

DUNE Horizontal Drift Field Cage Assembly

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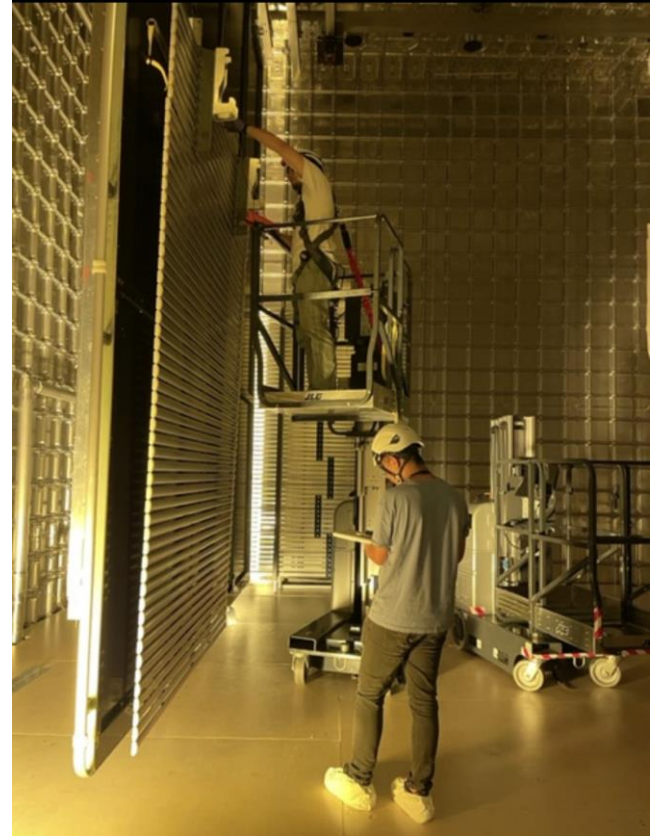
Outline

Introduction

Field Cage Assembly Table

Horizontal Drift Field Cage
Assembly

Vertical Drift Field Cage
Assembly



Introduction



Preface

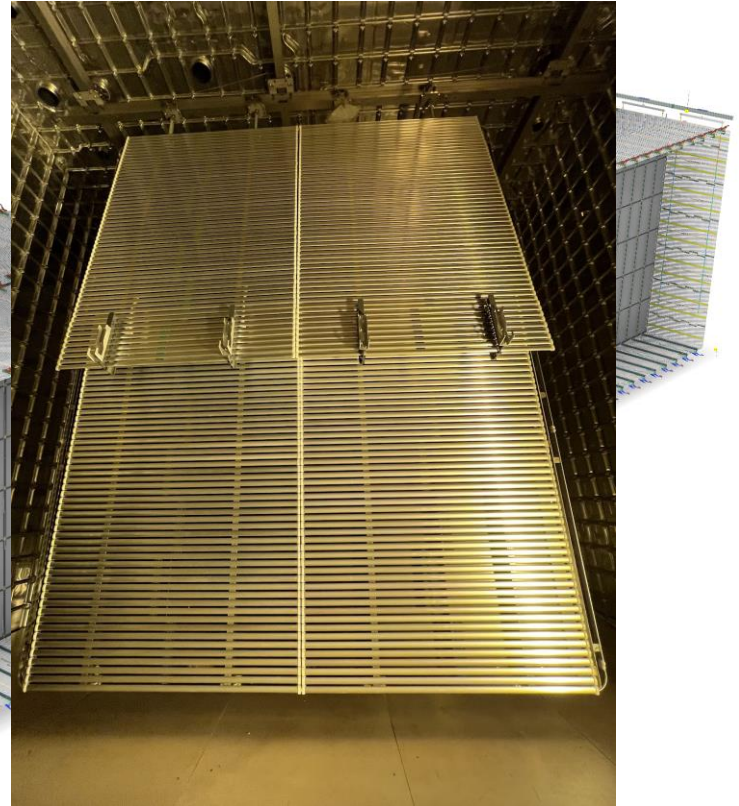
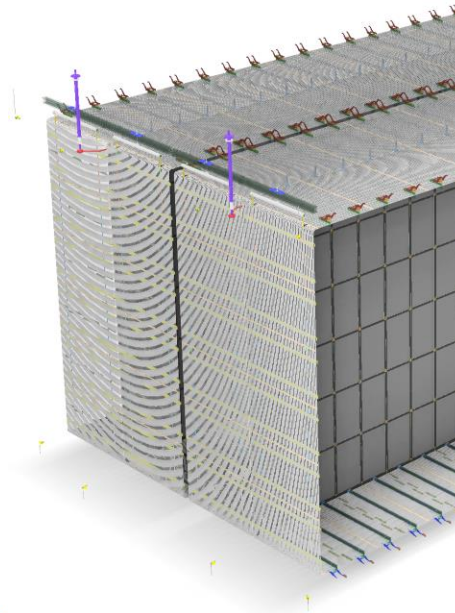
- CERN table used from Stony Brook University
- Differences: height, locking mechanisms, etc.
- Vertical Drift Process could be improved



Field Cage Construction

By the Numbers

- 63' x 220' cryostat
- 100 Bottom Field Cages



Field Cage Construction

By the Numbers: 1 Module

- 57 aluminum profiles
- 7 High Voltage Divider Boards (HVDBs)
- 114 2-hole slip-nuts
- 228 screws
- Lock and regular washer combination
- Latch beams for crane pickup/ deployment
- Takes approximately three hours to build one module



Module Co

Beam In

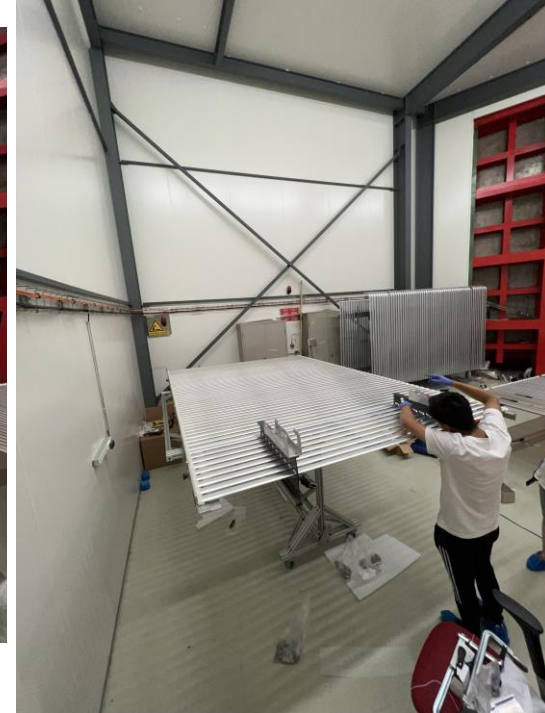
- Ensure correct length of guide rail for aluminum profiles
- Install and lock I-beams and Latch beams into place
- Teflon sheet for profile protection



Module Construction

Profile Installation & QC

- 1 person checking profiles & 2 installing
- Insert slip-nuts into profiles
- Install endcaps on both ends
 - Minus latch beam profiles
- Put all profiles on the table lying on the teeth
- Hand tighten screws into I-beam
- Latch beams have longer screws
- Lock table covers



Module Cons

Finish Profiles and

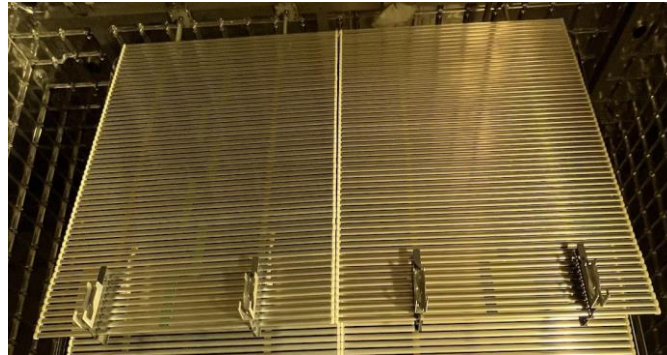
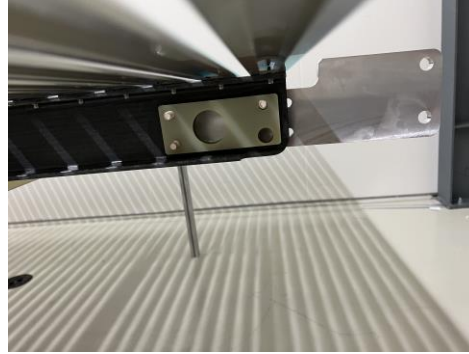
- Safely rotate assembly table
- Tighten all screws with power drill with specific torque
- Install all high voltage divider boards with rotating-nuts
 - Brass screws
 - Latch beam profile takes a spacer
- Distance to beams to be set



Module Construction

Final Attachments

- Install latch hooks and crane attachments with their specific screws



Sources of Error

Construction Process

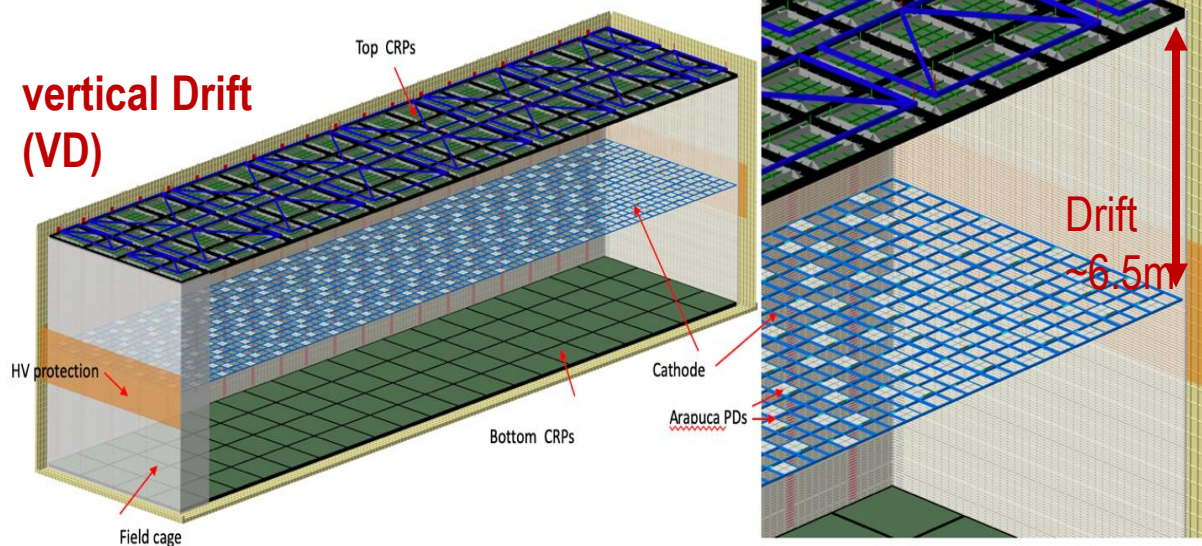
- Understand the specific screws
 - Necessary to keep workspace very organized
- Use caution underneath the assembly table/ hardhat
- Make sure all rotating-nuts are properly attached inside the profile



Vertical Drift Detector

Final Attachments

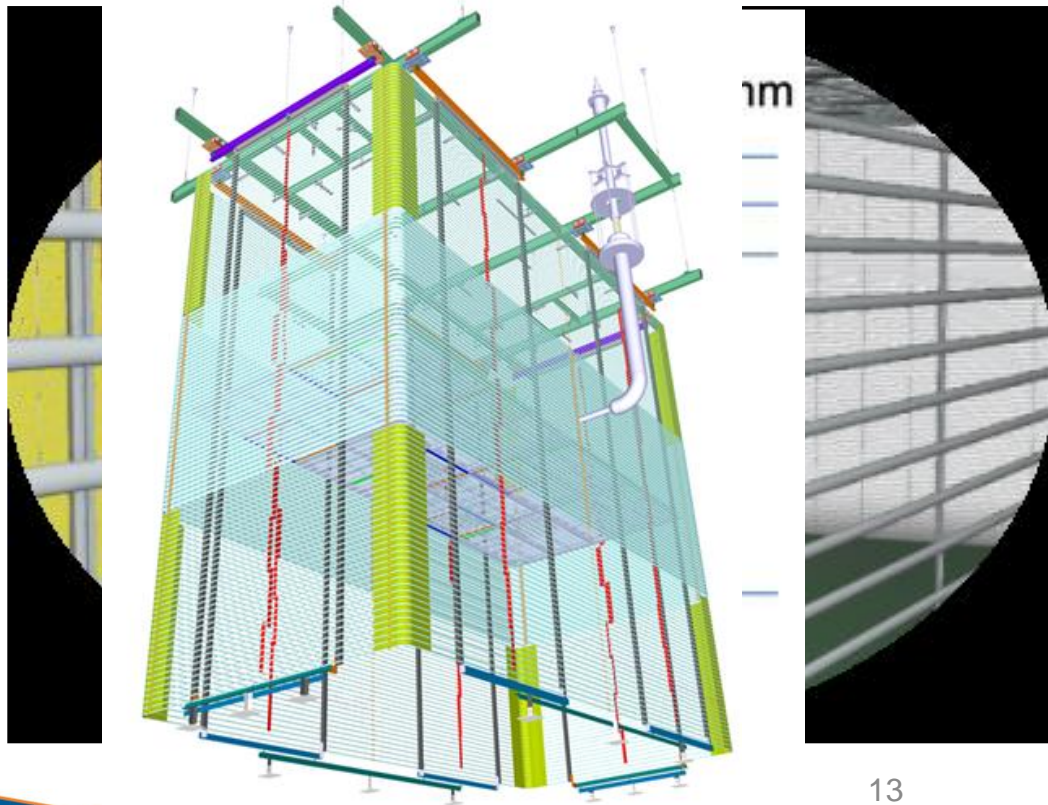
- The Vertical drift layout is simpler to construct. More efficient use of LAr volume
- 192 Field Cage modules
- 4 different types of profiles



Thin Profile Use

By the Numbers

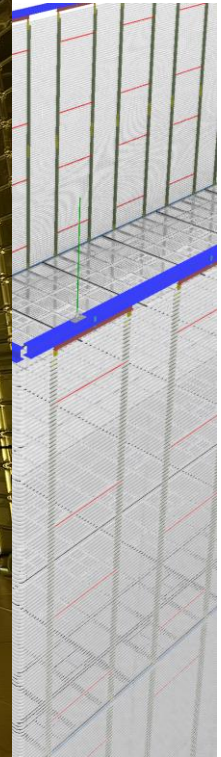
- Thin Profiles
 - 70% Transparency into the detector
- Make up about two-thirds of the detector
 - Thick profiles needed for electric stability near cathode plane assembly



Detect

Super-m

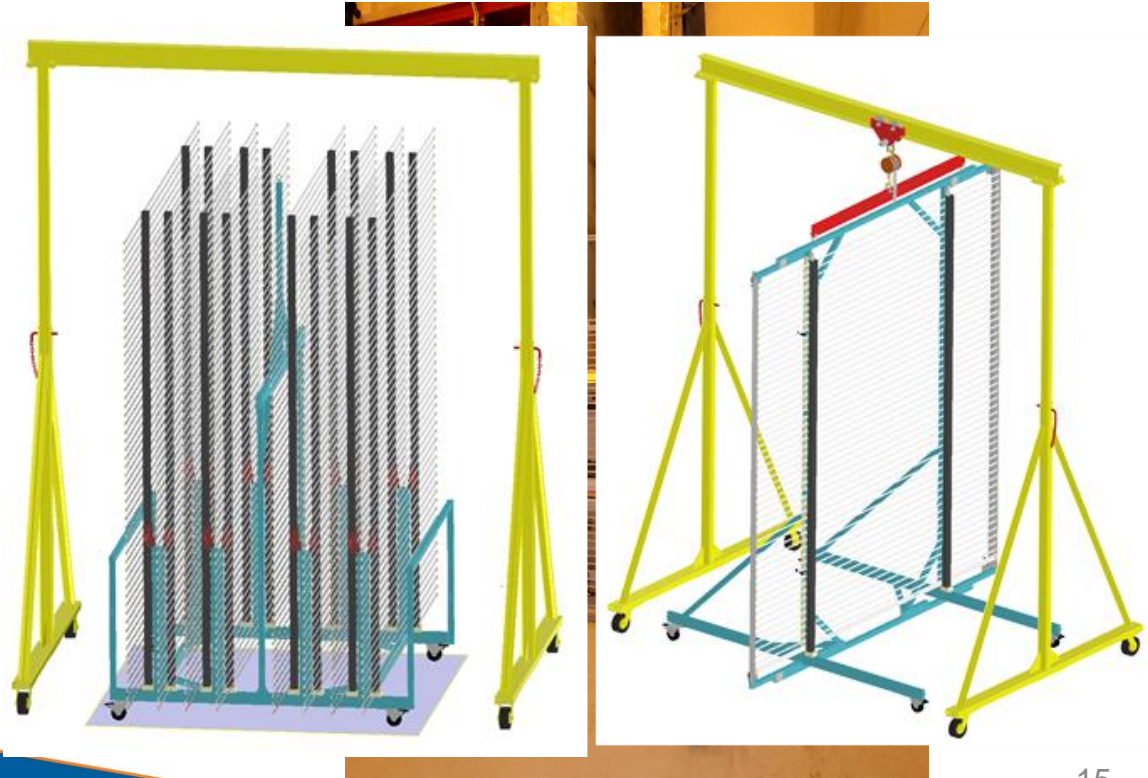
- 2 module width by 4 module length for surface area
- Done the same way LSU does end walls for HD detector



Assembly Stand

Functionality

- Verticality assisting in the handling and storage of the field cages
 - No time wasted between builds
- About 3.2m tall



Module Construction

Profile Procedure

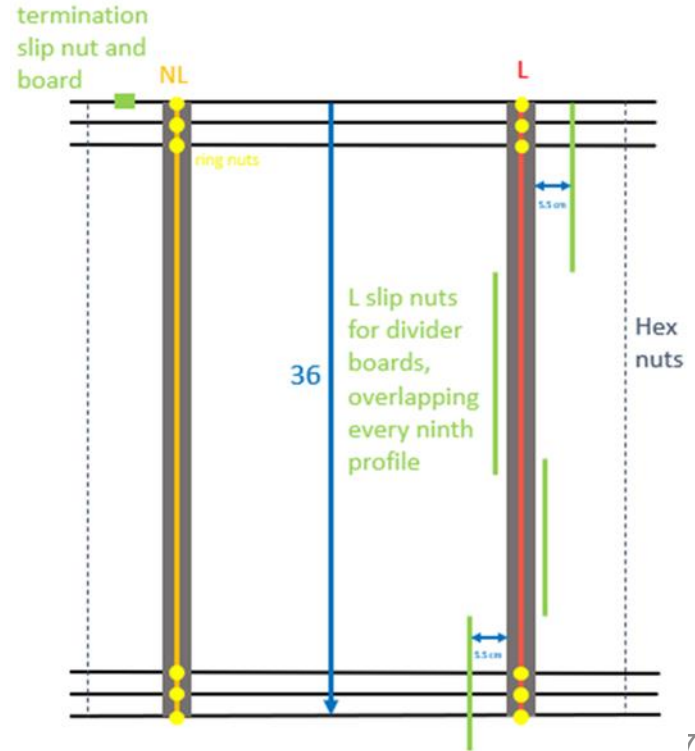
- Load the profiles one by one, by hand, onto the plastic teeth
 - Depending on the type of module being built
- Take this opportunity to visually inspect the profiles while cleaning.



Module Construction

Slip-nut Alignment

- insert the slip nuts, ring nuts, and hex nuts
 - Locking, Non-Locking, thick & thin
- Move towards positions behind the box-beams



Module Construction

VAT Attachments

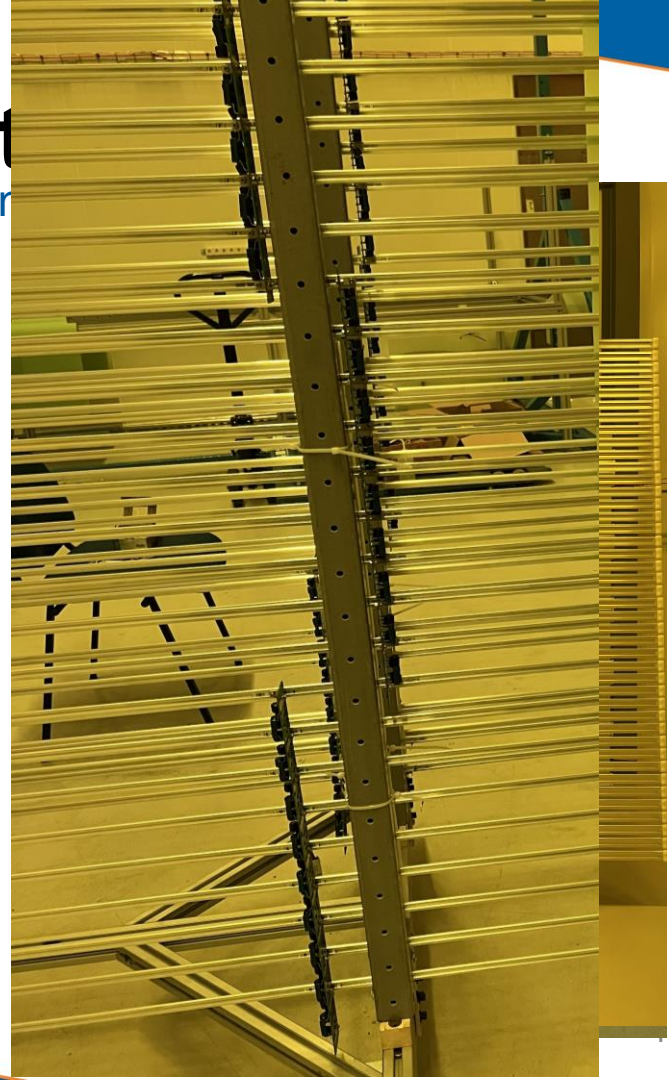
- Add Box-beams to VAT and tighten with allen-key
 - Double check dimensions
- Begin screwing profiles to the box-beams
 - Insert screwdriver into the box-beam hole; difficult at first.
 - Do not tighten until a final alignment
- Tighten locking slip-nuts then move to non-locking side



Module Const

Final Attachment

- Add cross bars in order to move to storage cart
 - If necessary
- Apply G-10 Strips to the modules
 - Structural and electrical stability
- Attach high voltage divider boards
 - Different boards for thick and thin profiles





Group's 3E Motto

Demand Yourself Excellence!

Demand Each Other Excellence!

Help Each Other Become Excellent!

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