

Intensity Frontier - Capability Frontier Connections



<http://www.snowmass2013.org/>

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Fermilab

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SNOWMASS WORKING GROUPS

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



Frontier Capabilities group charge

Charge: Frontier Facilities will assess the existing and proposed capabilities of two distinct classes of experimental capabilities for high energy physics broadly understood, namely, those provided by accelerator-based facilities and those provided by detector facilities distinct from accelerators. We expect the evaluations to be performed with two principal groups that will operate independently: Accelerator Facilities and Non-accelerator Facilities.

Conveners: William Barletta (MIT), Murdock Gilchriese (LBNL)

Goals of the Frontier Capabilities meeting at BNL April 2013

- The workshop was focused around five guiding questions:
- What are the particle physics anticipated needs and the requirements on secondary beams, i.e. neutrino, kaon, muon, neutron, etc?
 - Particles' energy
 - Particles' flux
 - Temporal and spatial characteristics
 - Purity / contamination constraints
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- What are the proton beam requirements to meet the above secondary beam requirements? Are there any overlaps?
- Can existing accelerator facilities accommodate proton beam requirements in Question 1?
- What new facilities or upgrades to existing facilities are needed to meet requirements in Question 1?
- What accelerator and target R&D is required for new facilities and for upgrades of existing facilities?

Conveners: J.Galambos (SNS), Sergei Nagaistsev (FNAL), M. Bai (BNL),
Intensity frontier liaison: R. Tschirhart (FNAL)
Kaon physics: L. Littenberg (BNL), S. Kettell (BNL)
Muon physics: B. Morse (BNL), B. Bernstein (FNAL)
Neutrino Physics: M. Bishai (BNL), B. Zwaska (FNAL), G. Karagiorgi (Columbia), K. Scholberg (Duke),
 J. Sptitz (MIT)
Neutron Physics: Y. Kamyshkov (U. Tenn.), A. Young (NCSU)
Proton EDM: Y. Semertzidis (BNL)
Muon Collider: M. Palmer (FNAL)
Polarized proton: A. Krisch (U. Mich., video)
International proton facilities: D. Findlay (ISIS), M. Seidel (PSI), T. Koseki (J-PARC),
 Y. Papaphilippou (CERN), S. Peggs (ESS), J. Tang (CSNS, video), R. Baartman (TRIUMF)
US proton facilities: R. Garnett (LANL), B. Weng (BNL), T. Roser (BNL), W. Fischer (BNL), D. Trbojevic (BNL),
 S. Holmes (FNAL), V. Lebedev (FNAL), I. Kourbanis (FNAL), B. Kephart (FNAL), N. Solyak (FNAL),
 M. Plum (SNS), J. Alonso (LBNL, video)
Target Experts: N. Simos (BNL), T. Gabriel (U.Tenn.), H. Kirk (BNL), K. McDonald (Princeton)
Machine Protection Expert: R. Schmidt (CERN)
HEP laboratory representatives: D. Li (LBNL), C. Adolphson (SLAC), J. Preble (J-Lab)

Conveners/liaison	4
Physics needs	14
Accelerator facilities, international	7
Accelerator facilities, US	12
System Experts	5
HEP lab representatives	3
Total	45

Comparative discussion of Project X

	v_{μ}	v_e	v_x	muons	kaons	neutrons	isotopes	...
Facility a	X			X				
Facility b		X				X		
Facility c				X	X			
Project X	X	X	X	X	X	X	X	X
Facility e						X	X	
Facility f							X	
...								

Project X in the draft report

Project X is a high intensity proton facility that will support a world-leading Intensity Frontier research program over the next several decades at Fermilab. When compared to other facilities in the planning stages elsewhere in the world Project X is completely unique in its ability to deliver, simultaneously, up to 6 MW of site-wide beam power to multiple experiments, at multiple energies, and with flexible beam formats. Project X will support a wide range of experiments based on neutrinos, muons, kaons, nucleons, and nuclei. In addition, Project X will lay the foundation for the long-term development of a Neutrino Factory and/or Muon Collider. A complete concept for Project X has been developed and is documented in the Project X Reference Design Report . The 2013 HEPAP Facilities Subpanel has assessed the science capabilities of Project X as “absolutely central” and the state of development as “ready for construction”.

The Snowmass “Tough Questions” tactic...is it effective?

Intensity Frontier Research Program Summary, Snowmass on the Pacific, May 29th 2013

- **Framework & Texture:** The U.S. Intensity Frontier has a proposed framework and texture to deliver the science: LBNE & Project-X and a texture of experiments. Given the projected funding environment the framework must be strong enough to stand the test of time.
- **Time:** Large projects in Particle Physics will develop and evolve over decades. We know how to do/survive this, and the Tevatron/LHC is the most recent example of a robust framework in our field.
- **Federation:** Improving communication and ties among the texture of Intensity Frontier experiments and the theory community will strengthen the research program. Again, our field has demonstrated this in the evolution of the Energy Frontier program.
- **Resources:** Intensity Frontier researchers must reach out broadly to the funding agencies to communicate how particle physics spans agencies, and where synergies and leverage can be found. DOE/HEP, NP, NSF/NP, NIST, BES, etc.