow, the P5 report does all this.

My reporting:

More than 2000 signatures supporting the P5 report within the first week finally 3157

scientificamerican.com

12:22 AM · Dec 14, 2023 · **5,343** Views

Support the 2023 P5 Report : Statistics

Number of Endorsements (Total)	Number of Endorsements (US)
3523	3157

US Endorsements by Career Stage

US Endorsements by Snowmass Frontier

US Endorsements by State

US Endorsements vs. Time

Exploring the Quantum Universe

Date	Where	talk type	Event	Who requested?	Speaker
12/7/2023	Washington, DC	committee	HEPAP	DOE/NSF	Hitoshi/Karsten
12/11/2023	Fermilab	committee	P5 Townhall	DPF/Fermilab	Hitoshi/Karsten
12/12/2023	DESY	colloquium	Helmhotlz Alliance		Beate Heinemann
12/12/2023	CERN (Meyrin)	committee	CERN SPC	SPC chair	Karsten/Hitoshi
12/13/2023	Yale	colloquium	colloquium/discussion	Yale	Karsten/Sarah
12/13/2023	Houston, TX	conference	1st Int. Workshop on Muon-Ion Colliders	Workshop SPC	Mark Palmer
12/15/2023	BNL, Brookhaven NY	seminar	town hall/discussion	BNL	Karsten Heeger
12/15/2023	AAAC	committee	AAAC	NSF	Hitoshi/Karsten
12/18/2023	Asmeret Berhe	briefing	briefing	DOE	Hitoshi/Karsten
12/19/2023	KEK, Tsukuba	seminar	seminar	Masa Yamauchi	Hitoshi Murayama
12/19/2023	BNL, Brookhaven NY	seminar	seminar for ATLAS group	Viviana Cavaliere	Sarah Demers
12/19/2023	Congressional Staffers	briefing	briefing	DOE	Hitoshi/Karsten/Abby
12/22/2023	KEK, Tsukuba	briefing	briefing	Masa Yamauchi	Hitoshi Murayama
12/21/2023	Fermilab	seminar	Colliders of Tomorrow	Sridhara Dasu	Tulika Bose
12/27/2023	MEXT	briefing	Briefing to Research Promotion Bureau	Masa Yamauchi	Hitoshi Murayama
1/5/2024	OSTP	briefing	briefing to Kei Koizumi	DOE	Hitoshi/Karsten
1/9/2024	UChicago	other	KICP/A&A Chalk Talk	Austin Joyce	Abby Vieregg
1/11/2024	University of Hawaii	colloquium	Physics colloquium	John Learned	
1/12/2024	LBNL	seminar	Annual LBNL ATLAS Meeting	Kevin Einsweiler	Hitoshi Murayama
1/12/2024	Edinburgh, Scotland (virtual)	other	LZ collaboration meeting	Sally Shaw	Richard Schnee
1/16/2024	IMCC (virtual)	briefing	IMCC Steering Cmmte.	Steinar Stapnes	Mark Palmer
1/17/2024	UT-Austin	colloquium			Peter Onyisi
1/17/2024	LSST DESC (virtual)	seminar	DESC seminar	LSST DESC spokesperson	Rachel Mandelbaum & Francis-Yan Cyr-Racine
1/17/2024	Multi-lab (virtual)	committee	MDP General Meeting	Georgui Velev (MDP Mgmt)	Mark Palmer
1/18/2024	MDP Management (virtual)	other	MDP Tech. Advisory Cmmte.	Soren Prestemon	Mark Palmer
1/19/2024	Fermilab	other	Accelerator Directorate All-Hands	Alexander Valishev	Bob Zwaska
1/22/2024	University of Washington, Seattle	colloquium		Henry Lubatti	Sarah Demers
1/22/2024	South Dakota Mines	colloquium		Jingbo Wang	Richard Schnee
1/23/2024	University of New Mexico	seminar	Particle/Cosmo Seminar	David Camarena	Francis-Yan Cyr-Racine
1/25/2024	Argonne National Lab	colloquium		Christine McLean	Petra Merkel
1/25/2024	University of Florida	colloquium		Andrey Korytov	Hitoshi Murayama
1/26/2024	William & Mary	colloquium		Marc Sher/W&M	Chris Monahan
1/30/2024	Washington, DC		URA Council of Presidents	John Mester	Hitoshi/Karsten/Sally
1/31/2024	Rutgers	colloquium			Yuri Gershtein
2/2/2024	Annecy	conference	FCC Physics WS	Patrick Janot	Hitoshi Murayama
2/2/2024	CERN (Meyrin)	colloquium	CERN colloquium	Joachim Mnich	Hitoshi Murayama
2/5/2024	UK	other	European funding agencies and community	Lia Merminga	Hitoshi/Karsten
2/5/2024	Carnegie Mellon University	colloquium	CMU/Pitt joint colloquium series	Tao Han	Rachel Mandelbaum
2/12/2024	SLAC	colloquium		Marty Breindenbach	Hitoshi Murayama
2/15/2024	MIT	colloquium		MIT	Jesse Thaler/Lindley Winslow
2/27/2024	University of Maryland	colloquium		Kaustubh Agashe	Hitoshi Murayama
3/6/2024	Indiana University	colloquium		Hal Evans	Tulika Bose
3/7/2024	Michigan State University	colloquium		Reinhard Schweinhorst	Sarah Demers
3/14/2024	University of Oregon	colloquium		UO	Tien-Tien Yu
3/24/2024	Aspen Center for Physics	conference	Aspen Winter Conference	Karri DiPetrillo	Hitoshi Murayama
3/25/2024	MIT	conference	FCCee workshop	Christoph Paus	Karsten Heeger
4/3/2024	Sacramento	conference	APS April Meeting		Hitoshi Murayama
4/8/2024	UC Berkeley	colloquium		Christopher McKee	Hitoshi Murayama
4/9-11/2024	US congress	briefing	Annual Hill Visit	URA, DPF	
5/4/2024	University of Wisconsin, Madison	colloquium		Sridhara Dasu	Hitoshi Murayama
5/15/2024	Jefferson Lab	seminar		Dave Dean	Karsten Heeger
5/16/2024	ORNL	seminar		Marcel Demarteau	Karsten Heeger

🟨 community

🟦 agencies
government
congress

Today

Congressional Staffers on Appropriation Committees

Perry Yates Professional Staff at Subcommittee on Agriculture and FDA, House Appropriations Committee

Scott McKee Democratic Clerk, Subcommittee on Energy & Water Development at U.S. House Committee on Appropriations

Aaron Goldner Professional Staff at United States Senate Committee on Appropriations

Anna Newton Professional Staff Member at United States Senate Committee on Appropriations

Majority **Minority**

House

Perry Yates

Scott McKee

Senate

Aaron Goldner

Anna Newton

Harriet Kung: It went exceedingly well

Office of Science & Technology Policy

Kei Koizumi, Principal Deputy Director for Policy

Cole Donavan, Assistant Director for Research Security and Infrastructure

Joel Parriott, Assistant Director for Federal R&D (on detail from NSF)

Aliya Iftikhar, Special Assistant

Kei Koizumi

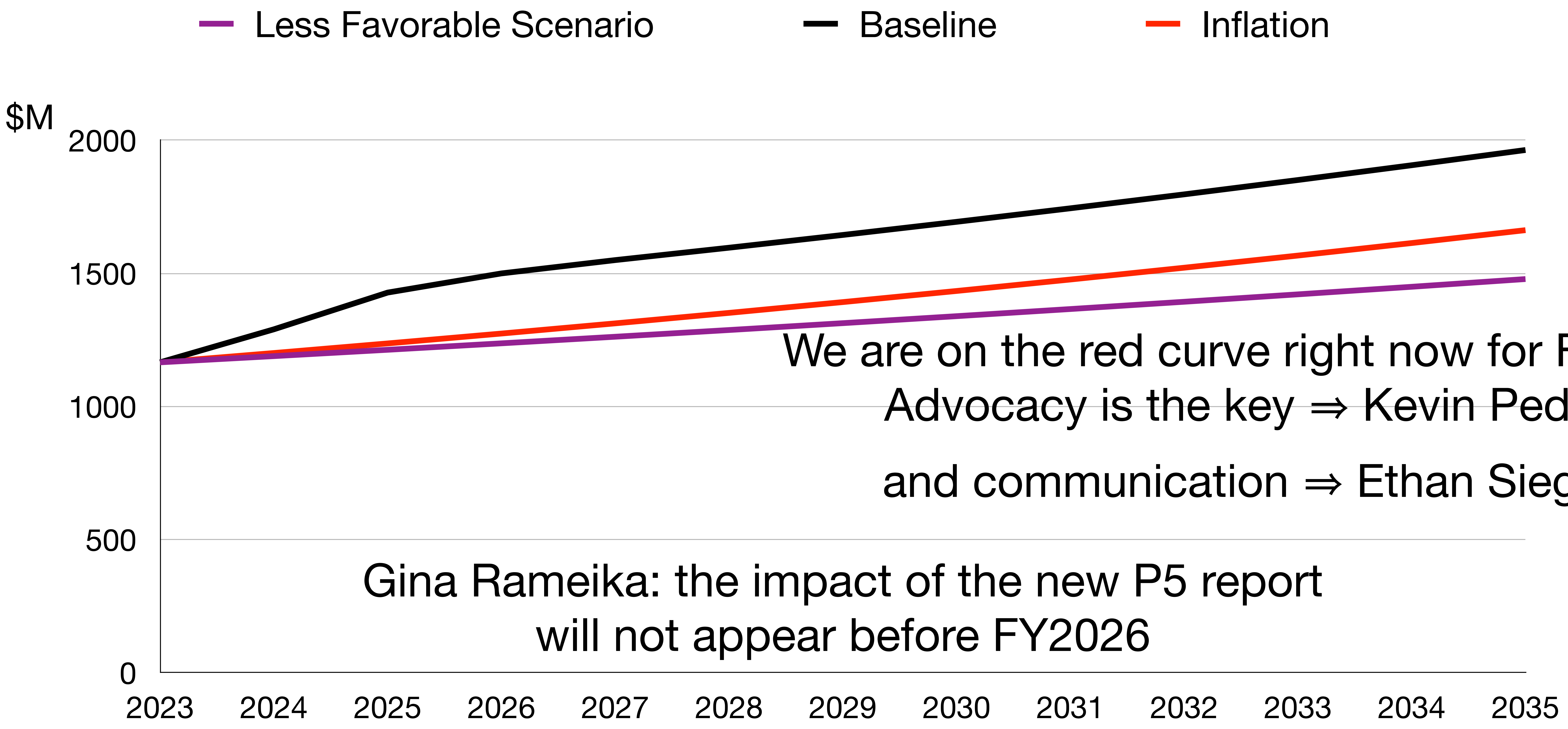
Cole Donavan

Joel Parriott
Ph.D. Astro
Michigan

Aliya Iftikhar

Harriet Kung: You guys keep getting better!

Budget Scenarios



We are on the red curve right now for FY2024

Advocacy is the key ⇒ Kevin Pedro

and communication ⇒ Ethan Siegel

Gina Rameika: the impact of the new P5 report
will not appear before FY2026

DOE only

2023 P5 Panel

Exploring
the
Quantum
Universe

Pathways to Innovation and Discovery in Particle Physics

Report of the Particle Physics Project Prioritization Panel 2023

We have exciting science ahead!