

# Non-Accelerator Capabilities

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October 11, 2012

# Current Scope

- The primary focus of the Non-accelerator Facilities working groups is expected to be on underground facilities.
- There will be two working groups on underground facilities.
- The formation of task forces on other topics related to non-accelerator facilities is under consideration.
  - These task forces would have a more limited scope than the working groups, and would be focused on particular topics of interest to the community.
  - One example of such a task force could be on the evolution of ground-based telescopes needed to support particle physics scientific goals.
  - Another could be reactor-based facilities for neutrino physics
- If areas other than underground facilities are addressed, it may be more natural in the context of other working groups e.g. Cosmic Frontier or Intensity Frontier. Would welcome feedback.

# Working Groups

- NAF1 – on underground facilities to support very large detectors for neutrino physics, proton decay and other science requiring detectors of the multi-kiloton scale.
  - NAF1 conveners: K. Heeger (Wisconsin), K. Scholberg (Duke), H. Sobel (Irvine)
- NAF2 – on underground facilities for dark matter experiments, neutrinoless double beta decay experiments, underground accelerators for nuclear astrophysics or other physics, low background assay of materials and related topics.
  - NAF2 conveners: P. Cushman (Minnesota), J. Klein (Pennsylvania), M. Witherell (Santa Barbara)

# Draft Charge

1. Assess the status and potential plans for underground facilities worldwide, with particular attention to the current and planned role of U.S. scientists;
2. Answer the following question in conjunction with the relevant Cosmic Frontier, Intensity Frontier and Instrumentation Frontier working groups – how will the existing or planned underground facilities meet the needs of US scientists and their scientific goals over the next 10 – 15 years?
3. Address future U.S. organizational aspects for underground facilities

# Connections

- These working groups are closely coordinated with working groups in the Intensity Frontier(IF) and Cosmic Frontier(CF) and liaisons between the NAF working groups have been established. Natural connections with the Instrumentation Frontier (underground space for detector development) also exist.
  - IF3 – K. Scholberg
  - CF1 – P. Cushman
- There are connections to ongoing studies by the nuclear science community. J. Klein is the principal liaison between the nuclear science community and the NAF working groups.
  - <http://cyclotron.tamu.edu/nsac-subcommittee-2012/>
  - <http://www.phy.ornl.gov/funsym/>
- We are also exploring potential overlap of underground science instrumentation needs with US and international nonproliferation goals. The US nonproliferation community is also considering underground deployments of kiloton scale and ultimately larger detectors, as a possible means for remote monitoring of the antineutrino signature from nuclear reactors. With an eye to possible synergies in planning and implementation, this topic describes the likely needs for such detectors, and the overlap in requirements with US underground science goals. This activity is being coordinated by A. Bernstein (LLNL).

# Information Gathering

- Started to gather information on status and plans from all underground facilities – see table.
- There have been many, many studies of the scientific goals and needs for underground facilities, including recent National Academy studies
  - Committee to Assess the Deep Underground Science and Engineering Laboratory (DUSEL) [http://sites.nationalacademies.org/BPA/BPA\\_058955](http://sites.nationalacademies.org/BPA/BPA_058955)
  - NP 2010: An Assessment and Outlook for Nuclear Physics [http://sites.nationalacademies.org/BPA/BPA\\_055628](http://sites.nationalacademies.org/BPA/BPA_055628)
- From U.S. perspective, recent developments
  - $\theta_{13}$  measurement
  - LBNE reconfiguration, potentially phased approach to underground detector
  - Potentially large response for “G2” direct dark matter experiments

	Facility Location	Convener Contact(s)	
United States			
	Kimbalton	Klein	
	Soudan	Cushman	
	SURF	Gilchriese	
	Washington	Sobel	
	WIPP	Sobel	
Canada			
	Snolab	Klein	
Europe			
	Boulby	Klein	
	Canfranc	Sobel	
	Gran Sasso	Scholberg	Witherell
	Modane	Cushman	
	Pyhasalmi	Scholberg	
Russia			
	Baksan	Sobel	
Japan			
	Kamioka/other	Scholberg	Sobel
China			
	Jinping	Heeger	
	Daya Bay/ II	Heeger	
Korea			
	Y2L	Gilchriese	
	RENO/ II	Heeger	
India			
	INO	Scholberg	
South America			
	ANDES	Scholberg	
Antarctica			
	IceCube (+ extensions)	Heeger	

# Planning

- Underground facility needs for instrumentation development will be addressed at the Instrumentation Frontier and CPAD meeting at ANL January 9 – 11, 2013.
- The NAF working groups will meet at a coordinated meeting of the Deep Underground Research Association (DURA) and the Cosmic Frontier working groups at SLAC March 5 – 8, 2013. The Assay and Acquisition of Radiopure Materials (AARM) collaboration is anticipated to also participate in this coordinated event.
- We anticipate meeting with the relevant Intensity Frontier working groups prior to Snowmass 2013 at a date and time to be decided. May 2013?
- The working group will compile information on the status and plans of existing and future underground facilities. The working group, in collaboration with other Frontiers and interested members, will write a ~ 30 page summary addressing the charge elements and activities of the working group.