CPM2012 Closing Remarks

(Not a summary of all the other talks @CPM201)

http://www.snowmass2013.org

[redacted]

Charge to Conveners, August 2012

The American Physical Society's Division of Particles and Fields is initiating 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

[redacted]

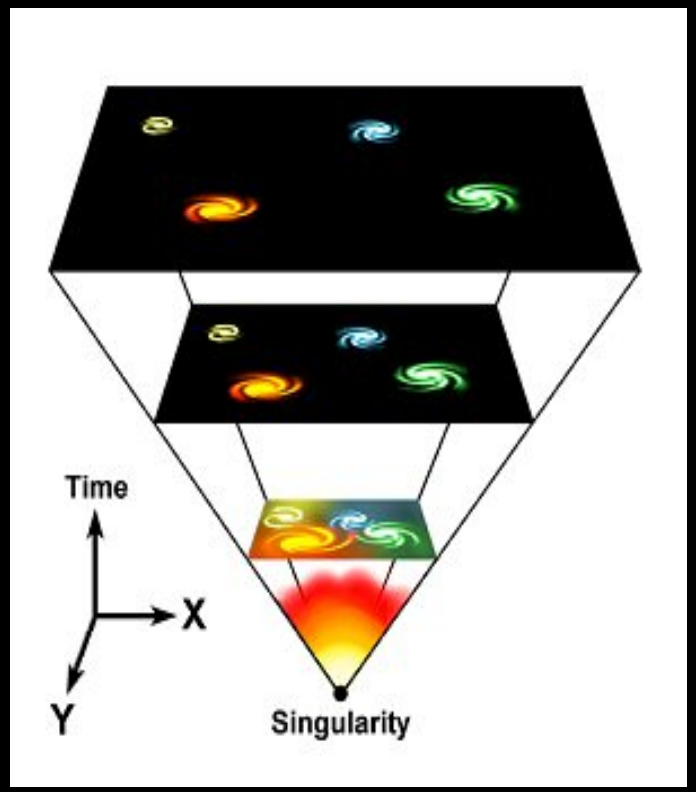
Charge to Conveners, August 2012

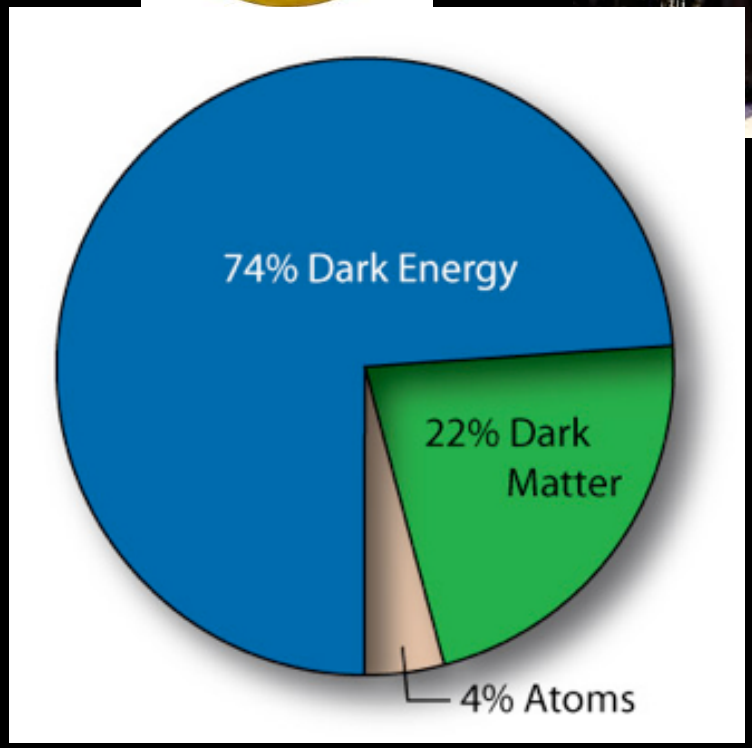
The long-term planning exercise is anchored by two meetings:

- A Community Planning Meeting (CPM2012), at Fermilab, October 11-13, 2012
- A Community Summer Study (CSS2013), at the University of Minnesota, July 29-August 10, 2013.

A special time….

- October 2011: Nobel Prize for the discovery of dark energy

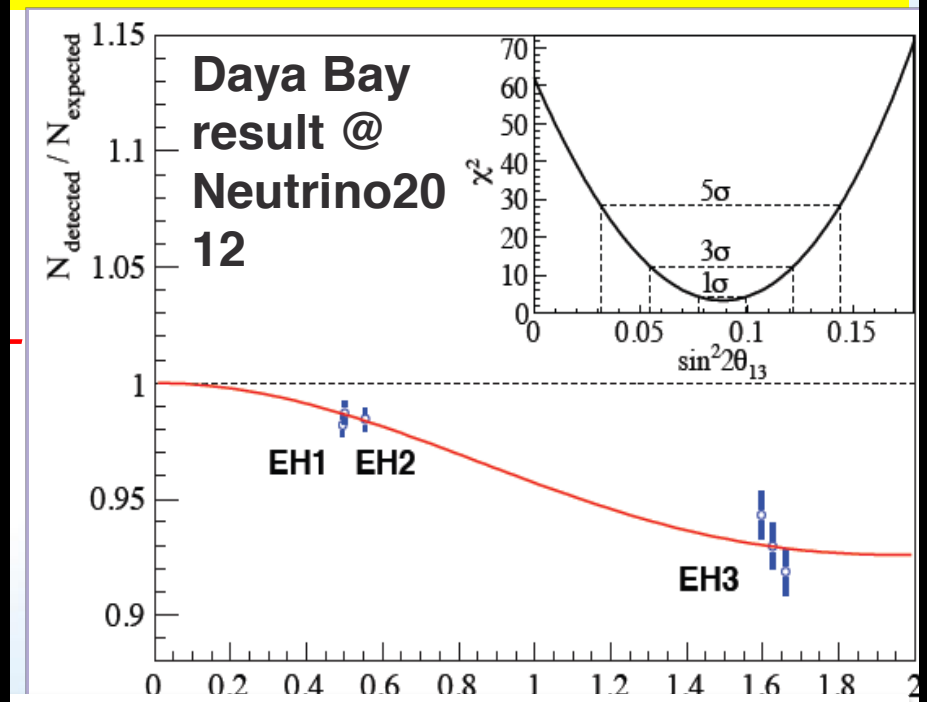




A special time….

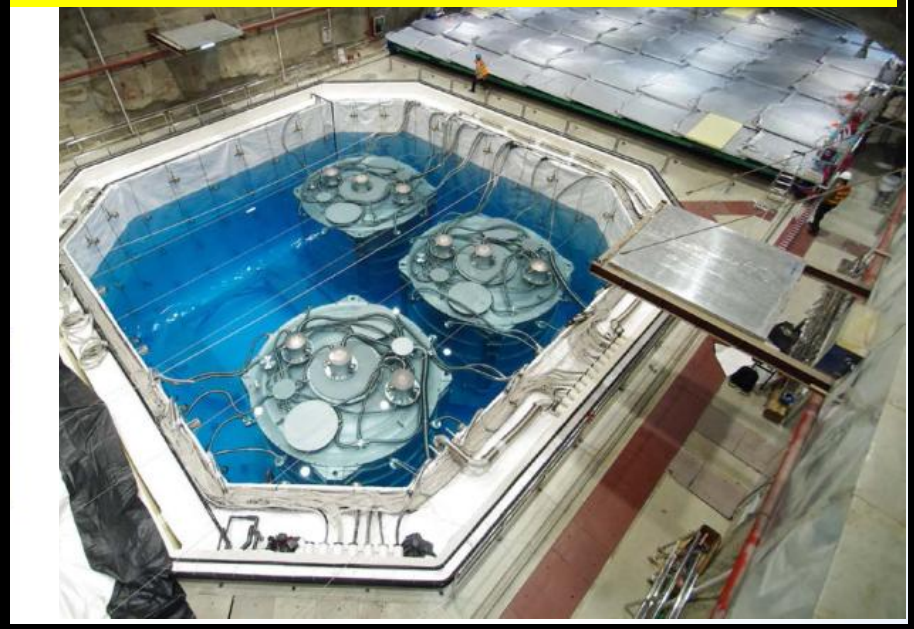
- March 2012: First results from Daya Bay:

Daya Bay - Large $\sin^2 2\theta_{13}$

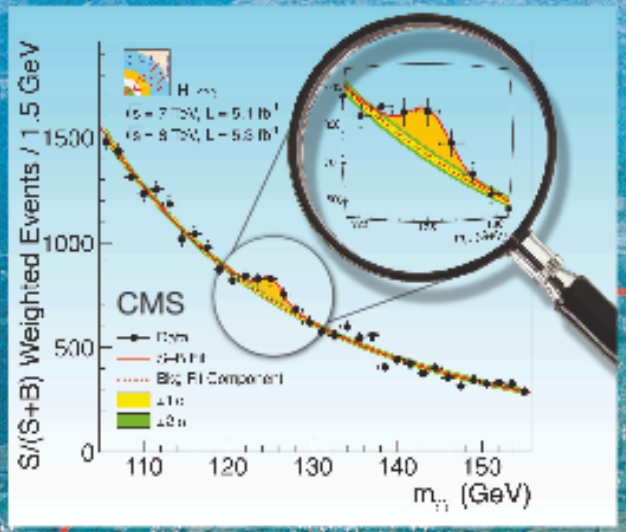


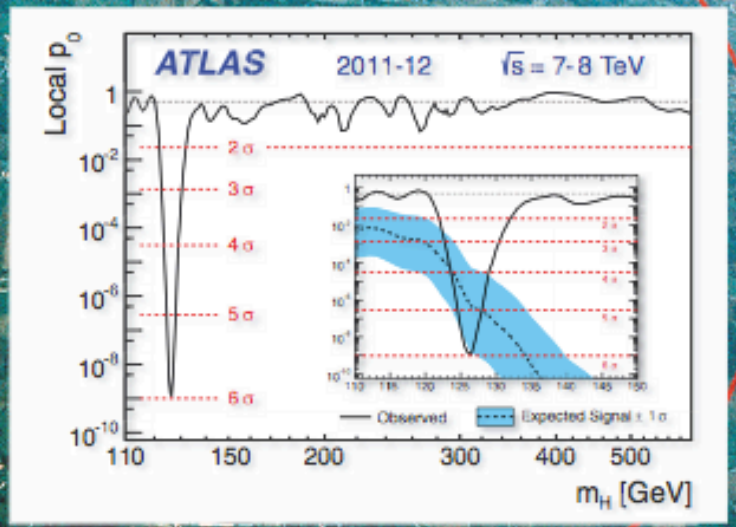
$\sin^2 2\theta_{13} = 0.089 \pm 0.010\ (stat) \pm 0.005\ (syst)$

Daya Bay - Far Det.



First observations of a new particle in the search for the Standard Model Higgs boson at the LHC





The LHC, the experiments and the observation of a Higgs-like boson is a global phenomena

PRESS COVERAGE

after July 4th seminars at CERN

CERN black board, Jul 2012

“Higgs update” seminar, 4th July

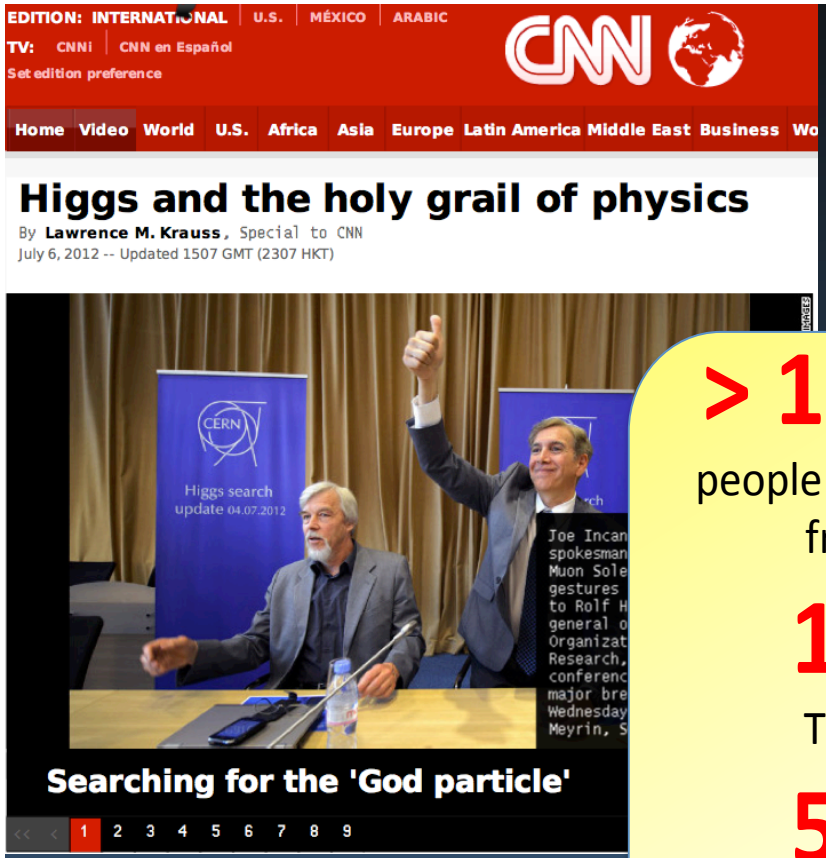
CERN press conferences
Multiple interviews
Hundreds of repeats of the CERN events around the globe

55

media organizations at CERN (11 global news, 21 print, 20 TV)

496,000

Distinct (IP) connections to seminar webcast



> 1 billion

people saw TV footage from CERN

1,034

TV stations

5,016

Broadcasts

Convincing current & next generation voters
Influencing decision makers

The public are very interested in science.
Combined with the unprecedented global impact of the Higgs-like 125 GeV discovery
this provides
an opportunity to
expand engagement
with the public
our colleagues
and the government.

To communicate what we have learned and the opportunities for discovery in high-energy physics

Education and Outreach Frontier

Why do we need a healthy particle physics program in the United States ?

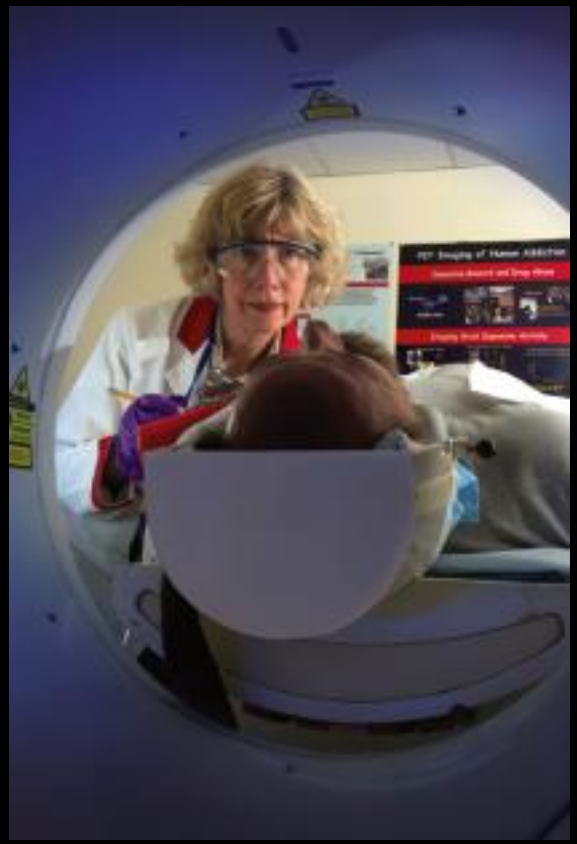
#1 Our science is important for the nation to pursue

What is the world made of?
What holds the world together?
How did the world begin?

For millenia all great societies have asked these questions

#2 The big questions we ask attract young talent to the sciences

#3 Particle physics is an essential part of the fabric of the physical sciences in the US.
Contributing broadly to other physical sciences:
Accelerator Science
Detector development
Large Scale computing driven by large collaborations



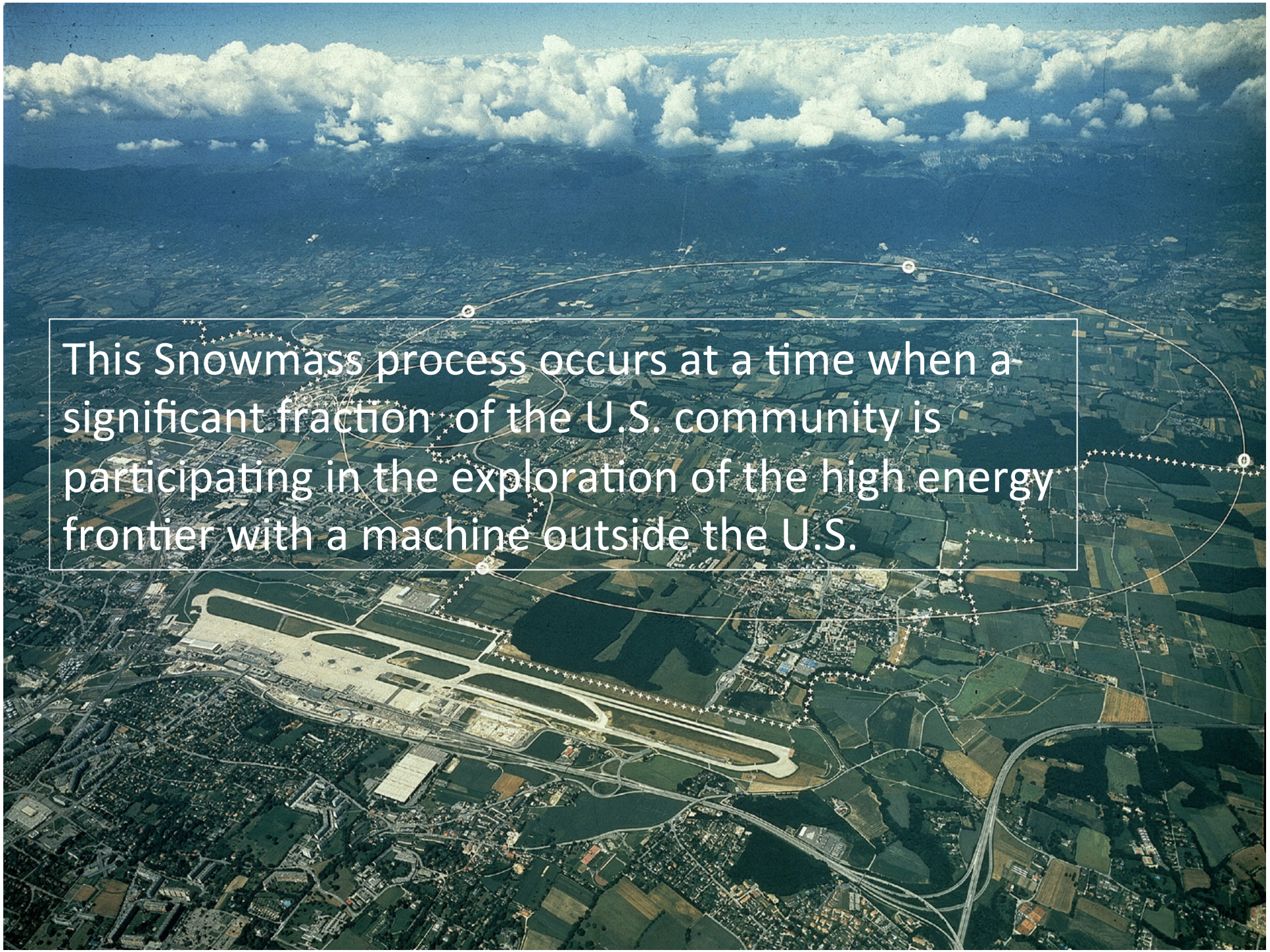
It is a two-way process. We benefit from developments in Material science & Basic Energy Sciences.

Some of the essential ingredients of a healthy particle physics program in the U.S. are:

A program focused on the most compelling science

Infrastructure to support the development of our tools

A long term vision and strategy to guide the program for future decades.



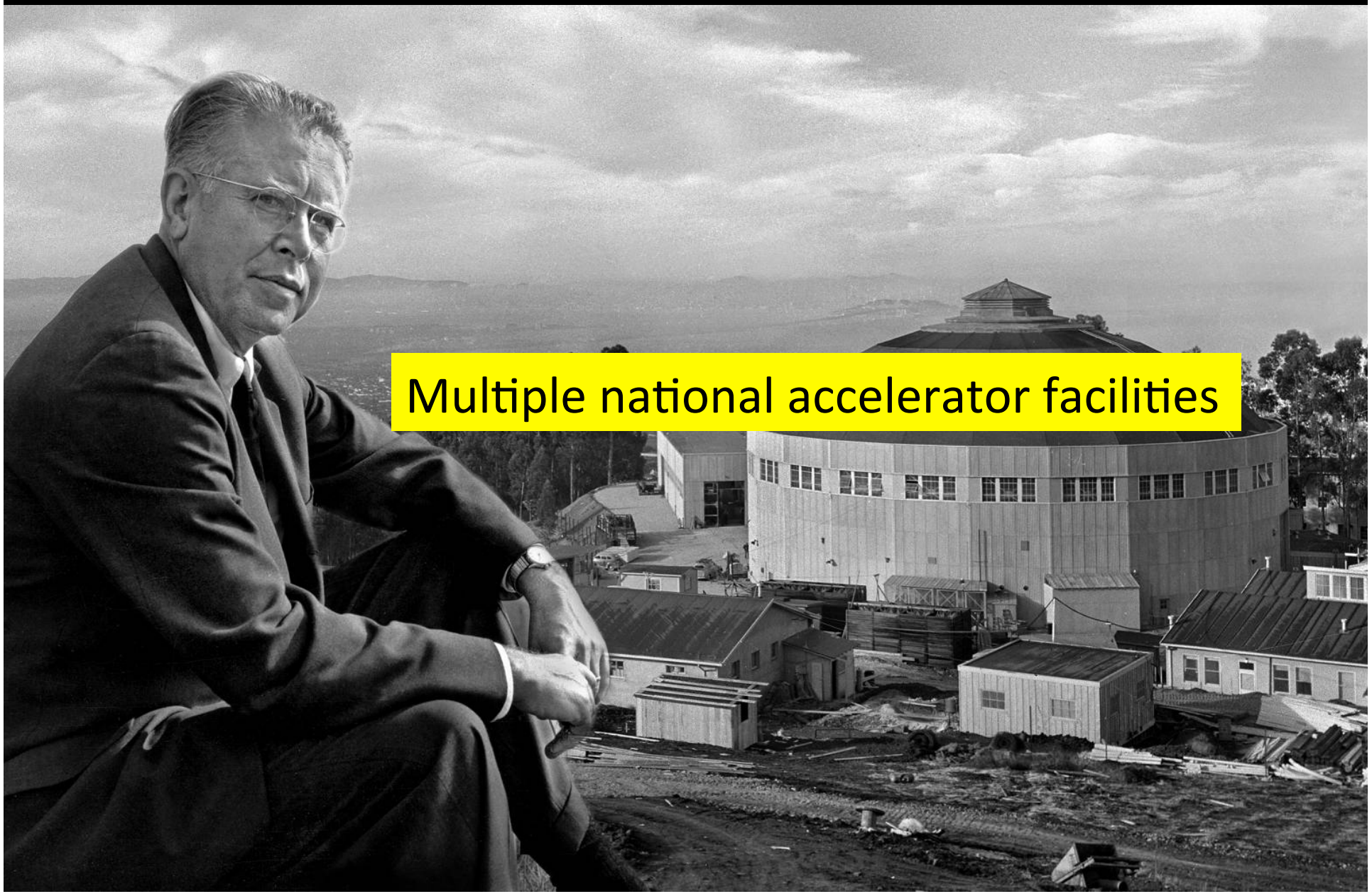
This Snowmass process occurs at a time when a significant fraction of the U.S. community is participating in the exploration of the high energy frontier with a machine outside the U.S.

The only constant is change itself

Harvard Cyclotron

local accelerators and local experiments

The only constant is change itself

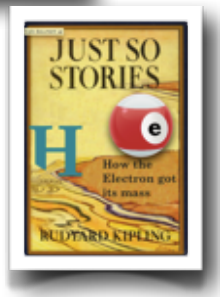


The Snowmass process must identify opportunities for achieving “transformational or paradigm-altering” scientific advances: *great discoveries*.

So, the High Energy Frontier's Jobs:

1. **Study the Higgs-like state at 125 GeV**

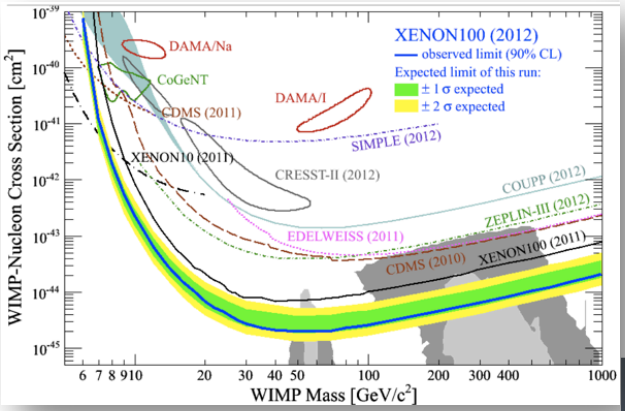
2. **Full-out on some troublesome questions**

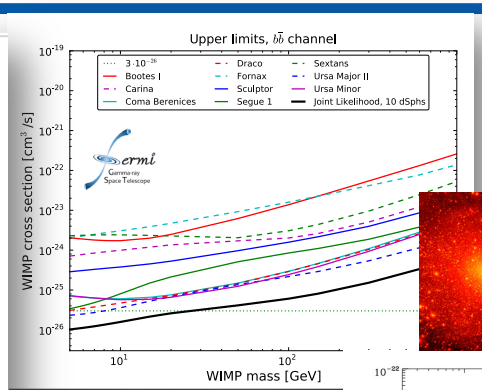


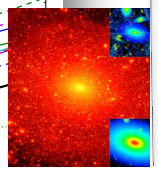
3. **Write the story that encompasses the SM**

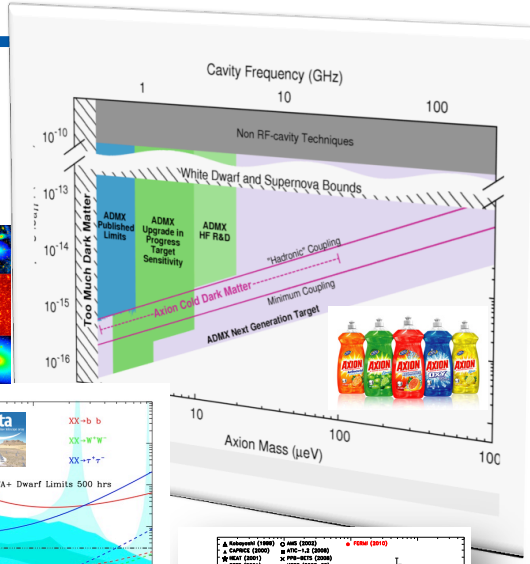
4. **Be nimble and observant to surprises**

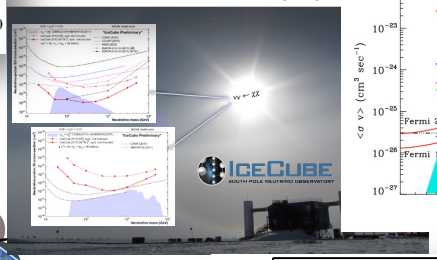
The Cosmic Frontier

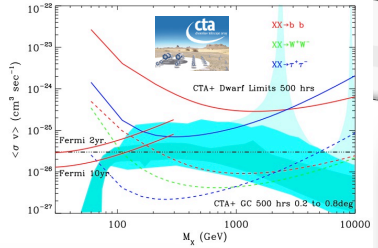


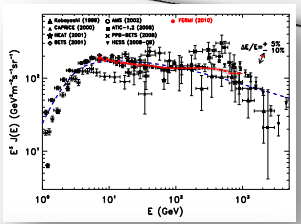


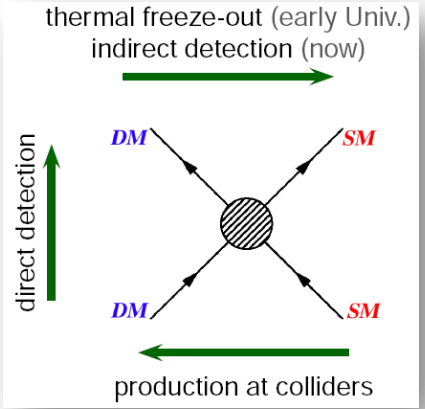


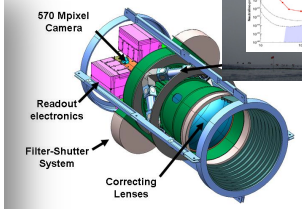


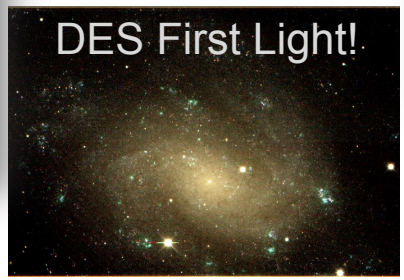


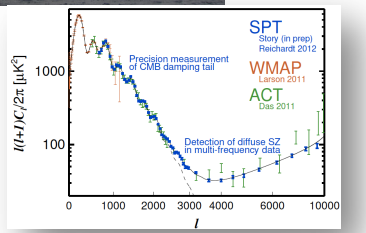


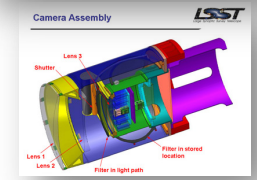


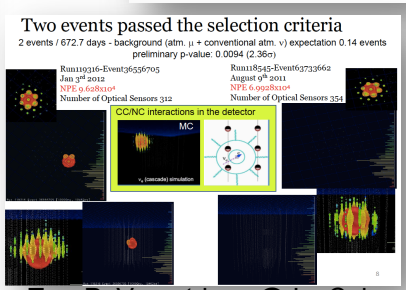












Two PeV neutrinos @ IceCube

Activities at the Cosmic Frontier are marked by rapid, surprising, and exciting developments

The Intensity Frontier

e Intensity Frontier is a broad and diverse,
t connected, set of science opportunities

Heavy Quarks

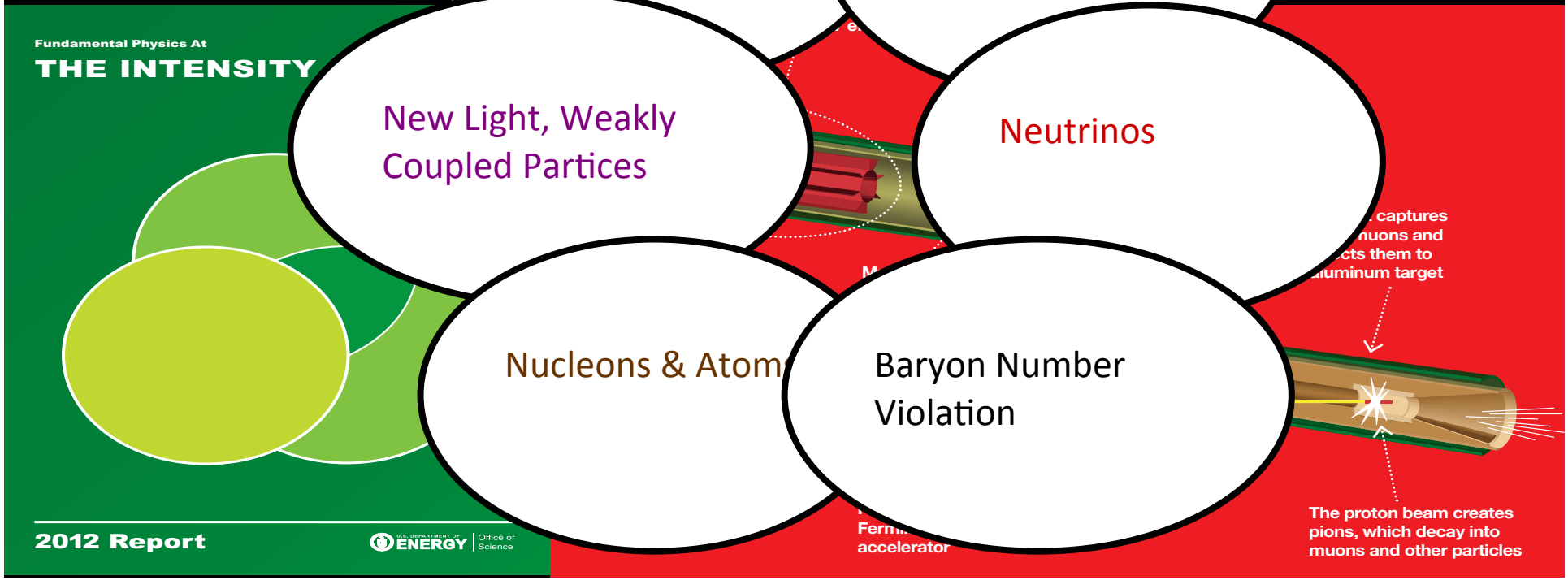
Charged Leptons

New Light, Weakly Coupled Partices

Neutrinos

Nucleons & Atom

Baryon Number Violation

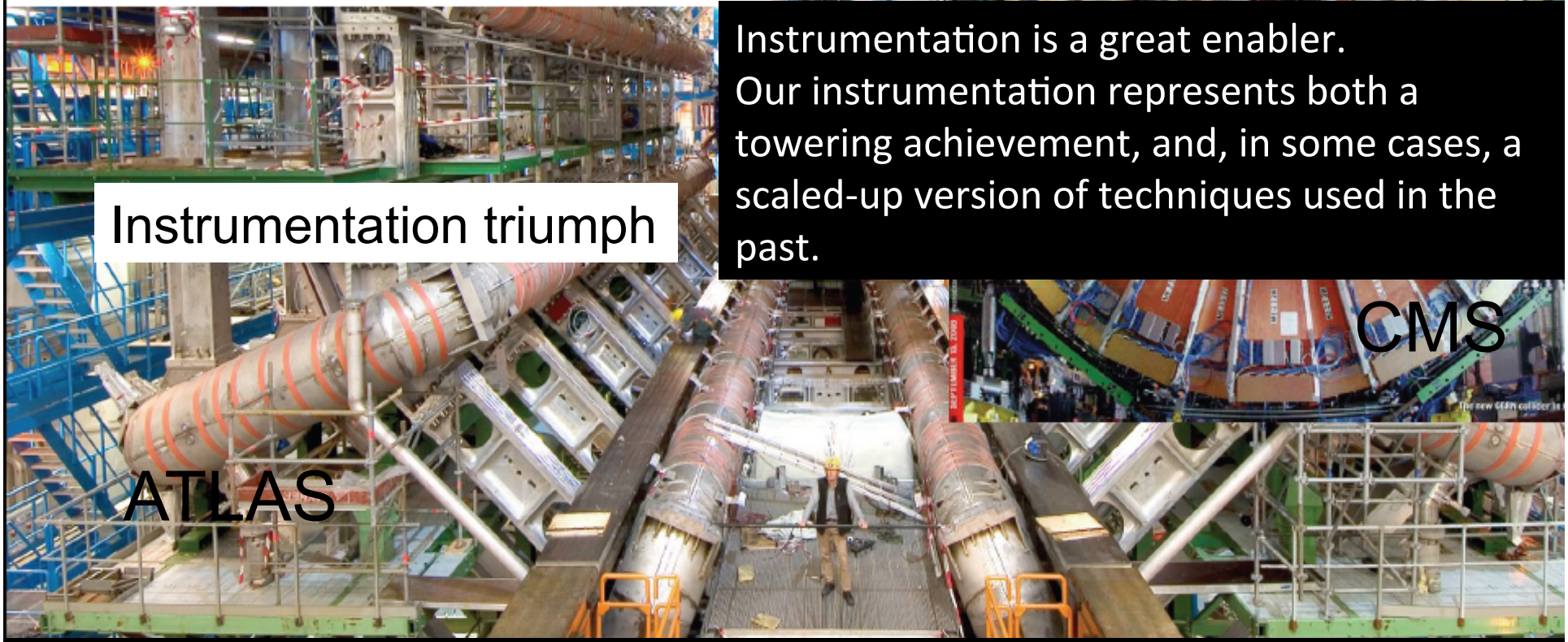


Object	Weight (tons)
Boeing 747 [fully loaded]	200
Endeavor space shuttle	368
ATLAS	7,000
Eiffel Tower	7,300
USS John McCain	8,300
CMS	12,500

Instrumentation frontier

Instrumentation is a great enabler.
Our instrumentation represents both a towering achievement, and, in some cases, a scaled-up version of techniques used in the past.

Instrumentation triumph



DIGITAL CAMERAS THE SIZE OF CATHEDRALS

Object	Weight (tons)
Boeing 747 [fully loaded]	200
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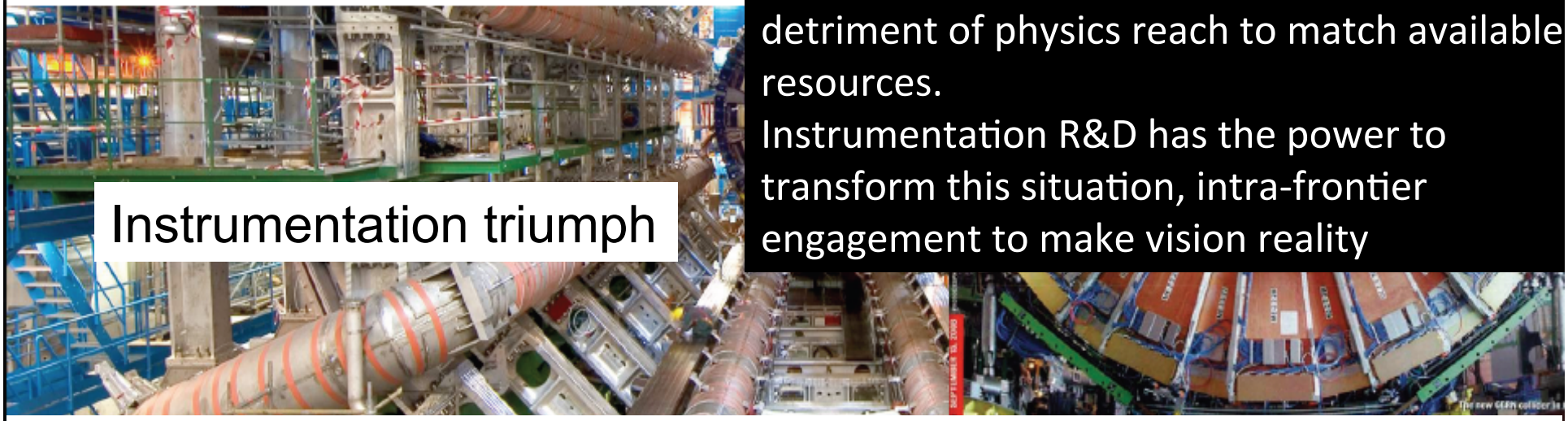
Many experiments are large and have high costs resulting in major de-scoping of detectors and their capabilities to the detriment of physics reach to match available resources.

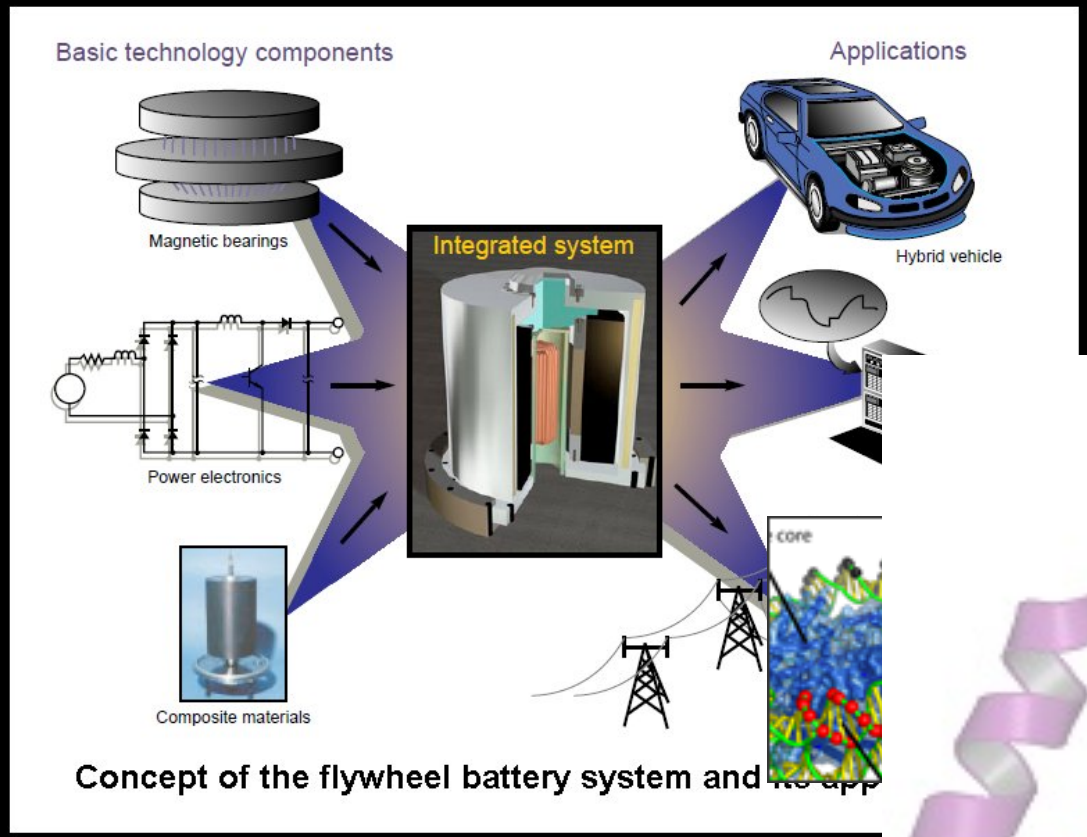
Instrumentation R&D has the power to transform this situation, intra-frontier engagement to make vision reality

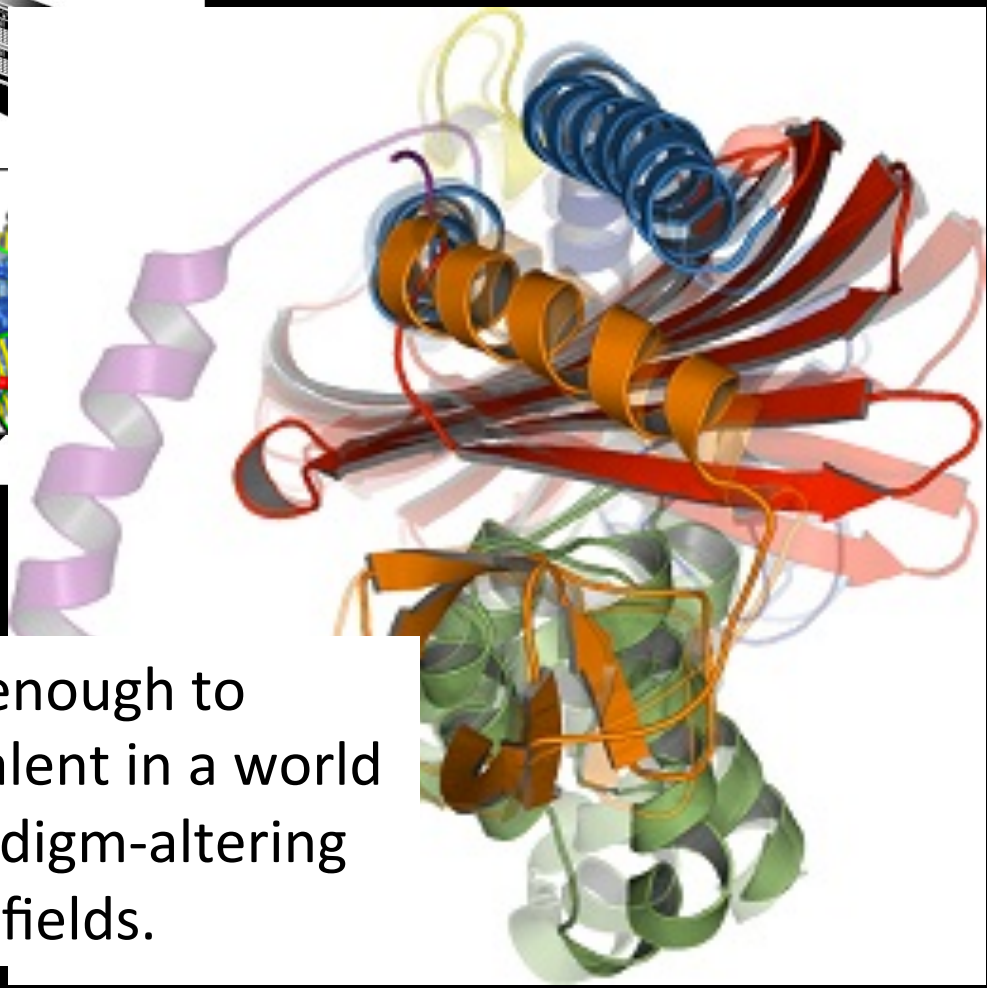


Instrumentation triumph

Instrumentation Challenge

DIGITAL CAMERAS THE SIZE OF CATHEDRALS

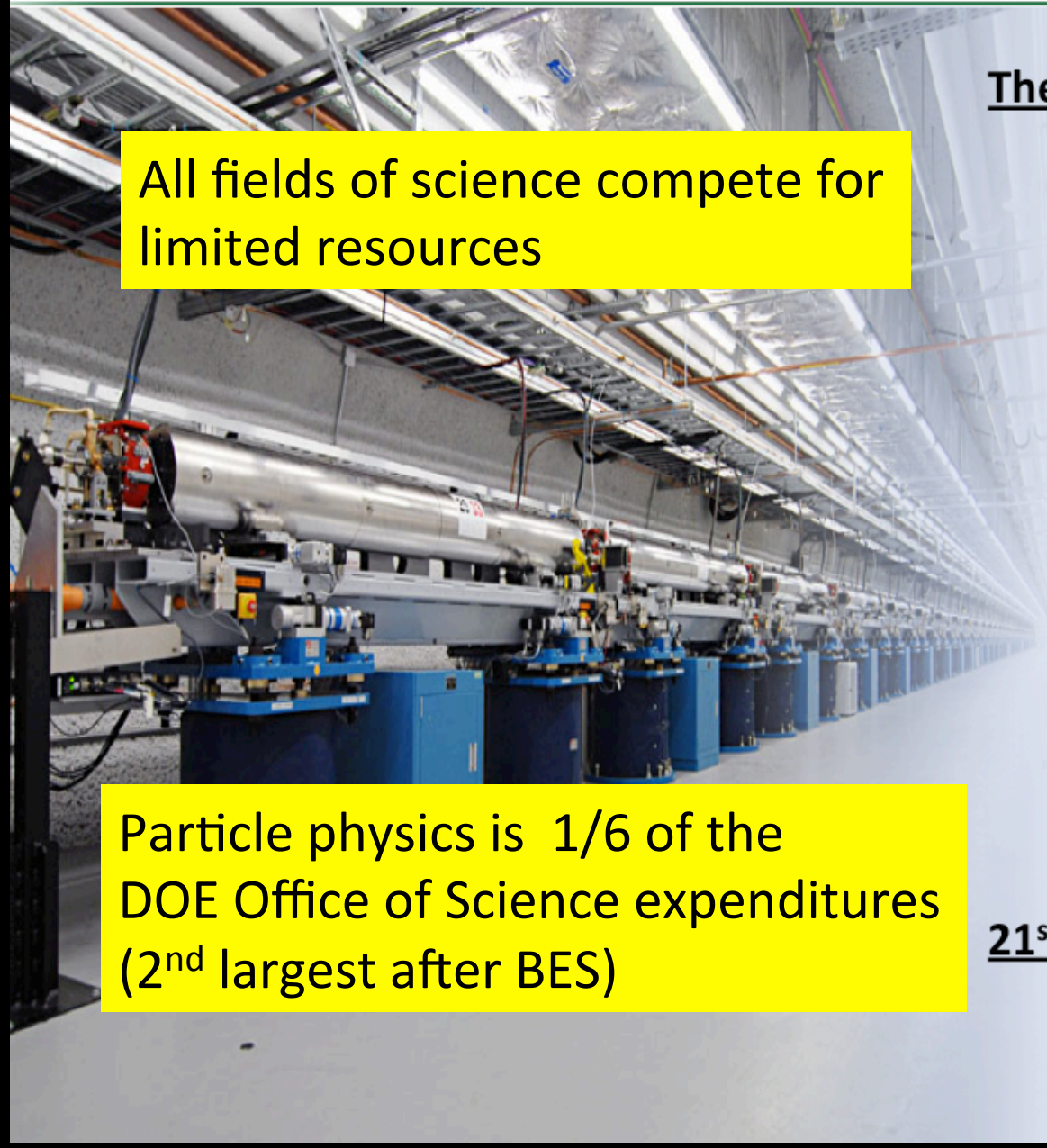




Our science must be compelling enough to compete favorably for the best talent in a world where transformational and paradigm-altering advances are happening in other fields.

Office of Science

Science to Meet the Nation's Challenges Today and into the 21st Century



All fields of science compete for limited resources

Particle physics is 1/6 of the DOE Office of Science expenditures (2nd largest after BES)

The Frontiers of Science

- Supporting research that led to over **100** Nobel Prizes during the past **6** decades—more than **20** in the past **10** years
- Providing **45%** of Federal support of basic research in the physical and energy related sciences and key components of the Nation's basic research in biology and computing
- Supporting over **25,000** Ph.D. scientists, graduate students, undergraduates, engineers, and support staff at more than **300** institutions

21st Century Tools of Science

- Providing the world's largest collection of scientific user facilities to over **26,500** users each year

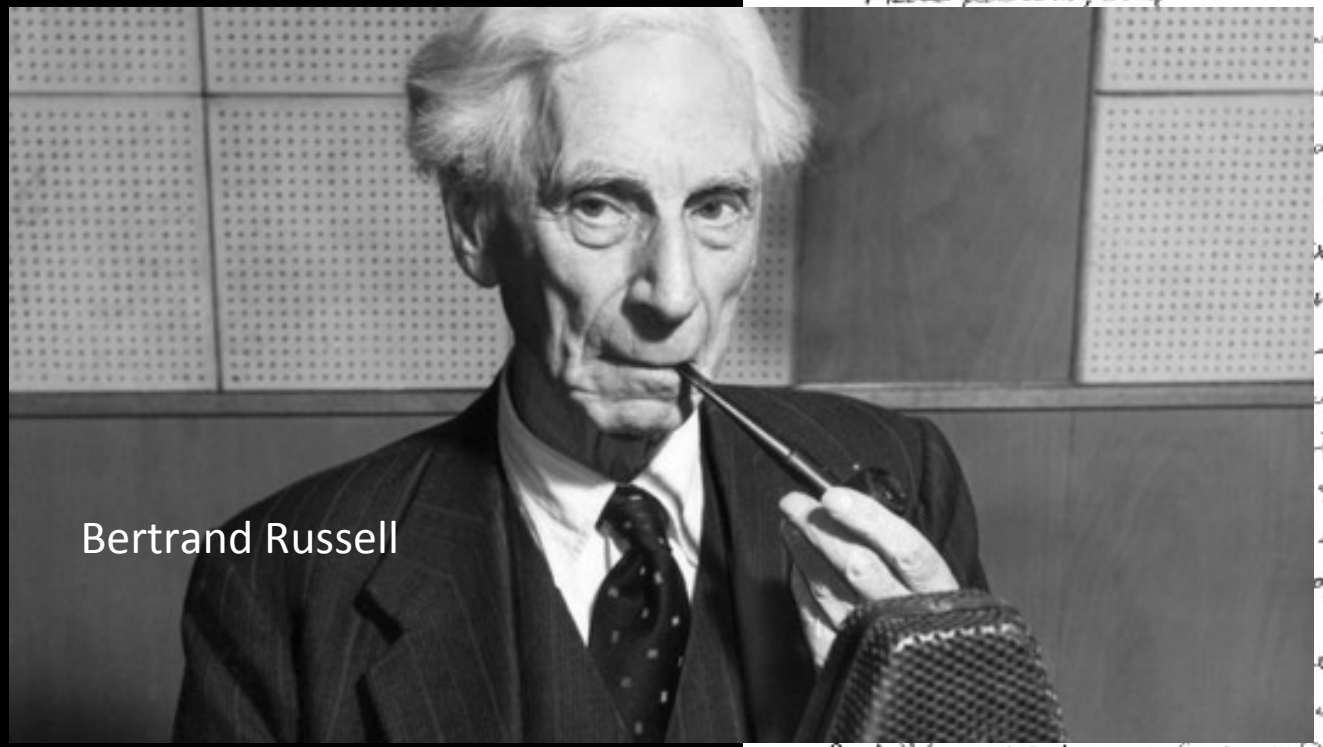
There is no entitlement for particle physics funding.

We must compete favorably with other opportunities on all the playing fields: in the agencies

in Congress

and in academia.

We need to see our science as compelling and we need to convince others it is compelling as well.



Prologue.

What I have lived for.

These passions, simple but overwhelmingly strong, have governed
ack for knowledge, & unbearable
ere pensive, like great wrecks,
a wayward course, over a deep
urge of despair.
t brings ecstasy – ecstasy so great that
t of life for a few hours of this joy.
ness loneliness – that terrible
ousness looks over the rim of the
jeless abyss. I have sought it,
I have seen, in a mystic miniature,
saints & poets have imagined. This is
oo good for human life, this is

ut knowledge. I have wished to
wished to know why the stars shine.
And I have tried to apprehend the Pythagorean power by which number
holds sway above the flux. A little of this, but not much, I have achieved.

Love & knowledge, so far as they were possible, led upward toward
the heavens. But always pity brought me back to earth. Echoes of cries of pain
reverberate in my heart. Children in famine, victims tortured by oppressors,
helpless old people a hated burden to their sons, & the whole world of
loneliness, poverty, & pain make a mockery of what human life should be.
I long to alleviate the evil, but I cannot, & I too suffer.

This has been my life. I have found it worth living, & would
gladly live it again if the chance were offered me.

25-7-56

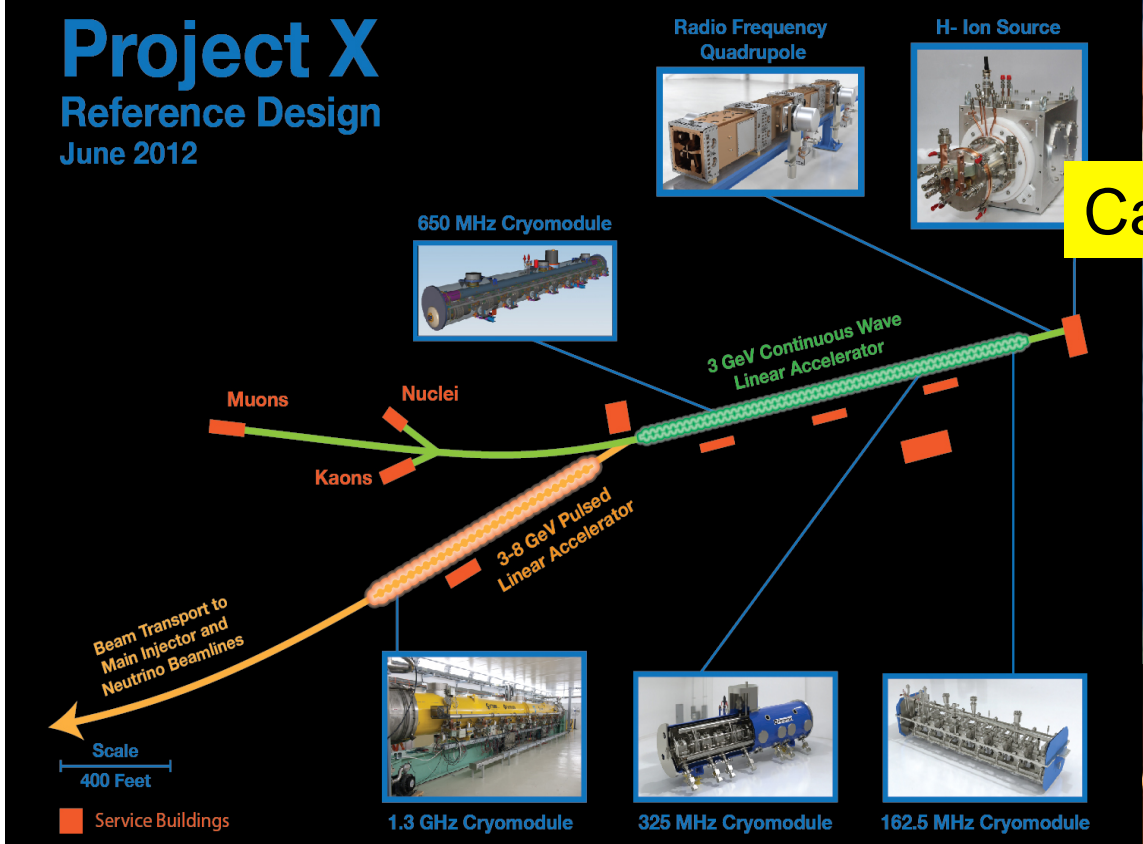
We need to do that clearly, and articulately.

Wilson Hall, inspired by a Gothic cathedral in Beauvais, France, is the focal point for administrative and scientific activity at Fermilab.

Our big science with big tools requires the infrastructure to support the development of those tools for today and for the future.

FNAL, ANL, BNL, LBNL, SLAC.

Accelerator R&D



Capabilities frontier

Intimately related to the need for healthy infrastructure is the need for a strong program in accelerator R&D. The future of particle physics at the energy and intensity frontiers is dependent on innovations in accelerator science

Given the global nature of our field, our long term strategy has to maintain an international perspective, and strong international partnerships will be crucial to our future health.

What are the best strategies to make our projects international?

A healthy program needs a long term strategy with a compelling vision for the future and future scientific achievements. This is what Snowmass 2013 will produce.

[redacted]

Charge to Conveners, August 2012

The American Physical Society's Division of Particles and Fields is initiating 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

The Snowmass process will inform the HEPAP P5 priority setting process

The Snowmass Process 2013

CPM 2012 and CSS 2013 a.k.a Snowmass 2013

Log In

Groups

- All
- Energy Frontier
- Intensity Frontier
- Cosmic Frontier
- Frontier Capabilities
- Instrumentation Frontier
- Computing Frontier
- Education and Outreach

Google Search

Snowmass 2013 process

Community Planning Meeting 2012 (FNAL, October 11-13 2012)

http://www.snowmass2013.org

These are your long term aspirations & narrative to develop

Think large, think smart

Identify compelling opportunities at all scales

Participate in frontier pre-meetings

Continue to reach out to our community; many
could not be at CPM 2013

Reach out to younger colleagues, give them roles; they are the future

Plan for lots of interaction between the frontiers

Participate vigorously in the Community Summer Study (CSS2013),
University of Minnesota, July 29-August 10, 2013.

Snowmass on the Mississippi

Here are some other reasons to come with your family and stay in Minneapolis.

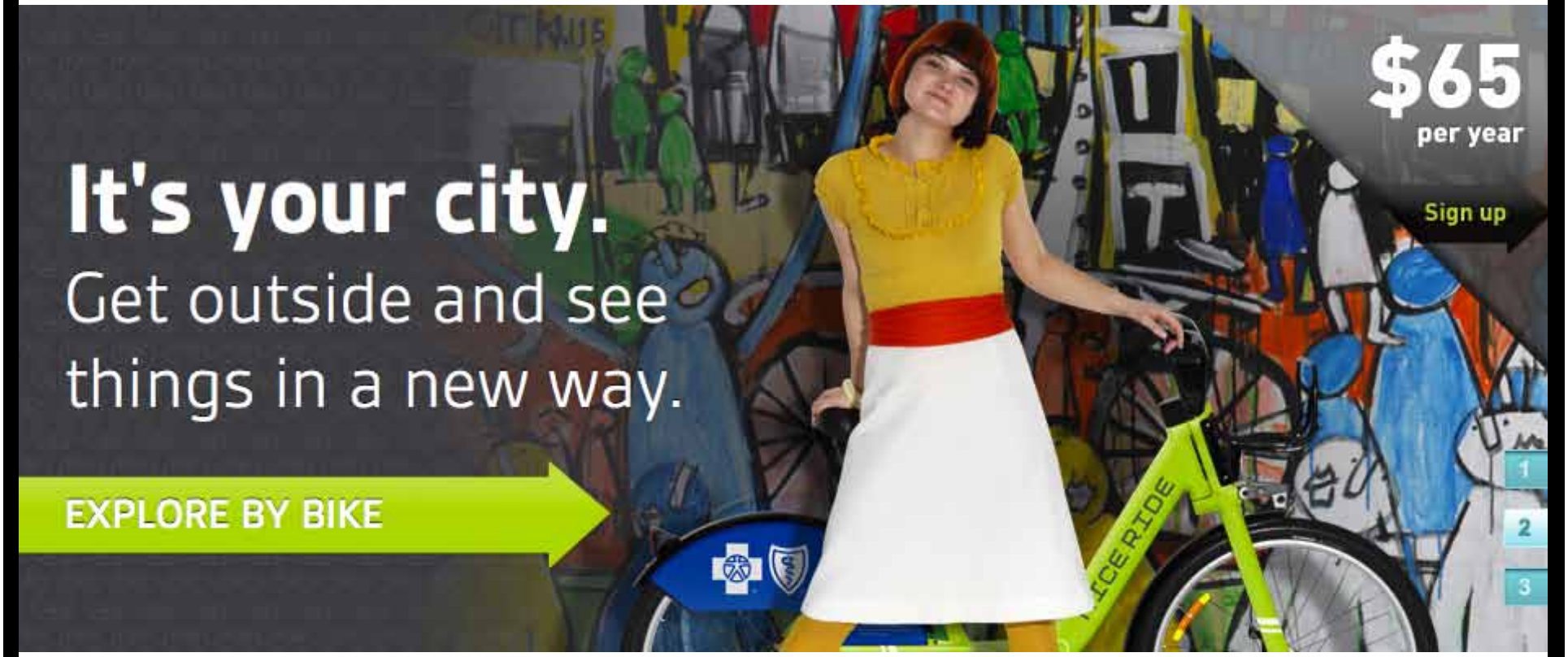
Summer Camps

- Excellent day camps for kids run by the University, Science Museum, YWCA etc. around the cities.

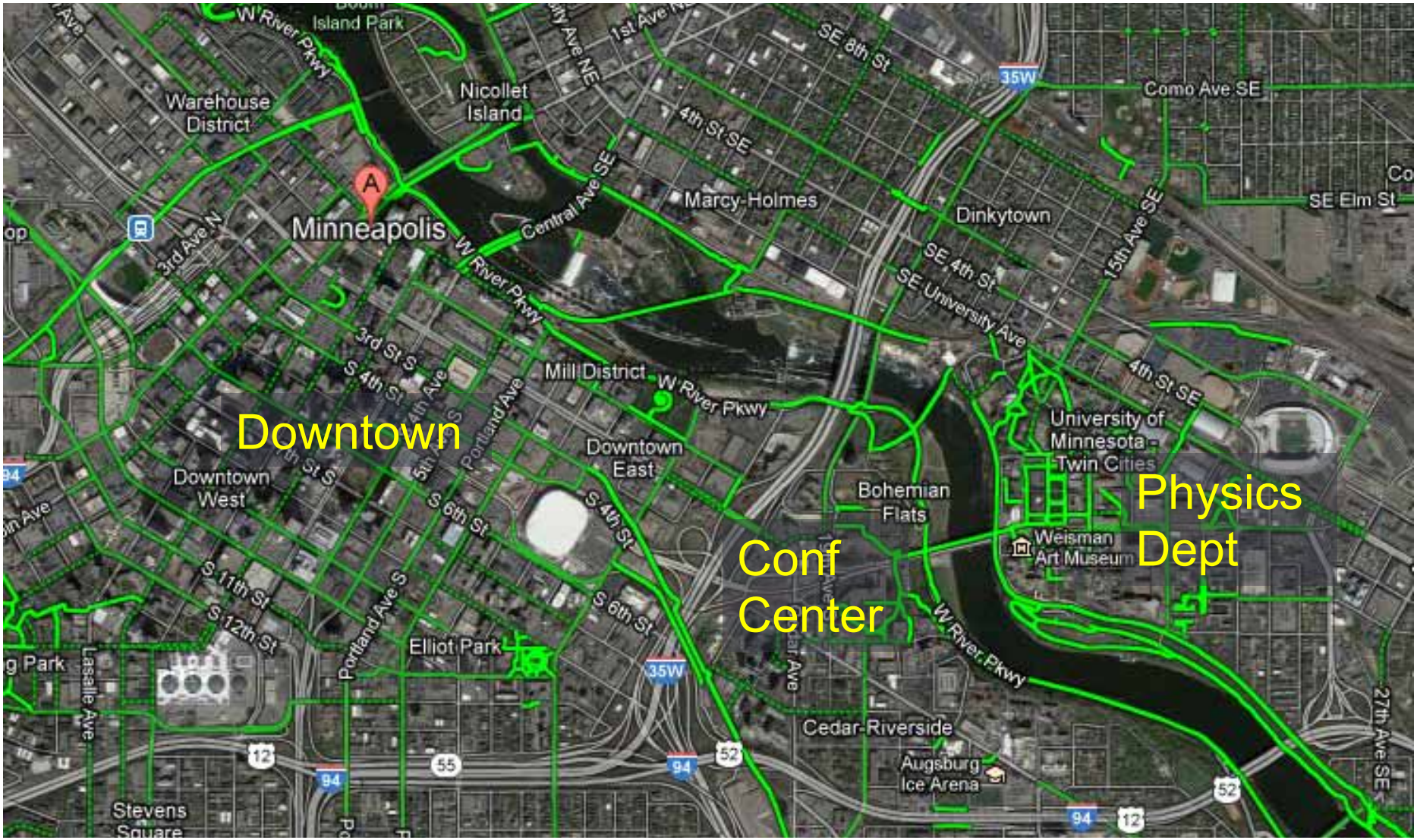
- Overnight camps outside of the Twin Cities at nearby lakes.

Getting around

- Convenient Bus and Light Rail system.
- Bikes – Bicycle Magazine :”best city in the nation for cycling”
- Nice Ride bike share system all over St Paul and Minneapolis.
- Easy walk from Conference location to Downtown or the River.



Bike paths shown in green



Entertainment & Dining

- **Minneapolis Fringe Festival. Aug 1-11**
  - **Two weeks of experimental theatre at locations all over the town.**
- **Uptown Art Fair. Aug 2-4**
  - **First weekend in August.**
- **Lively Arts scene – Theatre, Music, Museums etc.**

Sports & Parks

Baseball

Canoeing, Swimming, Minneapolis Marathon

Water Parks –in your hotel!

Sports & Parks

Baseball

Canoeing, Swimming, Minneapolis Marathon

Water Parks –in your hotel!

No guarantees on the ice fishing!

The DPF Chairline & DPF Executive Committee would like to thank

Conveners

Energy Frontier: Chip Brock, Michael Peskin

Intensity Frontier: JoAnne Hewett, Harry Weerts

Cosmic Frontier: Jonathan Feng, Steve Ritz

Capabilities: William Barletta, Murdock Gilchriese

Instrumentation: Marcel Demarteau, Ron Lipton, Howard Nicholson

Computing: Lothar Bauerdick, Steve Gottlieb

Education and Outreach: Marge Bardeen, Dan Cronin-Hennessy

Local Organizing Committee

Jonathan Rosner, Chicago (Chair)
Harry Cheung, Fermilab
Brenna Flaugher, Fermilab
André de Gouvêa, Northwestern
Karsten Heeger, UW Madison
Steve Holmes, Fermilab
Dan Hooper, Fermilab
Andreas Kronfeld, Fermilab
Patricia McBride, Fermilab
Kevin Pitts, UIUC
Pierre Ramond, Florida
Cynthia Sazama, Fermilab
Ian Shipsey, Purdue
Bob Tschirhart, Fermilab
Nikos Varelas, UIC
Suzanne Weber, Fermilab
Harry Weerts, Argonne

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Suzanne Weber, Al Johnson,
Jennifer Seivwrigh, Katie Yurkewicz

Supporting Organizations

Fermi Research Alliance LLC
The APS:
DAP, DNP, DPB