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DUSEL Workshop Washington DC 11/2-4

Yesterday
This week end

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Description of the great opportunities of Deep Underground Science and Engineering

History Joe Dehmer
Hitoshi Murayama: Physics/Astrophysics Education?Outreach
Tullis Onstott: Earth Sciences/Biology/Engineering

International aspects: Art MacDonald

We need more space at depth
We need space for Geo,Enginering and Bio

S1 recommendations Hamish Robertson

Interests of agencies NSF (MPS,GEO,EMG) DOE (HEP,NP,BES)

Homestake

Selection process and what next?

Partnership

Senator Thune — Representative of Senator Johnson
Congresswoman Herseth-Sandlin — **Governor Rounds** (SUSEL $70+$46M)

The S3 Design process

Kevin Lesko, R. Di Gennaro, Jose Alonso

Scientific Findings

- **Deep underground science is an essential component of research at the frontier.** Underground experiments are critical to addressing some of the most compelling problems of modern science and engineering; and long-term access to dedicated deep underground facilities is essential.

- **Disciplines in transformation.** Deep underground experiments have for some time constituted an important component of physics and astrophysics. Biologists, earth scientists and engineers have long made observations underground and have in recent years also recognized the extraordinary potential of deep long-term underground experiments.

- **Benefits to Society.** Investment in deep underground experiments can yield important societal benefits. Underground construction, resource extraction, management of water resources, environmental stewardship, mine safety and national security are prominent examples. By creating a unique multidisciplinary environment for scientific discovery and technological development, a deep underground laboratory will inspire and educate the nation's next generation of scientists and engineers.

Programatic Findings

- **Worldwide need for underground space.** The rising interest in deep underground science; the diversification of underground disciplines; the increase in the number of underground researchers; and the increased size, complexity and duration of experiments all point to a rapidly rising demand for underground laboratory space worldwide. The opening of numerous facilities outside the U.S. attests to the gap between supply and demand, especially at very great depth.

- **Need for a U.S. world-class deep multidisciplinary facility.** The U.S. is among the very few developed countries without a deep underground facility (≥ 3000 m.w.e). In an international environment where deep underground space is at a premium, a U.S. Deep Underground Science and Engineering Laboratory would provide critical discovery opportunities to U.S. and foreign scientists, place the U.S. in a stronger strategic position in deep underground science, and maximize the benefits of underground research to the nation.

3 RECOMMENDATIONS:

• **Strong support for deep underground science.** The past decade has witnessed dramatic scientific returns from investments in physics and microbiology at great depths. Underground research is emerging as a unique and irreplaceable component of science, not only in physics and astrophysics, but also in biology, earth sciences and many disciplines of engineering. We recommend that the U.S. strengthen its research programs in subsurface sciences to become a world leader in the multidisciplinary exploration of this important new frontier.

RECOMMENDATION 2

• **A cross-agency Deep Science Initiative.** In order to broaden underground research and maximize its scientific impact, we recommend that the U.S. science agencies collaborate to launch a multidisciplinary Deep Science Initiative. This initiative would allow the nation to focus the whole range of underground expertise on the most important scientific problems. It would aim at optimizing the use of existing or new underground facilities and at exploiting the complementary aspects of a variety of rock formations. The Deep Science Initiative should be coordinated with other national initiatives and take full advantage of international collaboration opportunities.

RECOMMENDATION 3

• **A Deep Underground Science and Engineering Laboratory.** The U.S. should complement the nation's existing assets with a flagship world-class underground laboratory providing access to very great depth (approximately 2200 meters, or 6000 meters water equivalent) and ample facilities at intermediate depths (approximately 1100 meters or 3000 meters water equivalent) currently not available in the U.S. Such a Deep Underground Science and Engineering Laboratory (DUSEL) should be designed to allow evolution and expansion over the next 30 to 50 years. Because of this long lifetime, the initial investment must be balanced with the operating costs. For maximum impact, the construction of DUSEL should begin as soon as possible.

Other Committees

Numerous committees in last 7 years

P5 (HEPAP) Abe Seiden:

P5 in 2006 constructed a Roadmap for Particle Physics, which included priorities for various projects.

DUSEL was in our second priority group, after the ILC.

We were particularly pleased with the strategy of having approximately 1/2 of the initial funding being allocated to the first round of experiments, which includedabsolutely first rate science.

This included the search to directly detect dark matter scattering on materials and the search for neutrino-less double beta decay.

We reviewed the progress of DUSEL in September 2007 and were delighted to see that a potential location for the lab has been chosen and that the lab is receiving strong local support.

We reaffirm the importance of the science program which motivates DUSEL and which is making excellent progress in parallel.