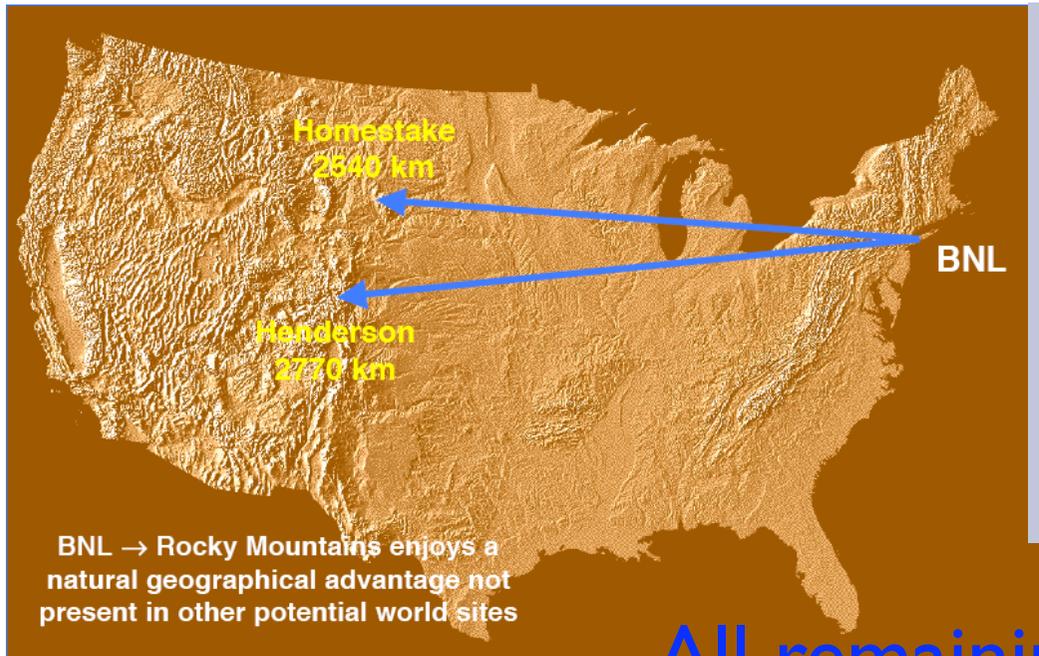


Status of very long baseline



Next Generation Experiments

- increase sensitivity $\sin^2 2\theta_{13}$ & δ_{CP} significantly
- precision measurements of Δm^2_{32} & $\sin^2 2\theta_{23}$
- resolve mass hierarchy (sign of Δm^2_{32})
- sensitive to new physics

All remaining physics in a single project

- 28 GeV protons. 1 MW beam power. Horn focussed
- 500 kT water Cherenkov detector stationed in a new DUSEL.
- baseline > 2500 km. WIPP, Henderson, Homestake
- We have proven by 3 years of work that this can be done. But much remains, especially on the detector design.

Design for 1 MW AGS sent to DOE DUSEL selection process by NSF: two sites in consideration. Homestake, Henderson Final selection will result in a CDR. Large detector (and beam) will have to be proposed separately.

Scientific Reach of Future Neutrino Oscillations Exps.

Parameter	T2K	T2H	Reactor	Nova	Nova2	VLBNO.
Δm_{32}^2	$\pm 4\%$	$\pm 4\%$	-	$\pm 2\%$	$\pm 2\%$	$\pm 1\%$
$\sin^2(2\theta_{23})$	$\pm 1.5\%$	$\pm 0.4\%$	-	$\pm 0.4\%$	$\pm 0.2\%$	$\pm 0.5\%$
$\sin^2(2\theta_{13})^a$	>0.02	>0.01	>0.01	>0.01	>0.01	>0.01
$\Delta m_{21}^2 \sin(2\theta_{12})^b$	-	-	-	-	-	12%
sign of $(\Delta m_{32}^2)^c$	-	-	-	possible	yes	yes
measure δ_{CP}^d	-	$\sim 20^\circ$	<i>Both results needed to resolve ambiguities!</i>		$\sim 20^\circ$	$\pm 13^\circ$
N-decay gain	x1	x20	-	-	-	x8
Detector (Ktons)	50	1000	20t	30	30+50	400
Beam Power (MW)	0.74	4.0	14000	0.4	2.0	1.5
Baseline (km)	295 ^e	295 ^e	1	810 ^e	810 ^e	>2500
Detector Cost (\$M)	exists	~ 1000	20	165	+200	400
Beam Cost (\$M)	exists	500	exists	50	1000	400
Ops. Cost (\$M/10 yrs)	500	700	50	500	600	150/500 ^f

^a detection of $\nu_\mu \rightarrow \nu_e$, upper limit on or determination of $\sin^2(2\theta_{13})$

^b detection of $\nu_\mu \rightarrow \nu_e$ appearance, even if $\sin^2(2\theta_{13}) = 0$; determine θ_{23} angle ambiguity

^c detection of the matter enhancement effect over the entire δ_{CP} angle range

^d measure the CP-violation phase δ_{CP} in the lepton sector; Nova2 depends on T2K2

^e beam is 'off-axis' from 0-degree target direction; ^f with/without RHIC operations

Best Bets

Possible timeline

Project	Start Constr.	Start data	Running time
Reactor	2007	2010	3 yrs
T2K	2003	2008	5 yrs
Nova	2008	2012	5 yrs
T2HK	2012	2017	5-10 yrs
BNL-HS	2010	2017	5-10 yrs