

News from NSF: A DUSEL Update

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Community Planning Activities

Bahcall report (2001): NSF-DOE sponsored ad hoc committee of scientists strongly recommended that Homestake Mine be converted to a national underground laboratory.

NSAC Long-Range Plan (2002): Strongly supported development of an underground laboratory to enable some aspects of nuclear research, e.g., double beta decay.

NESS 2002: An NSF sponsored conference on Underground Science showcases the wide variety of science that would be enabled with an underground laboratory.

Connecting Quarks to the Cosmos (2003): Known as Turner Report, NRC panel recommended development of an underground laboratory to enable a number of fundamental science experiments

HEPAP Long-Range Plan (2003): Supported development of an underground laboratory to enable some aspects of high energy research, e.g., long baseline neutrino detector and proton decay

Neutrinos and Beyond (2003): Known as Barish Report, NRC report reviewed neutrino physics in a international framework and pointed to need for depth and size of DUSEL.

EarthLab 2003: An NSF sponsored report of the GeoSciences and GeoEngineering opportunities that would be enabled by an underground laboratory.

Physics of the Universe—A Strategic Plan for Federal Research at the Intersection of Physics and Astronomy (NSTC) 2004: Strongly supported development of an underground laboratory for S&E

The Neutrino Matrix (Four APS Divisions) 2004: The need for suitable underground facilities to support major questions in neutrino physics stressed.

Quantum Universe—The Revolution in 21st Century Particle Physics, 2004: Report identifies key science drivers and indicates need for underground facilities to address key questions

A lot more activity in 2005-6: NuSAG, DarkMatterSAG, EPP2010, P5, nat. and internat. mtngs.

Science, Engineering, and Education Drivers—Part 1

- Physics, Astrophysics

- What is Dark Matter?
- Are neutrinos their own antiparticle, how much do they weigh, and what are their fundamental properties?
- How do stars burn? How were the elements formed?
- What are the processes taking place during supernovae?
- Are all the fundamental forces unified at sufficiently high energy (e.g., during the Big Bang)?
- Is ordinary matter stable?

Features of Note

- World-leading facility enabling broad program of frontier research through generations of technical and scientific advances
- Importance documented in over a dozen studies by distinguished bodies (NRC, APS, HEPAP, NSAC)
- Very "NSF'ish," i.e., transformational impact on multiple disciplines, great education/outreach potential, unique vision in government
- Investment in R&D of approximately \$6M planned for DUSEL and DUSEL-related experiments in FY 2007
- Interagency coordination & prioritization through NSTC working group on physics of universe
- For particle physics, DUSEL introduces diversity into the portfolio, complementing ILC

Schedule of Main Events

- June 2006: Conceptual Design Reports submitted by Henderson and Homestake teams
- Sept. 2006: Solicitation issued for proposals to develop "preliminary" design of a DUSEL, including initial suite of experiments
- December 2006: Deadline for proposals
- April 2007: Award to design DUSEL at selected site
- October 2007: Deadline for DUSEL Cost/Schedule/Scope/Management Baseline Plan
- December 2007: NSF Baseline Review
- March 2008: DUSEL package ready for consideration by MREFC panel

Early Cost Information

- Conceptual Design Reports give rough estimate of construction costs with <50% for infrastructure and >50% to experiments
- Basic Underground Infrastructure
 - Subsurface construction of underground stopes (rooms) and drifts (tunnels) and utilities for experiments
 - Surface laboratory/office and outreach center
 - Underground clean room facilities
 - Ultra-pure materials stock and fab facility underground
 - Emphasis on safety systems
- Initial Suite of Experiments
 - Dark matter detector & Neutrino mass experiment
 - Geosciences and Biosciences experiments
 - Engineering: rock mechanics, tunneling, large excavations
- Significant long-term discovery potential
- Most DUSEL physics experiments also in DOE 20 yr plan