DUSEL Initial Suite of Experiments (ISE)[1]	Experimental Cavity Size (m^2)[2a]	Required U/G Support Space (m^2)[2b]	Minimum Depth (mwe)[3]	Approximate Construction Start Date for "Generations" or Experiments[4]	Approximate Experiment Capital Cost[5] (Preliminary)	Notes on Cost Estimates	Assumed Funding Agency and Division	Notes on Cavity Dimension Estimate	Notes on Depth Requirements
Dark Matter (WIMPS)									
Generation 0 (PreDUSEL) Sensitivity 10^-44 - 10^-45									
Noble Liquid (2 phase)	100	250	4100	LUX 300 proposal for Sanford Lab (2008) (Xe)	$3,000k	LUX 300 proposal	NSF PHY/DOE HEP	based on LUX 300 engineering layout at Sanford	LUX Proposal
Low Temperature Solid State	100	250	2000	CDMS Experiment in Soudan (running) (Ge + Si)	$10,000k	CDMS actuals	NSF ASTRO + PHY/DOE HEP	based on Soudan	
Low Temperature Solid State	100	250	4100	SuperCDMS Proposal to SNOLab (2009) (Ge + Si)	$16,000k	SuperCDMS (25 kg)	NSF PHY/DOE HEP	based SuperCDMS proposal	CDMS Proposal
Noble Liquid (1 phase)	*N/A*	N/A	N/A	miniClean Proposal to SNOLab (2008) (Ar)					
Noble Liquid (2 phase)	*N/A*	N/A	N/A	WARP Experiment to Gran Sasso (running) (Ar)					
Noble Liquid (2 phase)	*N/A*	N/A	N/A	Xenon10 Experiment to Gran Sasso (completed) (Xe)					
Noble Liquid (2 phase)	*N/A*	N/A	N/A	Xenon100 Proposal to Gran Sasso (2008) (Xe)					
Generation 1 (DUSEL ISE) Sensitivity 10^-45 - 10^-46				~ 2011 - 2013					
Technology 1 TBD	100	250	4100	detector construction to commence earlier on the surface	$10,000k	based on a ~3000kg noble liquid using nucleus one	NSF PHY/DOE HEP	based on LUX 300 engineering layout at Sanford Lab	LUX 300 Proposal
Technology 2 TBD	100	250	4100	detector construction to commence earlier on the surface	$10,000k	based on a ~3000kg noble liquid alternative nucleus to emphasize spin independent/spin-dependent cross sections	NSF PHY/DOE HEP	based on LUX 300 engineering layout at Sanford Lab	LUX 300 Proposal
Generation 2 (DUSEL ISE) Sensitivity 10^-46 - 10^-47				~ 2015					
Technology 1 TBD	200	500	6400	detector construction to commence earlier on the surface	$35,000k	LUX 10000, costs could be reduced if Xe is resold	NSF PHY/DOE HEP	scaled from LUX 300	LUX 300 + CDMS proposals
Technology 2 TBD	200	500	6400	detector construction to commence earlier on the surface	$50,000k	Could be 2 phase Ar, (scaled from Xe proposal) or solid state when ZIP detectors are industrialized	NSF PHY/DOE HEP		

DUSEL Initial Suite of Experiments (ISE)[1]	**Experimental Cavity Size (m^2)**[2a]	**Required U/G Support Space (m^2)**[2b]	**Minimum Depth (mwe)**[3]	**Approximate Construction Start Date for "Generations" or Experiments**[4]	**Approximate Experiment Capital Cost**[5] **(Preliminary)**	**Notes on Cost Estimates**	**Assumed Funding Agency and Division**	**Notes on Cavity Dimension Estimate**	**Notes on Depth Requirements**
Neutrinoless Double Beta Decay									
Generation 0 (PreDUSEL) Degenerate Mass Scale Sensitivity									
Solid State (Ge)	100	200	4100	R&D for demonstator prior to MREFC at Sanford Lab (2009)	$20,000k	Majorana (MJ) proposal	DOE NP	based on Majorana engineering layout	Majorana Proposal
Noble Liquid (Xe)	150	200	2000	EXO200 running at WIPP	$12,000k	Actual costs for EXO200	DOE HEP, DOE EM, Foreign and Private	Actual from EXO200	EXO Proposal
Bolometric (Te European)	N/A	N/A	3200	Cuoricino running, Cuore being built at Gran Sasso (2010)					
Generation 1 (DUSEL ISE) Atmospheric Mass Scale Sensitivity				~ 2015					
Solid State (Ge)	250	500	6400		$108,000k	scaled from MJ500 kg proposal, assuming European contribution of $72M, based on actual Ge arrays (e.g. GRETINA), estimates include full EDIA	NSF PHY/DOE NP / International Contributions	based on 500 kg Majorana engineering layout	Majorana 500 kg proposal
Noble Liquid/Gas (Xe)	500	200	6400		$40,000k	scaled from EXO200, estimates, M&S only, have not demonstrated ion daughter identification, International Contributions may reduce this total	DOE HEP/ NSF PHY / International Contributions	scaled from EXO200	Will make final determination based on EXO200 running, 6400 is thought to be adequate
Long Baseline Neutrinos and Nucleon Decay									
Large Cavity R&D (~ 100kt first cavity)	2400	250	4100					assuming 55m dia cavity	hep-ex/0608023
Site Investigations, coring, geotech work				~ 2008 - 2009	$2,000k				
Continued geotech work, and Initial mobilization, instrumentation, access drifts 1-time equipment costs				~ 2011	$25,000k	Estimate includes geotechnical site investigations including coring and creation of access drifts for subsequent development	NSF ENG/NSF PHY		
Excavation ~ 55m cavity				~ 2012	$50,000k	Unreviewed Mine Engineering Estimate	NSF ENG/NSF PHY		
Instrumentation				~ 2015 (PMT production to start earlier)	$100,000k	PMT cost dominated, budgetary estimates in hand, mounting and read-out based on SNO and similar expts	NSF PHY/DOE HEP		
1 Ton Liquid Argon Module at 300 Level	500	200	230	~2013	$10,000k	Rough Estimate	NSF PHY/DOE HEP		
Nuclear Astrophysics									
Low Energy Accelerator	800	200	4100	~ 2013	$20,000k	detail pre CDR estimates from Berkeley LDRD and town meeting white paper	DOE NP/NSF PHY	50m long x 20 m wide, town meeting discussions	LUNA facility ALNA White Paper
Heavy Ion Medium Energy Accelerator				~ 2015		R&D required			workshops and Town Meetings (2003, 2006, 2007)
Geoneutrino (multipurpose)									
1 kt liquid Scintillator Detector	250	250	4100	~ 2015	$30,000k	LDRD funded effort at Berkeley	NSF PHY/DOE NP	scaled from KamLAND	LBNL LDRD study

DUSEL Initial Suite of Experiments (ISE)[1]	Experimental Cavity Size (m^2)[2a]	Required U/G Support Space (m^2)[2b]	Minimum Depth (mwe)[3]	Approximate Construction Start Date for "Generations" or Experiments[4]	Approximate Experiment Capital Cost[5] (Preliminary)	Notes on Cost Estimates	Assumed Funding Agency and Division	Notes on Cavity Dimension Estimate	Notes on Depth Requirements
Low Energy Solar Neutrinos									
Generation 0 (PreDUSEL) (7Be, CNO?, pep?)									
Borexino	1000		3700	Borexino running at Gran Sasso	$50,000k				
KamLAND	300	200	2000	Kamland Solar being developed in Kamioka					
miniLENS	100	100	4100	miniLENS stage II proposal for Sanford Lab (2009)	$3,000k	miniLENS proposal assuming u/g space provided by Sanford, and DUSEL R&D, $2M DUSEL R&D and $1M Sanford Lab Shielded environment	NSF PHY/DOE NP	obtained from engineering drawings	1500 MWE minimum depth, adapted to match Sanford 4850 L
Generation 1 (DUSEL) (pep, pp)									
Charged Current (CC)	250	200	4100	~ 2013	$30,000k	LENS proposal online	NSF PHY/DOE NP	assuming 125 T detector	2000 MWE minimum depth LENS LOI to Homestake
1 kt liquid Scintillator Detector (ES)	250	250	4100	~ 2015		see geoneutrino, above		same detector as geoneutrino	LBNL LDRD study
3000kg Noble Gas (ES)	500	200	6400	~ 2015		see DM 3000kg proposal	NSF PHY/DOE NP	scaled from DM	
Characterization of Low Vibration Studies for Future Gravity Wave Experiments									
Low vibration and microseismic studies	20000		1690	~ 2013	TBD		NSF PHY	two 1 km drifts x 10 m wide	Level of convenience
GeoBiology									
Biology Observatory	50	200	6400	~ 2014	$2,000k	Rough Estimate	NSF BIO	rough estimate	
Pristine Fracture Zone		300	6400	~ 2016	$3,000k	Rough Estimate	NSF BIO	mostly support space access	
Intermediate Bio/Geo Drilling	50	300	4100	~ 2011	$15,000k	includes core	NSF BIO	scaled from existing drill room	Assay of life in conditions at intermediate levels
Deep Bio/Geo Drilling	50	300	7000	~ 2015	$15,000k	includes core	NSF BIO	existing drill room	Probe life to 16,000 feet from deepest available level
Deep Engineering and Excavation Research Facility									
Cavity Engineering	200	100	4100	~ 2011	$12,000k	Auxilliary work to that for large detector.	NSF-ENG		Cavity construction research at intermediate rock stress, temperatures
Excavation Research (TBM)	400	200				Not including TBM.	NSF-ENG		
Excavation Research (Drilling)	200	100				Not including drilling rig.	NSF-ENG		
Cavity Engineering	200	100	6400	~ 2016	$12,000k	Auxilliary work to that for large detector.	NSF-ENG		Cavity construction research at high rock stress, temperatures
Excavation Research (TBM)	400	200				Not including TBM.	NSF-ENG		
Excavation Research (Drilling)	200	100				Not including drilling rig.	NSF-ENG		

DUSEL Initial Suite of Experiments (ISE)[1]	Experimental Cavity Size (m^2)[2a]	Required U/G Support Space (m^2)[2b]	Minimum Depth (mwe)[3]	Approximate Construction Start Date for "Generations" or Experiments[4]	Approximate Experiment Capital Cost[5] (Preliminary)	Notes on Cost Estimates	Assumed Funding Agency and Division	Notes on Cavity Dimension Estimate	Notes on Depth Requirements
Scale Effects Experiment									
Run-of-Mine Fracture Characterization	50	50					NSF-ENG/GEO		
State-of-Stress and Deformation Research	50	50	4100	~ 2011	$7,500k	Rough Estimate	NSF-ENG/GEO	Staging areas for expts.	Fracture research at intermediate conditions (temp, water flow, stress, etc.)
Multiphase Fluid Flow Research	50	50					NSF-ENG/GEO		
Run-of-Mine Fracture Characterization	50	50					NSF-ENG/GEO		
State-of-Stress and Deformation Research	50	50	6400	~ 2016	$7,500k	Rough Estimate	NSF-ENG/GEO	Staging areas for expts.	Fracture research at extreme conditions (temp, water flow, stress, etc.)
Multiphase Fluid Flow Research	50	50					NSF-ENG/GEO		
Seismic Array - surface	1000		100	~ 2008	$500k	funded proposal	NSF ENG	2 km x 5 m	
Seismic Array - 3800	1000	10	3200	~ 2009	$500k	scaled from funded proposal	NSF ENG	2 km drift x 5 m	Deep seismic array to monitor facility activity in 3D
Active Processes Laboratory									
Transparent Earth (Shallow)		200					NSF-ENG/GEO		
Transparent Earth (Deep)	200	100					NSF-ENG/GEO		
THMBC (Chemical Migration)	200	100	4100	~ 2011	$22,000k	Single large facility 25mx25mx25m with 3 drifts per side for access (1200 ft) and 250 m^2 staging.	DOE-BES	Single large facility 25mx25mx25m with 3 drifts per side for access (1200 ft) and 250 m^2 staging.	Coupled processes research at intermediate depths (temp, water flow, rock stress, etc.)
THMCB (Multiphase Migration)	200	100					DOE-BES		
Fracture Processes Facility	1000	200					NSF-ENG/GEO		
Transparent Earth (Deep)	200	100					NSF-ENG/GEO		
THMBC (Chemical Migration)	200	100	6400	~ 2016	$20,000k	Single large facility 25mx25mx25m with 3 drifts per side for access (1200 ft) and 250 m^2 staging.	DOE-BES	Single large facility 25mx25mx25m with 3 drifts per side for access (1200 ft) and 250 m^2 staging.	Coupled processes research at extreme conditions (temp, water flow, rock stress, etc.)
THMCB (Multiphase Migration)	200	100					DOE-BES		
Fracture Processes Facility	1000	200					NSF-ENG/GEO		
CO2 Sequestration and Flow	bore holes		Various	~ 2011	$2,500k	Berkeley LDRD assessing this experimental program (2005-8)	DOE BES	makes use of sand lines and existing bore holes	Must go sufficiently deep to maintain super-critical CO_2.
Low Background Counting									
Prescreening array, ICPMS & NAA Assay Facility	50	100	230	~ 2011	$3,000k	prescreening and ICPMS	DOE NP/ NSF PHYT/ EPSCoR	includes prescreening facility and ICPMS NAA assay	Remove hadronic component of cosmic rays, provide ready access
Gamma, Beta, Alpha, Whole Body Assays and Radon Emanation Measurements	200	100	4100	~ 2011	$3,000k	(assuming $3M is funded by existing EPSCoR proposal)	DOE NP/ NSF PHY/ EPSCoR	based on engineering layout for University of South Dakota EPSCoR Proposal	S1 and Town Meeting studies, experimental proposals
Materials Storage									
	150		230	~ 2013	$200k	Rough Estimate	DOE NP / NSF PHY	Rough Estimate	
	150		4100	~ 2011	$200k	Rough Estimate	DOE NP / NSF PHY	Rough Estimate	Reduce cosmogenic activity to required levels via shielding at various depths
	150		6400	~ 2013	$200k	Rough Estimate	DOE NP / NSF PHY	Rough Estimate	
Ultralow Background Materials Processing									
Copper Facilities including Ultraclean Machine Shop	350	150	4100	~ 2011	$2,000k	Cu baths and raw materials, from Majorana proposal	DOE NP / NSF PHY	from engineering layout of Cu facility for Majorana	Remove hadronic component of cosmic rays, provide ready access

DUSEL Initial Suite of Experiments (ISE)[1]	Experimental Cavity Size (m^2)[2a]	Required U/G Support Space (m^2)[2b]	Minimum Depth (mwe)[3]	Approximate Construction Start Date for "Generations" or Experiments[4]	Approximate Experiment Capital Cost[5] (Preliminary)	Notes on Cost Estimates	Assumed Funding Agency and Division	Notes on Cavity Dimension Estimate	Notes on Depth Requirements
Education and Outreach									
Shallow Lab	250	100	230	~ 2013				Rough Estimate	matched to 300 Level Infrastructure
Intermediate Depth Lab	100	100	4100	~ 2013				Rough Estimate	matched to 4850 Level Infrastructure
Prototyping and R&D									
	500	500	230	~ 2013				Rough Estimate	Matched to available space, infrastructure
	250	500	4100	~ 2015				Rough Estimate	
	250	500	6400	~ 2017				Rough Estimate	

[1] DUSEL road maps and experimental program plans were outlined in the Homestake Conceptual Design Report (CDR), and in white papers drafted by the community at the November 2007 Town Meeting. Community planning activities, reports and workshop presentations may be found at the web site *www.dusel.org* . List contains the current superset of potential DUSEL experiments, from which the initial suite will likely be chosen.

[2a,b] Cavity size estimates space needed to accommodate experimental instrumentation; support space estimates footprint required to accommodate associated infrastructure.

[3] Depth requirements are documented in experimental proposals, Town Meeting white papers, Scientific Assessment Group report (DMSAG, NuSAG), the DUSEL Solicitation 1 report entitled *Deep Science* , and the Homestake Conceptual Design Report. In some cases, experiments have been sited at the nearest level in Homestake beyond the specified minimum depth. All depths are in meters water equivalent (mwe).

[4] Dates indicate when excavation would begin for the future cavities at Homestake, or the installation of experimental instrumentation in existing cavities, as relevant. A FY2011 MREFC funding construction start is assumed.

[5] Experimental costs are preliminary, and have not yet been formally reviewed. In all cases, operations is not included, nor is cavity excavation or basic infrastructure; these latter two elements are assumed to come from MREFC funding for the facility. Estimates are top-down; engineering and design work is included in some, but not all, cases. Estimates will be improved with design funds for the experiments from DUSEL Solicitation 4. Foreign contributions are noted when known.

Summary of Space Requirements by Depth (mwe)	Experimental Cavity Size (m^2)	Required U/G Support Space (m^2)	Total Space Required (m^2)	Space Available from Homestake CDR (m^2)
"surface"	1000	0	1000	N/A
230	1450	900	2350	640
1690	20000	0	20000	20000
3200	1000	10	1010	1010
4100	8000	4300	12300	7200
6400	4150	3750	7900	4500
7000	50	300	350	100

Total Cost for Listed Initial Suite of Experiments	
$520,000k	Physics
$119,000k	Biology, Geology & Engineering
$8,600k	Common Infrastructure
$644,600k	Total Initial Suite Experiments