

SNOWMASS ^{CSS} 2013

ON THE MISSISSIPPI

JULY 29 – AUGUST 6, 2013



ORGANIZED BY THE DIVISION OF PARTICLES AND FIELDS OF THE APS
HOSTED BY THE UNIVERSITY OF MINNESOTA

STUDY GROUPS

Energy Frontier
 Chip Brock (Michigan State),
 Michael Peskin (SLAC)

Intensity Frontier
 JoAnne Hewett (Argonne),
 Harry Weerts (Argonne)

Cosmic Frontier
 Jonathan Feng (University of California, Irvine),
 Steve Ritz (University of California, Santa Cruz)

Frontier Capabilities
 William Baretta (MIT),
 Miroslav Glicha (BNL)

Instrumentation Frontier
 Marcel Demarteau (Argonne),
 Howard Nicholson (Mt. Holyoke),
 Ron Lipton (Fermilab)

Computing Frontier
 Lothar Bauer (Fermilab),
 Steven Gottlieb (Indiana)

Education and Outreach
 Harge Bardeen (Fermilab),
 Dan Cronin-Hennessy (Minnesota)

Theory Panel
 Michael Dine (University of California, Santa Cruz)

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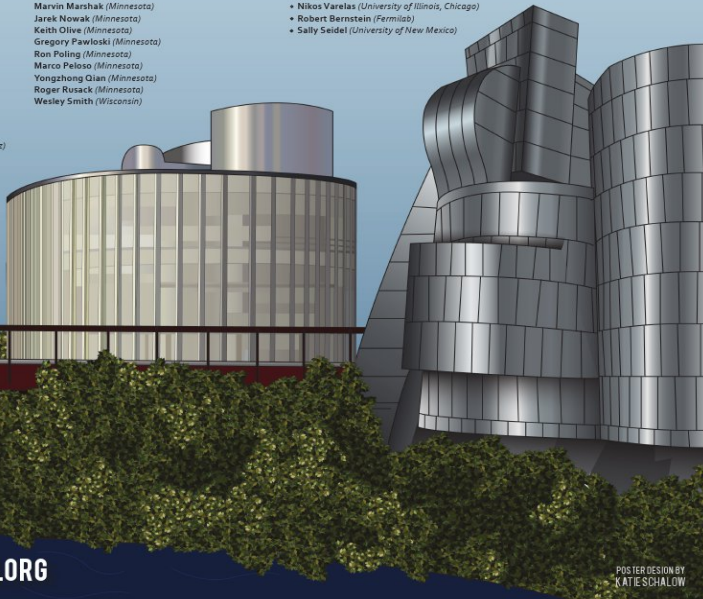
Marcela Carena (Fermilab and University of Chicago)
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POSTER DESIGN BY
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Some Perspectives After Snowmass

Kevin Pitts
University of Illinois

Outline

- **Disclaimer**
- **Recent history**
- **The Snowmass process**
 - **Benefits**
 - **Weaknesses**
- **After Snowmass**
- **Some observations**


Disclaimer

- **These thoughts are my own.**
- **When I talk about “what other people think” it’s a composite of conversations I’ve had with many people. Not fair to over generalize.**
- **None of my comments presupposes any P5 outcome.**

Recent History

- Intensity Frontier Workshop
- Neutrino conveners:
 - Andre deGouvea
 - **Kevin Pitts (observer)**
 - Kate Scholberg
 - Sam Zeller
- My comments
 - Lots of contributions
 - Lots of interesting talks and panels at meeting
 - Lots of interest
 - Nice writeup

But it was never clear where it went or who read it.




Working groups: Heavy Quarks • Charged Leptons
Neutrinos • Photons • Proton Decay • Nucleons, Nuclei & Atoms

This workshop is an opportunity for the scientific community to identify the physics potential of the Intensity Frontier. Starting in September, six working groups will study and document the full spectrum of Intensity Frontier physics and describe the necessary facilities to explore such a program. The working groups will be open to and solicit input from the broader particle and nuclear physics community, and will present their preliminary findings at the workshop.

More information is available at www.intensityfrontier.org or from the workshop chairs, JoAnne Hewlett and Harry Weerts, at intensityfrontier@illinois.gov.

FUNDAMENTAL PHYSICS AT THE INTENSITY FRONTIER

November 30–December 2, 2011
Rockville, MD | www.intensityfrontier.org

 **DOE** Office of Science

History

- **Rockville report in May 2012.**
- **Snowmass 2013 became a reality in summer 2012.**
- **Intensity frontier subgroups resurrected.**
 - **Didn't we just do this?**
 - **Is there anything we can do that's different?**
 - **What exactly is the point of Snowmass, anyway?**

Along the way

- **Financial realities set in**
 - LBNE rebaselining
 - Project X reformulation
- **New leadership at Fermilab**
- **More emphasis and appreciation for the international context.**
- **I think these things conspired to make Snowmass more relevant.**

Thoughts on Snowmass

It was useful for two reasons:

1. Working groups really did take lots of input and really consider future direction. Reports reflect serious study/input/consideration.
 2. We got the chance to inform one another about the amazing physics opportunities ahead in high energy physics.
 - This was especially good to do outside the context of cost.
- Other thoughts:
 - Some misunderstanding of format/motivation
 - Still a fair amount of stovepiping.

Snowmass neutrinos

- **Seven active working groups.**
- **Lots of contributions ~80 white papers.**
- **Lots of interesting ideas.**
- **Good participation in pre-Snowmass meetings.**
- **Colloquia were well-received.**
- **“Tough questions” was an interesting idea, but seemed to get diluted.**

Where are we now

- **Snowmass successful. The HEP community as a whole has a better understanding of physics opportunities in all frontiers.**
- **P5 underway**
- **Snowmass inputs absolutely invaluable to the P5 process.**
 - This has been a very big success.
- **Much more discussion of global collaboration and global context in neutrinos**
 - Makes ICFA effort relevant

What's next?

- **Even with a P5 report, we are going to proceed in an uncertain environment for some time.**
 - T2HyperK? European long baseline?
 - International contributions to LBNE?
 - Short baseline plan?
 - Longer term neutrino program?
- **There is an important role for the community**
 - Success with existing projects and running experiments.
 - Arriving at a plan for short baseline experiments and anomalies.
 - Progress on future projects
- **We must come together to support “the plan”**

Views from outsiders

Common comments/beliefs/criticisms from non-experts:
(disclaimer: I'm the messenger. Unfair to over generalize.)

- **Neutrino physics interesting in general.**
 - Good recognition of track record of measurement and discovery.
 - Oscillation physics (solar, atmospheric, accelerator, reactor) is really interesting/cool.
- **Neutrino CP violation ok, but not worth lots and lots of \$\$\$.** It's one number that doesn't tell us anything fundamental.
- **Short baseline anomalies not compelling, it's ok to check provided it's cheap.**
- **Neutrinos obviously Dirac.** $0\nu\beta\beta$ will not see anything.
- **Proton decay pretty cool, but not much room for discovery.**
- **Big, expensive experiments don't serve many physicists.**

Precision physics

Precision physics is getting a bad rap.

- LEP/SLC measured Z parameters to death. What did we discover?
- Babar/Belle/Tevatron/LHCb measured the B system to death. What did we discover?
- Tevatron/LHC measured W mass, top mass, properties to death. What did we discover?
- **All of these radically improved our knowledge.**
- Now we want to measure the PMNS matrix to death. What will we discover?

comments

- **Snowmass moved the ball downfield.**
- **The community overall is on board with neutrino physics.**
- **They recognize it as a field that has produced many discoveries and a field that could reveal more surprises.**

- **Difference of opinion comes in when cost and timelines enter the equation.**

Suggestions from an outsider

- Don't take the physics case for granted. It maybe obvious to you, but it probably isn't obvious to your colleagues.
 - Don't be afraid of hypotheticals. It helps others get their head around potential scenarios.
 - Think of the SUSY “test points” for LHC
- International collaboration/consensus on the path forward will make a huge difference.
- Continue to be part of the process.
- When the plan emerges, get on board.
 - This message not limited to the neutrino community!