

Root Output & Liquid Argon Detector

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Outline

- Added FGD & MRD Hits to Root output
- Created liquid Argon Detector (lArD)
- Added lAr Hits to Root output

FGD & MRD

Changed Hits Collections

Similar construction → Similar hits collections

Contents of Hits:

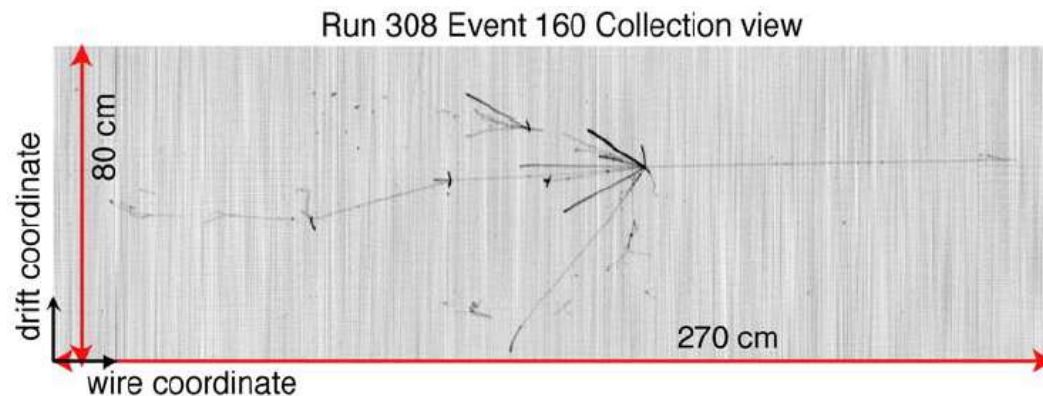
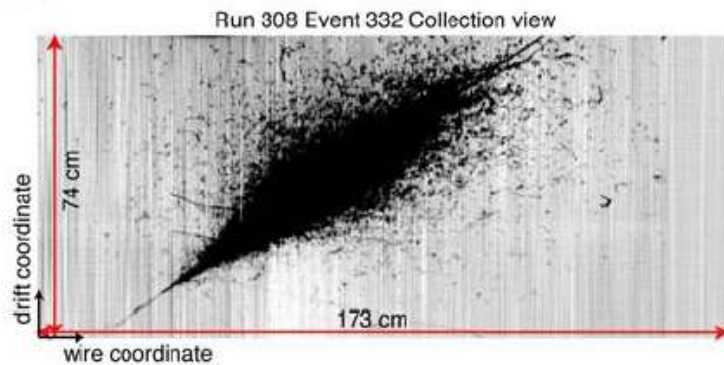
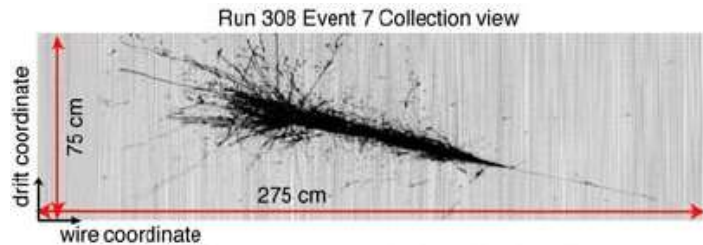
- FGDxCell (MRDxCell)
 - Detector Position (x,z)
 - True Particle Position (x,y,z)
 - Hit Time
 - Energy Deposition
- FGDyCell (MRDyCell)
 - Detector Position (y,z)
 - True Particle Position (x,y,z)
 - Hit Time
 - Energy Deposition

FGD & MRD

Conclusion

- FGD & MRD are currently writing Root output files
- Currently, readout is one hit per sensitive element per track
 - Potentially combine in digitizer
 - Retain raw hits for true data
- FGD & MRD are ready for analysis

Liquid Argon Detector

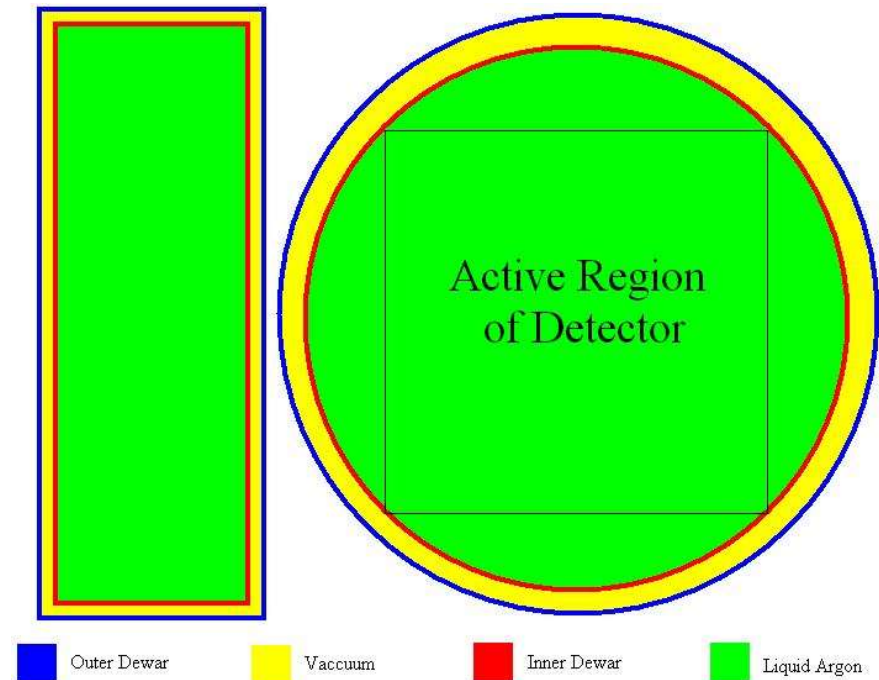


- "Electronic" Bubble Chamber
 - 3mm^3 voxels!!
 - $\sim 10^9$ sensitive detectors
 - See every track
 - 3-Dimensional output

Liquid Argon Detector

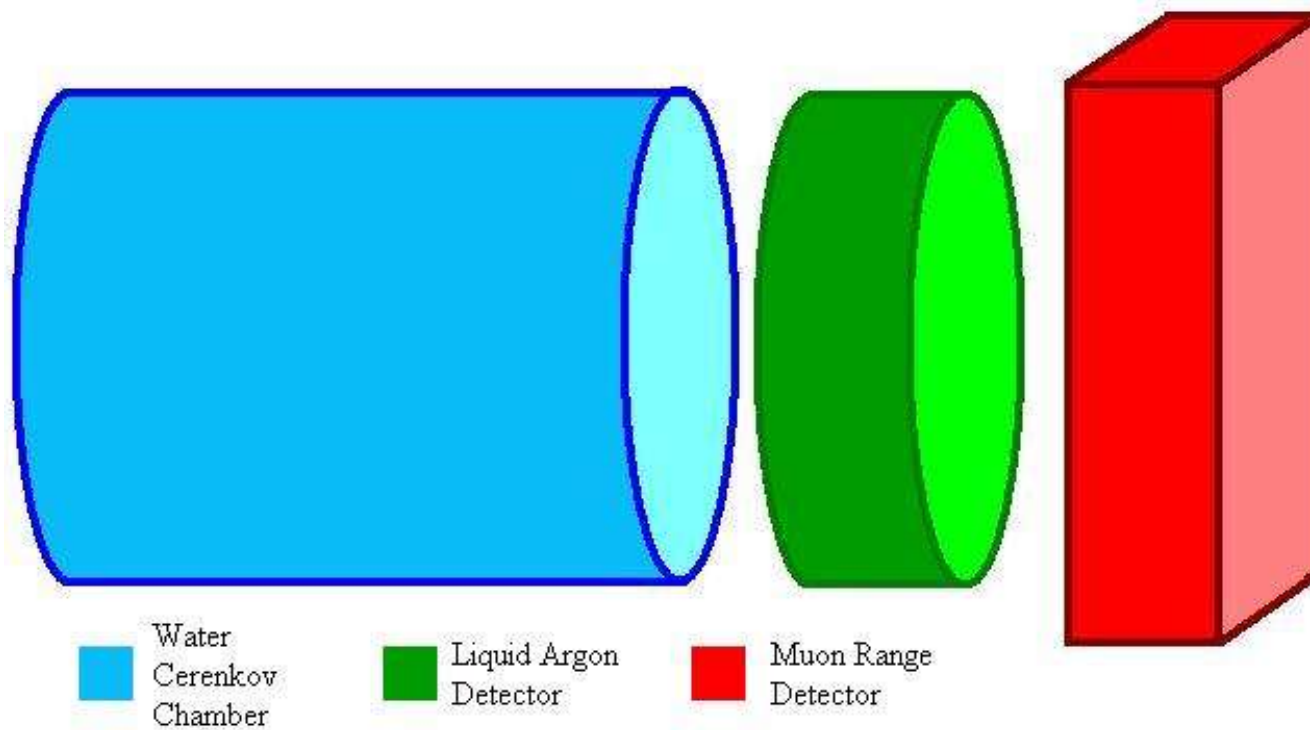
Current Construction

- Dimensions
 - Radius: 4.65 m
 - Length: 2.5 m
- Mass
 - Active Region: ~151.42 tons
 - Total lAr mass: ~237.85 tons
- Detector Size
 - lAr voxel: **3mm³**
- lAr Statistics
 - Radiation length: 14 cm
 - dE/dx : 2.1 MeV/g/cm²
 - Density: 1.4 g/cm³



Liquid Argon Detector

Current Construction (cont'd)



Note: this setup is a compile time option

Liquid Argon Detector

Event Displays

Liquid Argon Detector

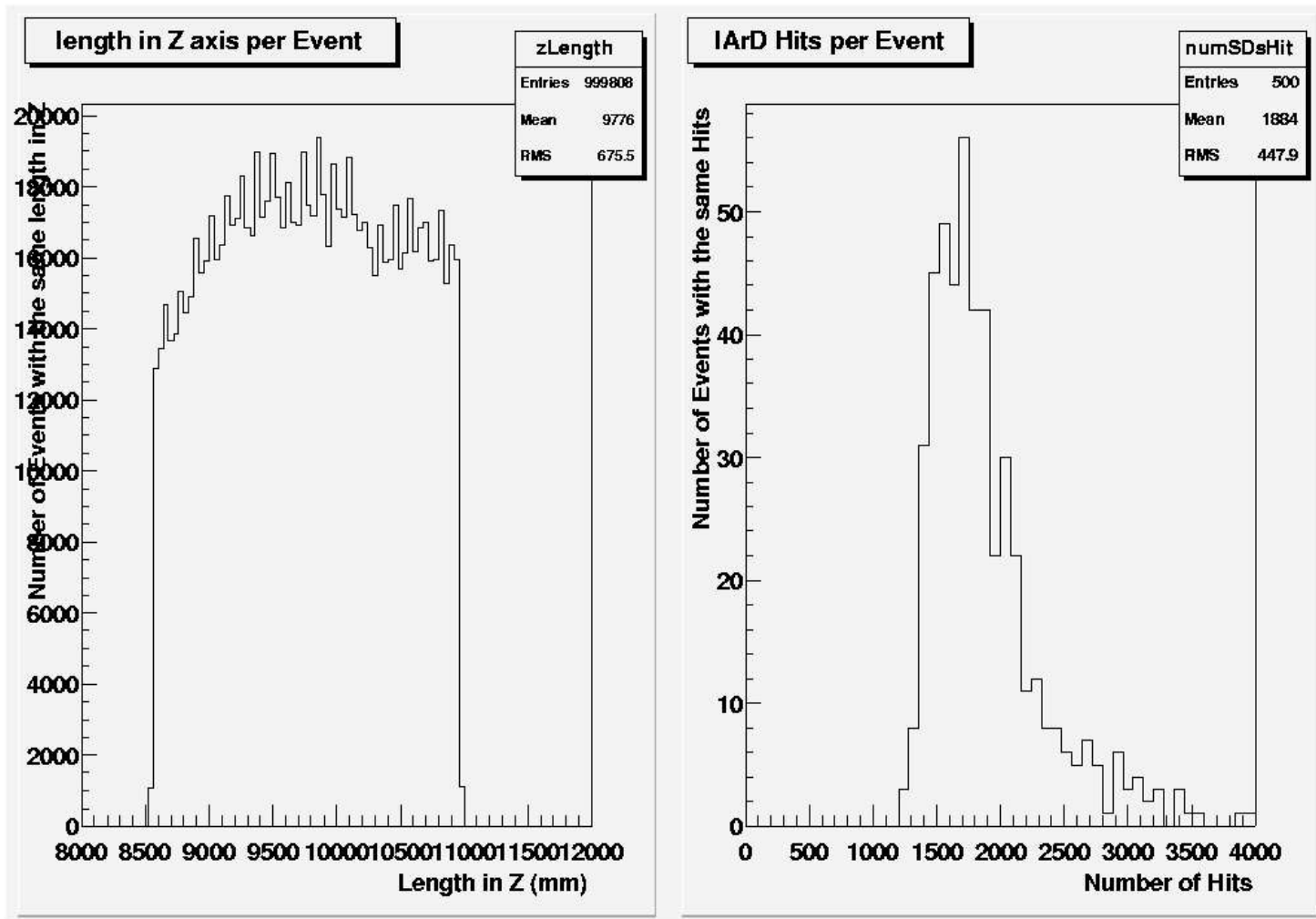
Hits Collection

The hits collection for the lArD is set up as follows:

- lArDVoxel
 - Voxel Position (x,y,z)
 - Hit Time
 - Energy Deposition
 - Parent Particle ID

Liquid Argon Detector

Plots



Liquid Argon Detector

Conclusion

- lArD is currently writing Root output files
- Due to the number of voxels, display must be disabled before running with the lArD
- Potentially use a digitizer to reconstruct data into a form more similar to a detector readout
- lArD is ready for analysis

Future plans

- Circumvent 1ArD visualization difficulties
- Optimize 1ArD dimensions
- Add digitizers to the 1ArD, FGD and MRD
- Begin analysis of data from 1ArD, FGD and MRD

Conclusion

- Constructed a liquid Argon detector option
- Root output files generated by lArD, FGD & MRD
- All detectors are ready for analysis