Hamko ma'aloom hai jannat ki haqeeqat lekin
dil ke khush rakhne ko, 'Ghalib' yeh khayaal achcha hai

Saying in the Streets (Translation Later)

LBNF Near Detector

What we need for Oscillation Physics:

✴ *Flux* Measure the four species of neutrinos

νμ ↔ μ-; **ν**e ↔ e-; *and* anti-**ν**μ ↔ μ+; anti-**ν**e ↔ e+

Absolute and Relative flux (E*ν*);

✴ *Cross-section* (anti)**ν**-*N*ucleus Inclusive and Exclusive processes

✴ *Energy Scale* Charged-particle momentum; 4-Calor; missing-P_T

⇛ E*ν*-Scale

✴ $\pi^{0/+/-}$ *produced in* **ν**-*Hadron-shower* (CC & NC)*:*

Background to Oscillation Charged and neutral π; Proton/ K / π ID

✴ *Measurement of* **ν**-Ar *Interaction:*

`Identical' ND and FD: Tremendous systematic constrain but not a panacea

x5 FD Statistics in FGT

Rich Precision Measurement program:

✴ *~100 Million* **ν**μ*-CC with commensurate systematics*

it follows:

❧ *'Identical' ND - LAr1 (~1000 t)*

with

❧ *Light, 'Transparent' Tracker:*

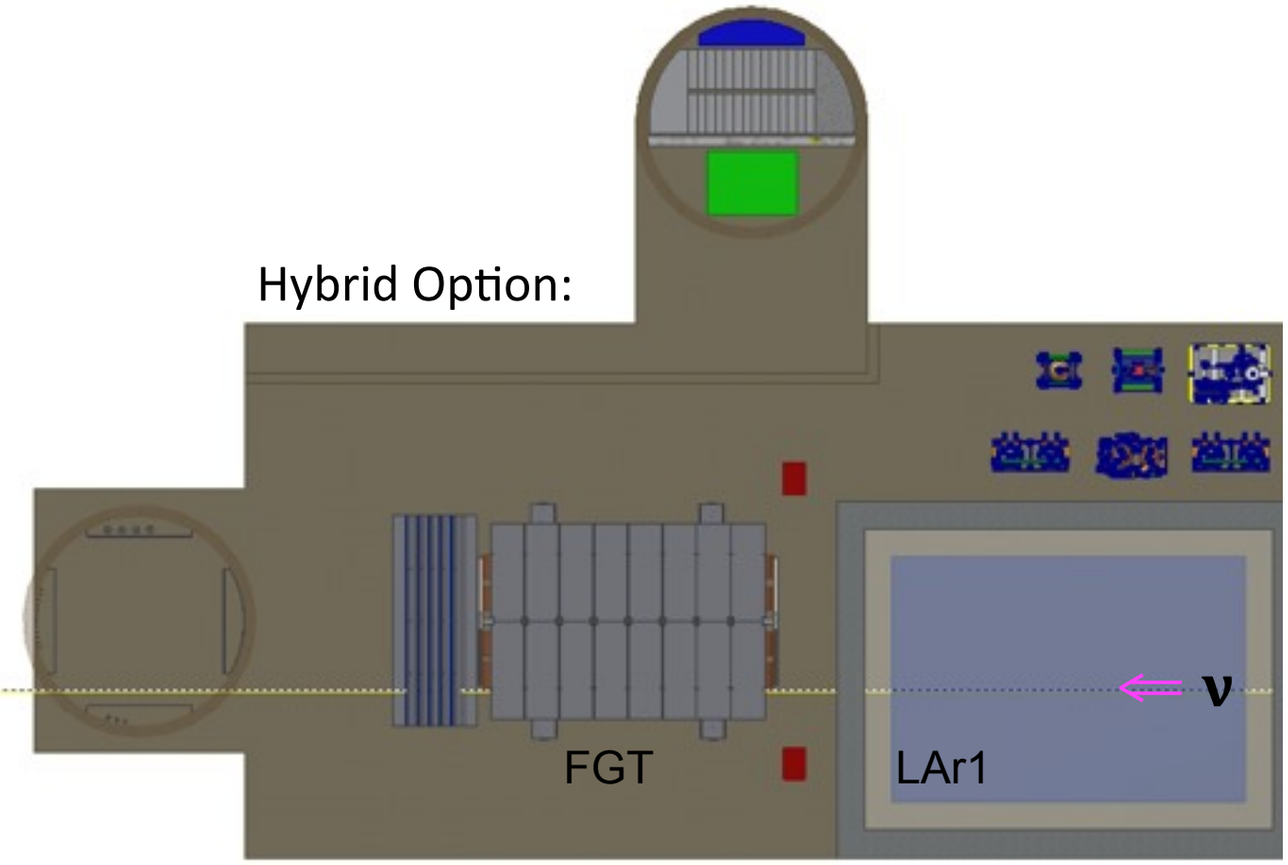
e- vs e+; μ-/μ+; π^-/π^+

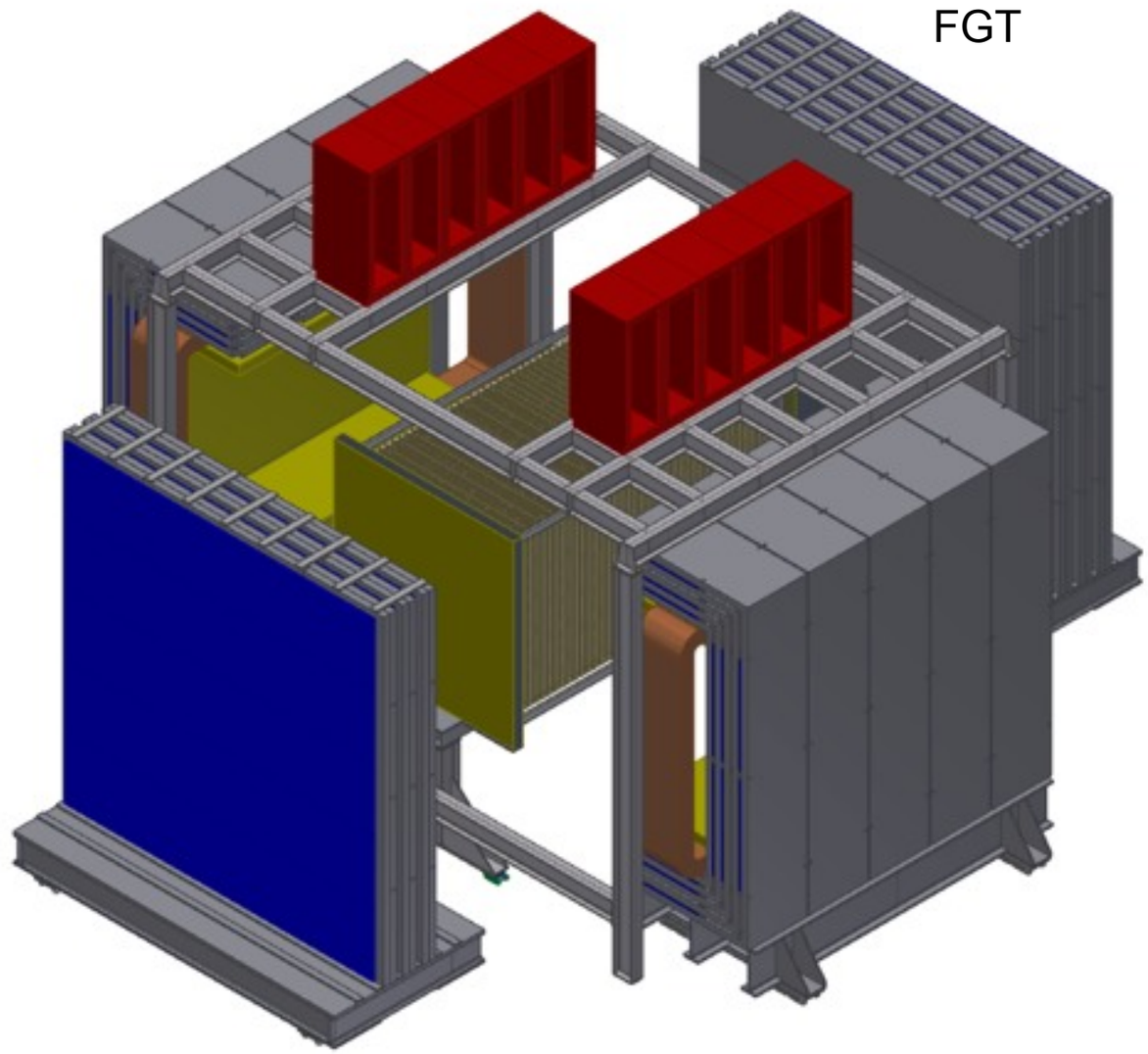
~0.1 gm/cm^3 with electron-ID (TR-capability); *γ*

❧ *B-Field*

❧ *4π-Coverage: Calorimeter and μ-ID*

Hybrid Option:





- Best performance among the 4-options
- STT (ρ≃0.1gm/cm^3)

  4 π -ECAL in a Dipole-B-Field (0.4T)

  4 π -μ-Detector (RPC) in Dipole and Downstream

- Pressurized Ar Target (≃x5--10 FD-Stat) ⇛ *LAr-FD*

Transition Radiation ⇛ e-/e+ ID ⇒ γ
dE/dx ⇛ Proton, π+/-, K+/-
Magnet/Muon Detector ⇛ μ+/-

⇛

- *Indian-participation to build ND*
- *For ν -Physics what KTeV and NA48 did for Kaon*
- *Build toward a 3rd. generation LBNE*

Hamko ma'aloom hai jannat ki haqeeqat lekin
(We know that the Near Detector will have 2.54cm Fe-Plates)
dil ke khush rakhne ko, 'Ghalib' yeh khayaal achcha hai
(It amuses us to think of these ideas)