



U.S. DEPARTMENT OF  
**ENERGY**

Office of  
Science

# Intensity Frontier Strategic Planning

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# Thank You!

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- **The Workshop produced**
  - Serious scientific studies of the opportunities available at the Intensity Frontier
  - An impressive reference document
  - Much evidence of extensive community engagement
  
- **This is an absolutely essential first step**
- **Now, the hard part...**

# Next Steps

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- **Community needs to take “ownership” of the science**
  - Science First
  - Speaking with one voice
  - Well-informed
- **We are asking HEPAP for constructive engagement and informed opinions**
- **We are asking DPF to take the lead in ongoing development of the science case**
  - See Jim’s talk tomorrow



# Congressional Language – HEP

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## Intensity Frontier:

“...the United States has unique capabilities that should be exploited to develop a world-leading program of neutrino science...The **Committee directs the Office of Science to submit a report** not later than 180 days of enactment that lays out

- the expected **benefits** of intensity frontier science,
- a **strategy** for maintaining the U.S. lead, and
- the **funding needs** over the next 10 years, including construction activities, of implementing the proposed strategy.

## The Intensity Frontier workshop report:

- Answers the first element of this charge and part of the second
- Illuminates the important connections between the 3 Frontiers
- Discusses the international context and the role of a strong domestic program in that context

# Strategic Plan

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- **DOE with community input will develop a high-level Intensity Frontier strategic plan based on**
  - Workshop report
  - Budget projections
  - Programmatic and cross-cutting concerns (NP, NSF,...)
  - This is NOT a list of projects and priorities (yet) but instead a vision for the detailed scientific opportunities
- **Turning the strategic vision of the Workshop report into an executable plan with options**
- **One main challenge will be to take a diverse but connected set of science topics and develop a simple coherent story (a la Higgs)**
  - Matter-antimatter asymmetry is the big pole in the tent
  - However there are important “secondary” messages :
    - Developing a comprehensive understanding of the lepton sector
    - Discovering the undiscovered laws of nature



# Strategic Plan Sketch

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- **Long-term Science Goal:**
  - Explain the matter-antimatter asymmetry of the universe
- **Science Implementation:**
  - Understand lepton flavor violation
    - Develop a comprehensive understanding of neutrino mixing and basic neutrino properties
    - Searches for charged lepton flavor violation
  - Deepen understanding of the quarks
    - Minimal Flavor Violation may be telling us something important
    - Search for evidence of new (non-CKM) sources of CP Violation
  - Are there important missing pieces?
    - New particles and interactions, “hidden” sectors
- **Program implementation:**
  - Experiments and facilities that are buildable in the ~next decade to start addressing these questions...see next slide
  - Path forward for LBNE is the key question right now



# The Intensity Frontier Landscape

Currently Operating	Approved Projects (past CD-0)	Future Projects
MINOS	NOvA (+NuMI upgrade)	Proton Linac upgrades
Minerva	Mu2e	Muon g-2
MiniBooNE	MicroBooNE	
T2K		T2K upgrades
EXO-200		Large DBD Experiments (NP Lead)
Daya Bay		Sterile nu searches
	Belle-II	ORKA
	LBNE	
		Nucleon edm (NP lead)
		Next-generation hidden sector searches

## Notes:

- DOE projects only. Does not necessarily include NSF MRI or MREFC.
- Does not include “small” projects below \$2M TPC



# Next-to-Next Steps

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- **This is not The End**

- Typically developing/socializing/implementing such a vision is a multi-year process. Higgs was not built in a day.
- We will likely fine-tune the vision as physics and budget environments evolve
- We will continue to press for implementation of the currently envisioned Intensity Frontier program, e.g.: LBNE, Mu2e, g-2, MicroBooNE, Belle-II,...
- We will continue to work with the community to develop future initiatives

*“In dreams begin responsibilities”* – Delmore Schwartz

