LArTPC Near Detector
Conceptual Proposal and Simulation Tasks

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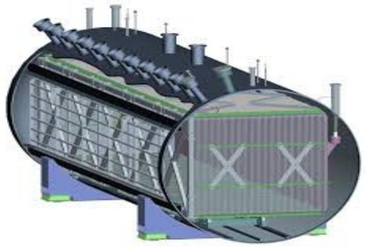
Beyond MicroBooNE; LArTPC Concepts



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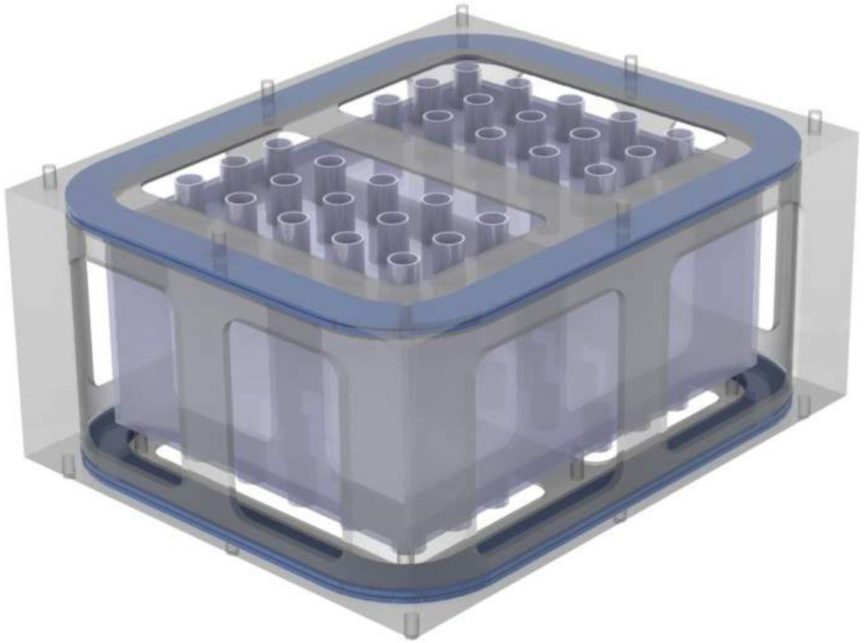
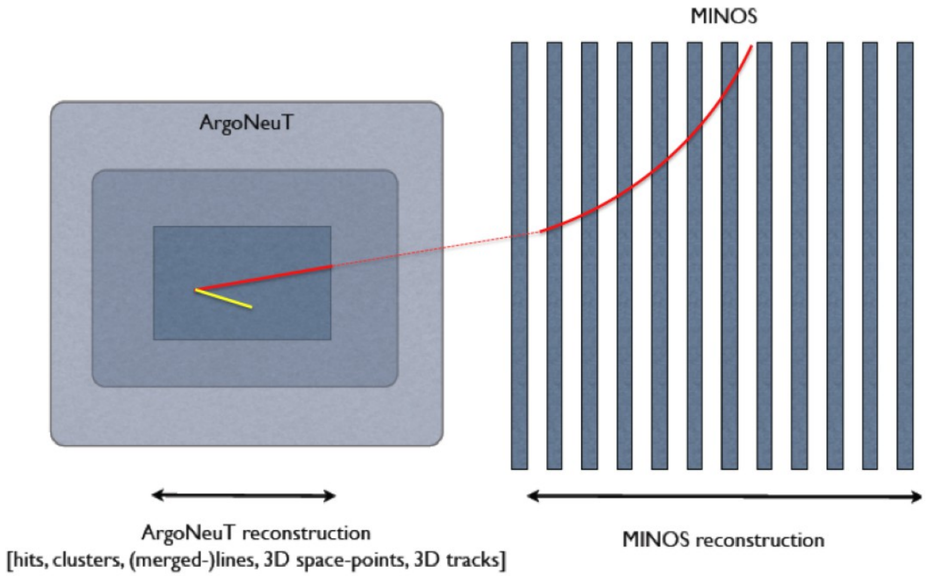
Option A:
Modular LArTPC
Within superconducting Helmholtz coil





Option B:
Hybrid detector
Non-Magnetized Modular LArTPC
In front of spectrometer

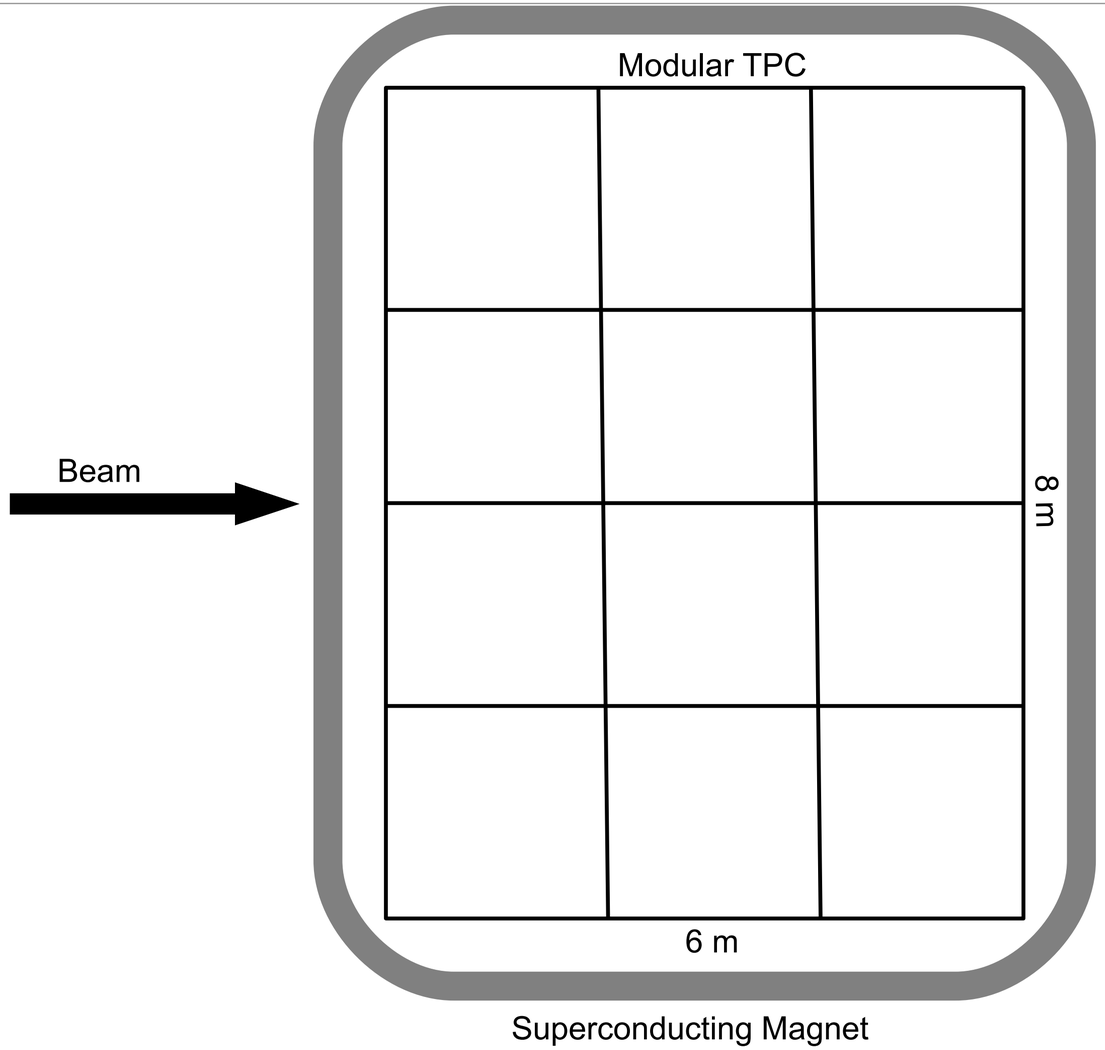
Magnetized Modular LArTPC

Optimized for LArTPC.

B-field at ~1T.

Length not limiting containment
- Cross as much beam as possible.

Modular TPC total 6 m x 8 m x 2 m
- ~ 150 t.
- Module 2 m x 2 m x 2 m.



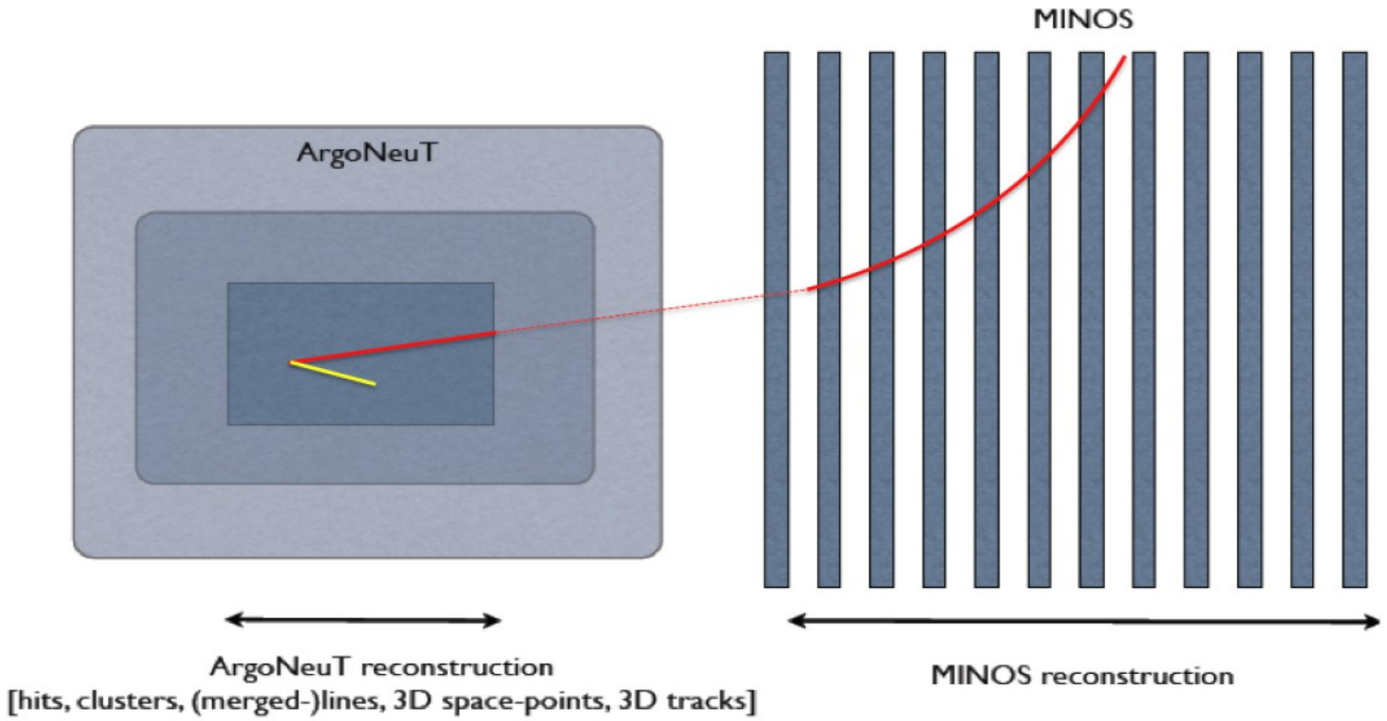
* Proposed ND hall 30 m x 16m

Non-Magnetized LArTPC

Hybrid detector.

Modular LArTPC upstream of spectrometer.

With only a 4 m long LArTPC, ~100t is achievable



A la ArgoNeuT

Simulation Tasks

Define new volume
- Containment study – study & optimize
- How the modular design helps with pile up (acceptance & rate)

Apply magnetic field
- Compare MagFields (0, 0.25, 0.5, 0.75, 1, 1.5 T)
- Can we separate e+- showers?
- To what extent does multiple scattering affect momentum resolution?
- Is a magnet necessary?

Resolution of pixel readout
- Determine expected performance, for more accurate reconstruction

Summary

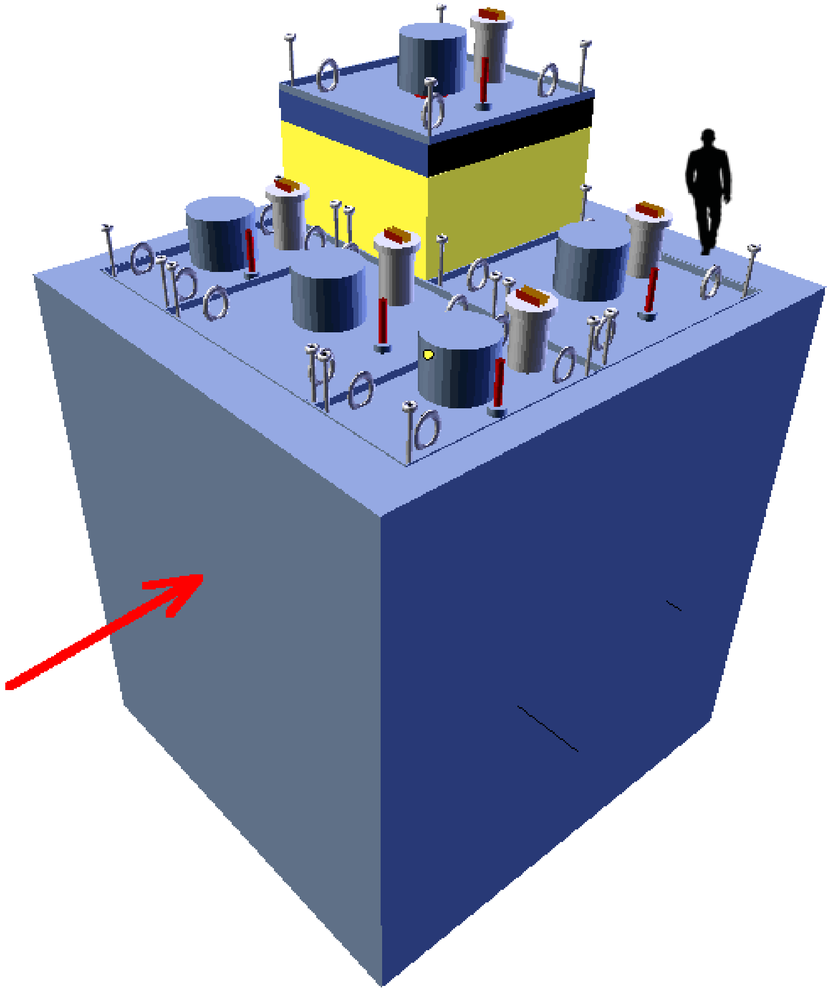
We are moving from the MicroBooNE geo, to ArgonCube's modular technology to the DUNE near detector.

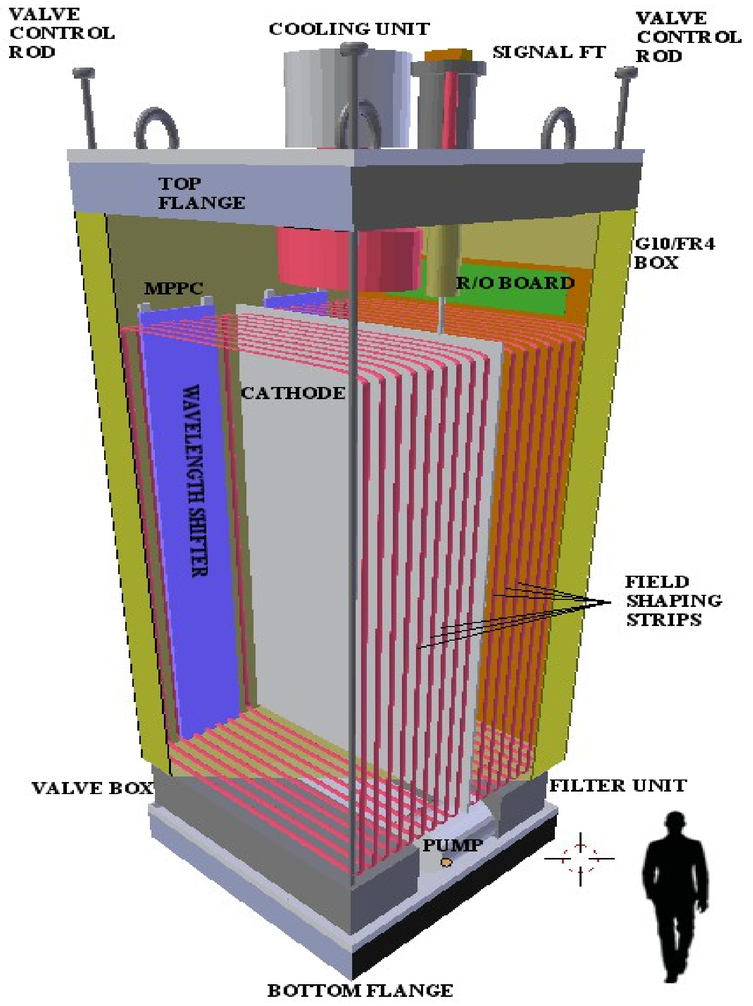
This allows simulation workload to be shared across collaborations.

Simulation is proceeding within the framework of ArgonCube, working in parallel with R&D for optimal design.

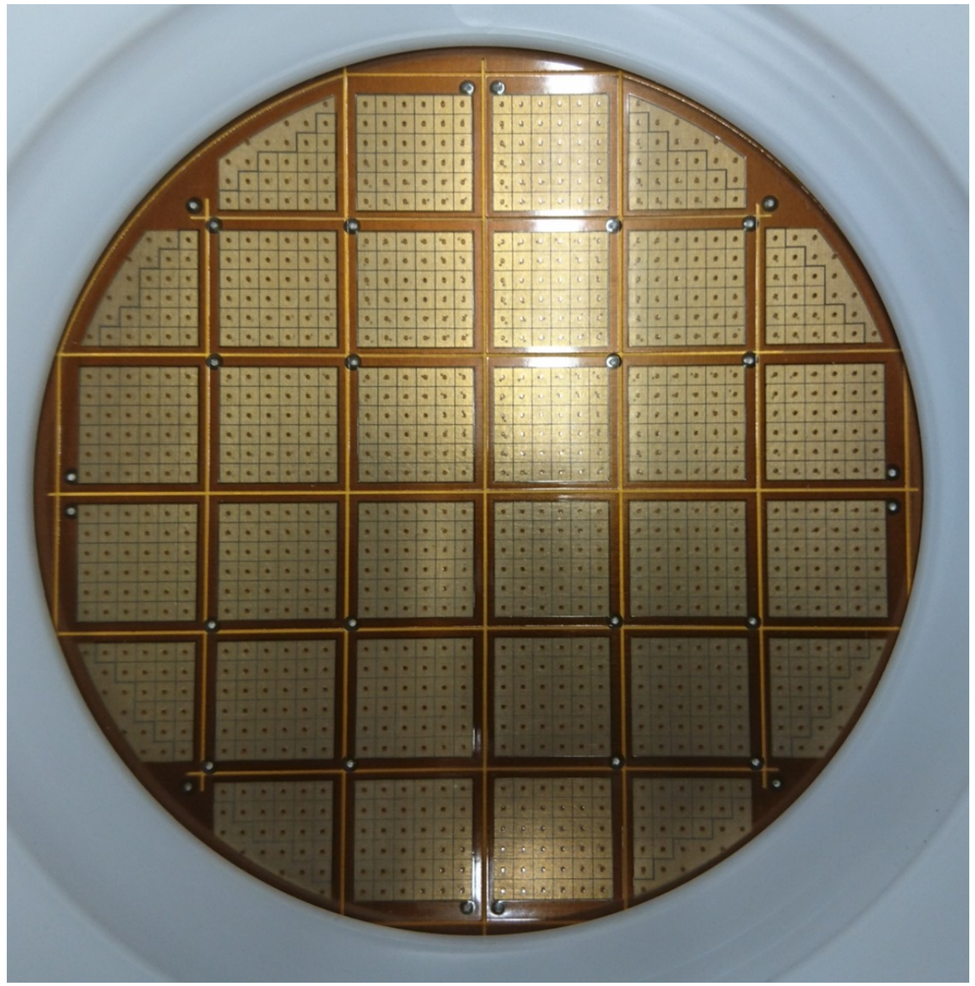
Two options are considered: Option A, a magnetized LArTPC of order 150 t. Option B, a standalone LArTPC of order 100 t. Both potentially complementary to other technologies.

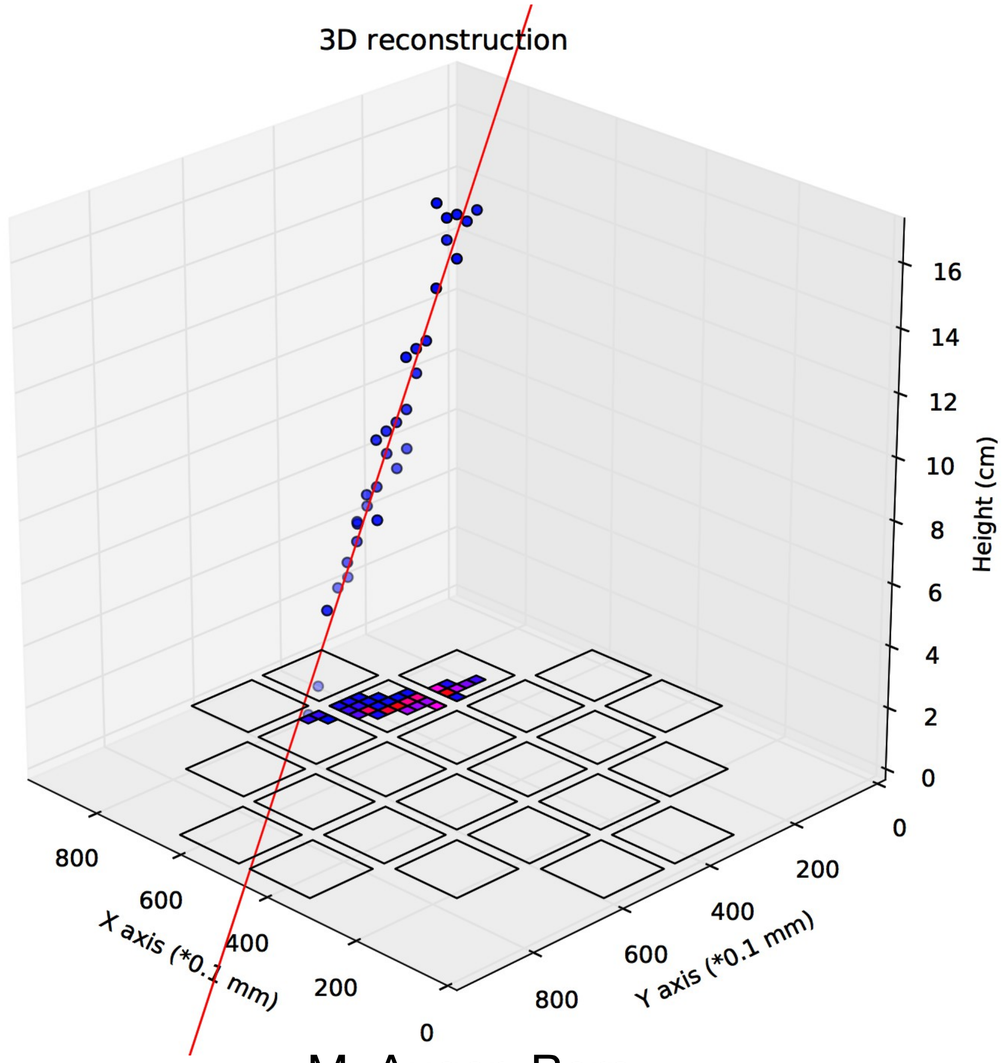
Modular Detector





Pixel Readout





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