

News from NSF

**Joe Dehmer
Division of Physics
MPS/NSF**

HEPAP

November 29, 2007

Some Recent Happenings

- At SC 07, Open Science Grid achieved milestone of >80 Gbps data flow
- Physics Frontiers Centers competition reviewed 58 preproposals, inviting 19
- DUSEL town meeting in DC involves community in discussions of initial suite
- NSF and DOE partner to enable CESR TA to perform critical path R&D for the ILC
- US and other regions participate in ASPERA
- Noticeable blossoming of POU-style physics

Observations

- Opportunities for fundamental, transformative discoveries in particle physics have never been more numerous or compelling.
- While the energy-frontier collider remains the tool of choice, additional approaches for major discovery have become indispensable portals of discovery.
- The resources and time required for frontier facilities call for unprecedented preparation and planning horizon.
- A vigorous, world-class, globally-engaged particle physics community is important for science and society.

Future Major Facilities – Present Coordinated Approach

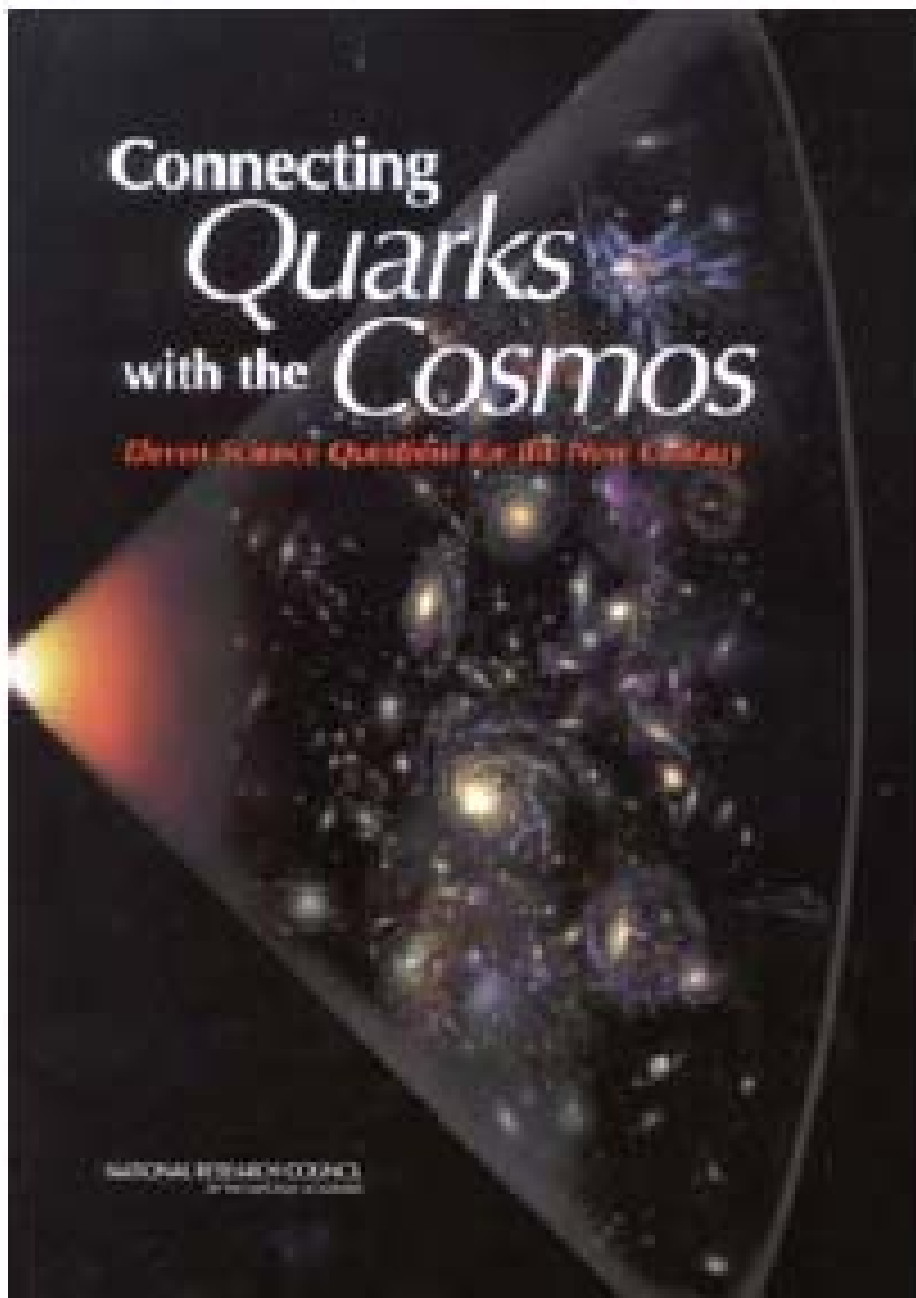
ILC	DOE/HEP lead	PHY supporting role
DUSEL	PHY lead	DOE/HEP and DOE/NP supporting role
RIBF	DOE/NP lead	PHY supporting role

Wanted: Strategy For Sustained, World-Class Program Of Discovery Well Into The 21st Century

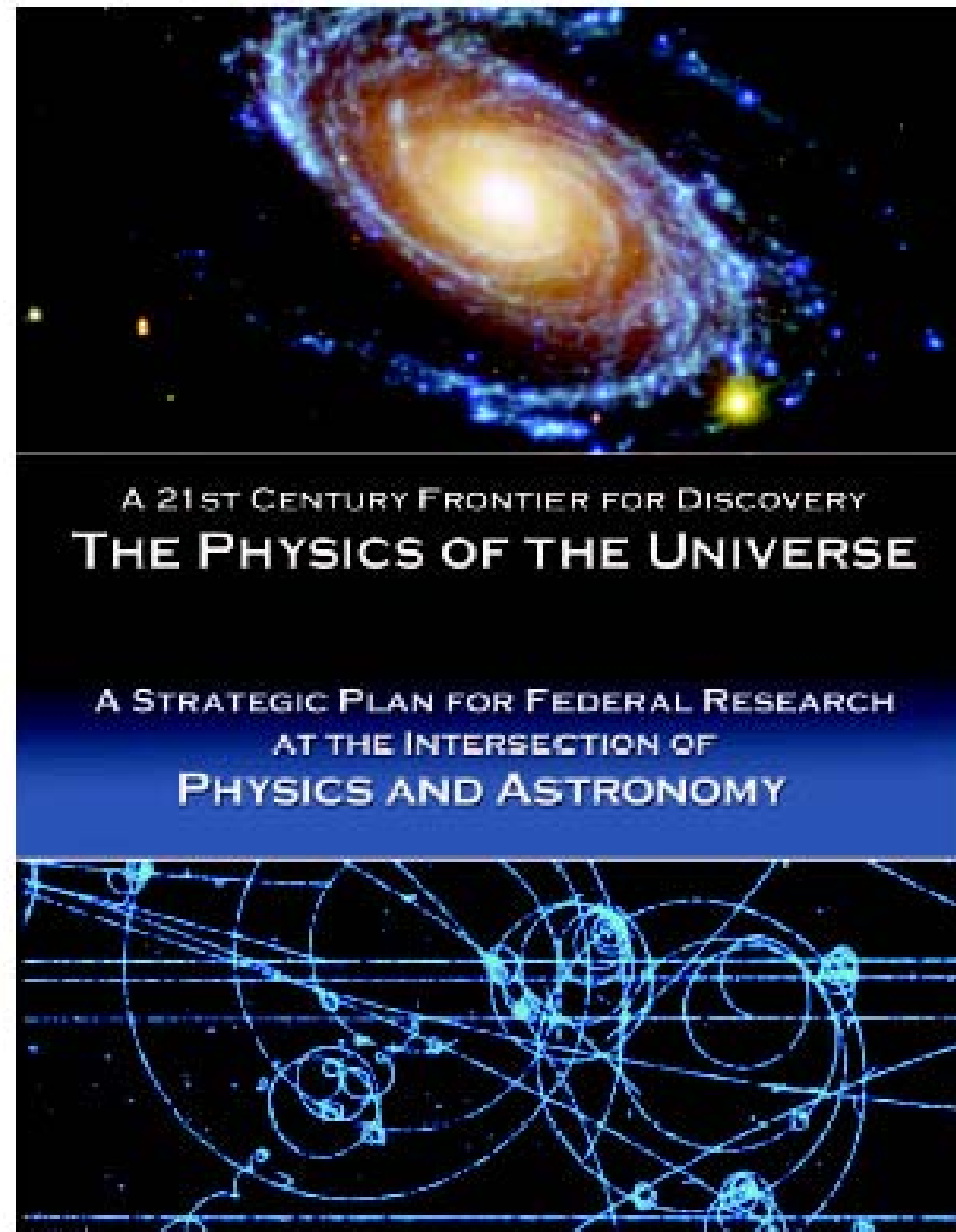
- Short term – Complete programs at FNAL, BaBar, CESR; begin LHC exploration of TeV scale; complete plans for neutrino, astrophysics/cosmology, rare processes program; R&D on all promising energy-frontier accelerator concepts; strengthen university program & theory
- **Intermediate term – Collaborate in discovery phase of LHC; exploit discovery potential of neutrino, POU, rare process approaches; prioritize/select best-value lepton & hadron accelerator concepts; strengthen university program & theory**
- Long term – Prepare to host the next energy-frontier collider, from the platform of a broad, vigorous, world-class program

Probing Terascale to Planck

- **Tevatron**
- **International Linear Collider**
- **Large Hadron Collider**
- **CLIC**
- **Muon Collider**
- **VLHC**
- **Rare Processes, e.g., MECO, KOPIO, NNbar...**
- **IceCube**
- **Auger**
- **Proton Decay**



www.nap.edu



http://www.ostp.gov/nstc/html/NSTC_Home.html

Astroparticle Physics Projects

- **Gravitational Waves: LIGO/AdvLIGO** (GEO, VIRGO, TAMA, 11 countries)
- **Cosmological Neutrinos: IceCube** (Germany, Sweden, Belgium,)
- **Underground Science: DUSEL**
- **Dark Matter: CDMS, XENON, WARP, ZEPLIN, DRIFT, COUPP** (DOE, INFN, PPARC, Germany, Poland)
- **Cosmic Rays: AUGER, HiRes, TA, Veritas, Milagro** (DOE, Japan, Korea, Canada, Ireland, Smithsonian, 17 more countries)
- **Neutrinos: Borexino, Double Chooz, CUORE** (DOE, INFN, France, Germany, Brazil, Japan, Russia, Spain, UK)
- **Structure of the Universe: ACT, SPT**
- **B-Mode Polarization of CMB: QUIET**
- **Origin of the Elements: NSCL** (DOE)

DUSEL Deep Underground Science and Engineering Laboratory at Homestake, SD

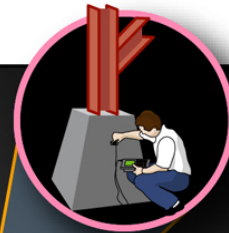
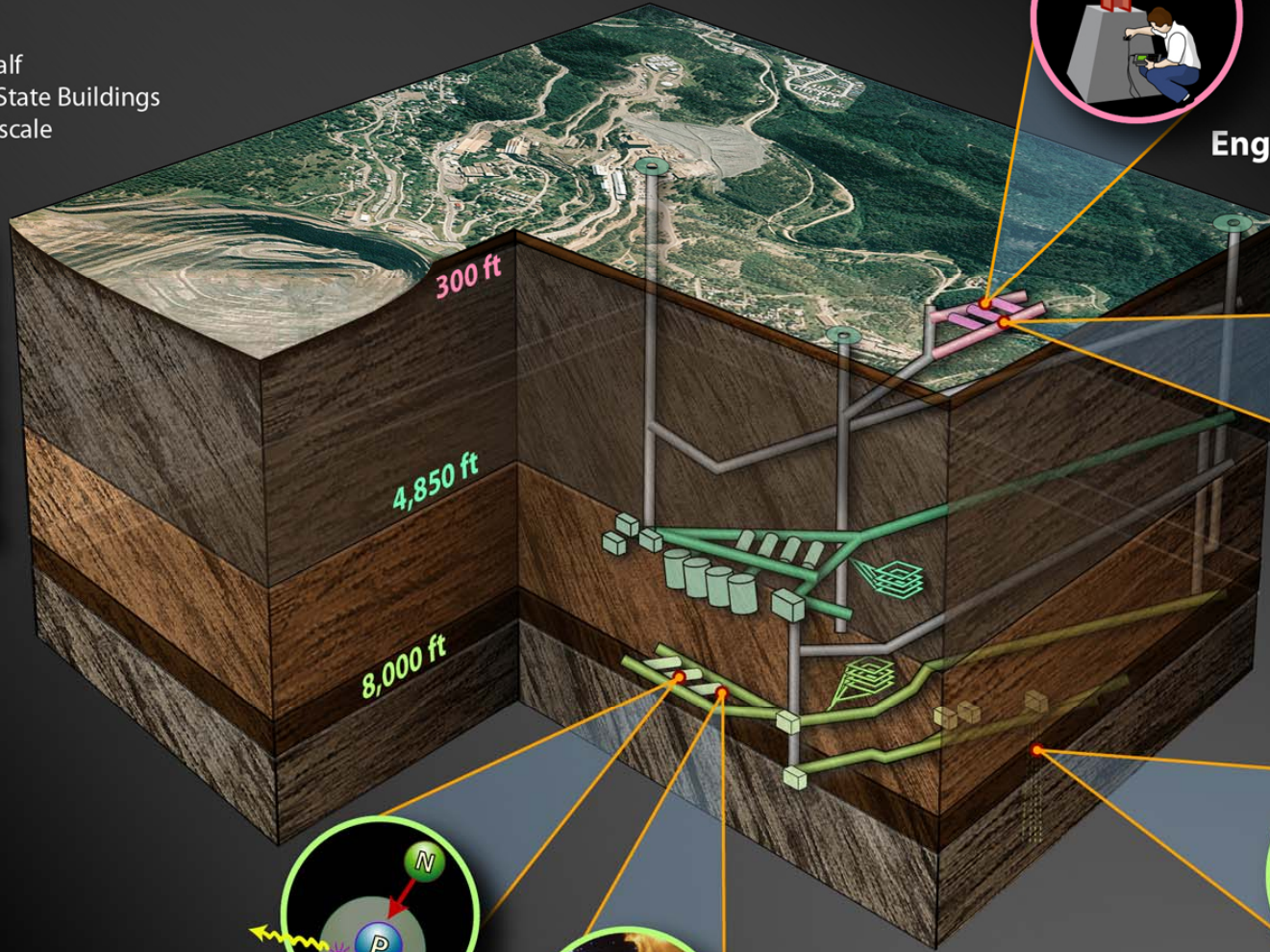


Six and a half Empire State Buildings for scale

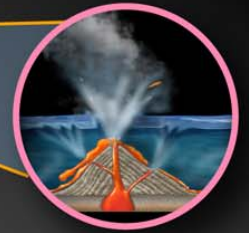
Shallow Lab

Mid-level

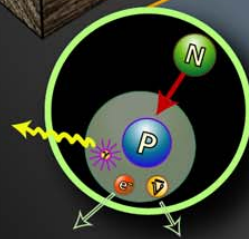
Deep Campus



Engineering



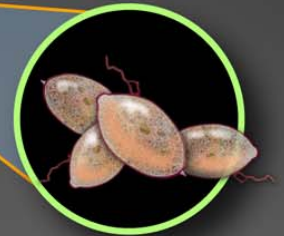
Geoscience



Physics

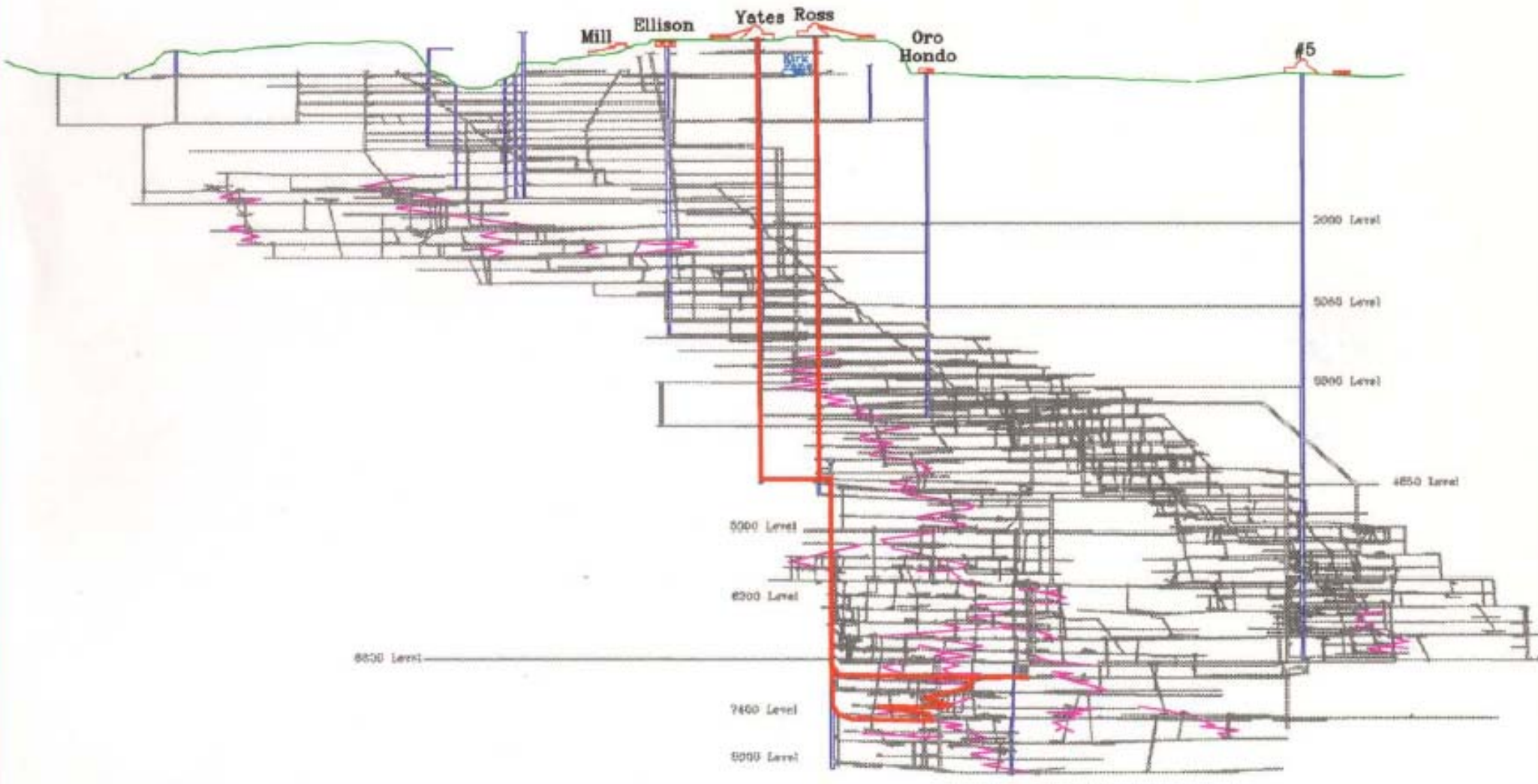


Astrophysics



Biology





- Shafts / Winzes —
- Main Ramps —
- NSF Tour Route —



HOMESTAKE GOLD MINE		Homestake Mine	
LONGITUDE VIEW		Looking East	
DATE:	BY:	DWG. NO.:	
SCALE:	BY:		
REVISION:	DATE:		

NSF/Community Process

- Town Meeting at NSF, March 2004
- Solicitation (S1): define site-independent science scope and infrastructure needs; unify the community (awarded in Dec 2004)
- Solicitation (S2): develop conceptual designs for 1 or more sites (2 awarded July 2005)
- Solicitation (S3): full technical design for an MREFC candidate (1 awarded - Homestake)
- Town Meeting at NSF, November 2007
- Solicitation (S4): technical design of initial suite

DUSEL FAQs

- **NSF POC**
- **Community Involvement/Science Case**
- **Interdisciplinary Scope**
- **MREFC Status**
- **Timeframe**
- **TPC**
- **Initial Suite (S4)**
- **R&D Support from NSF & DOE**
- **DOE and International Partnerships**
- **Interim Use of State-Private Operation (SUSEL)**

Community Planning Activities

- **Bahcall report (2001)**
- **NSAC Long-Range Plan (2002)**
- **NESS 2002**
- **Connecting Quarks to the Cosmos (NRC, 2003)**
- **HEPAP Long-Range Plan (2003)**
- **Neutrinos and Beyond (NRC, 2003)**
- **EarthLab (2003)**
- **DOE 20-yr. Facility Plan**
- **Physics of the Universe—A Strategic Plan for Federal Research at the Intersection of Physics and Astronomy (NSTC) 2004**
- **The Neutrino Matrix (Four APS Divisions) 2004**
- **Quantum Universe—The Revolution in 21st Century Particle Physics, HEPAP, 2004**
- **A lot more activity in 2005-7: NuSAG, DarkMatterSAG, P5, EPP2010, DEEP SCIENCE, workshops.**

