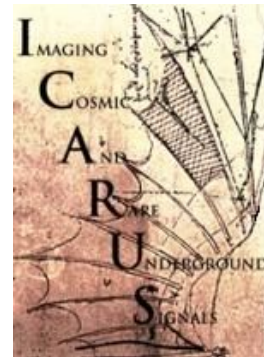




Topic #2 Close-Out

Giuseppe Cerati & Steven Gardiner
SBN Summer Analysis Workshop
28 July 2023

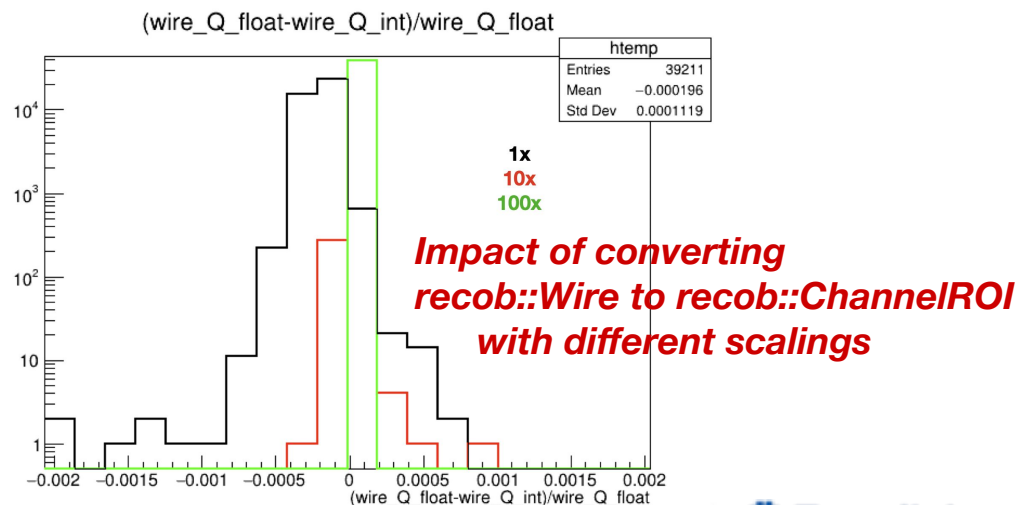
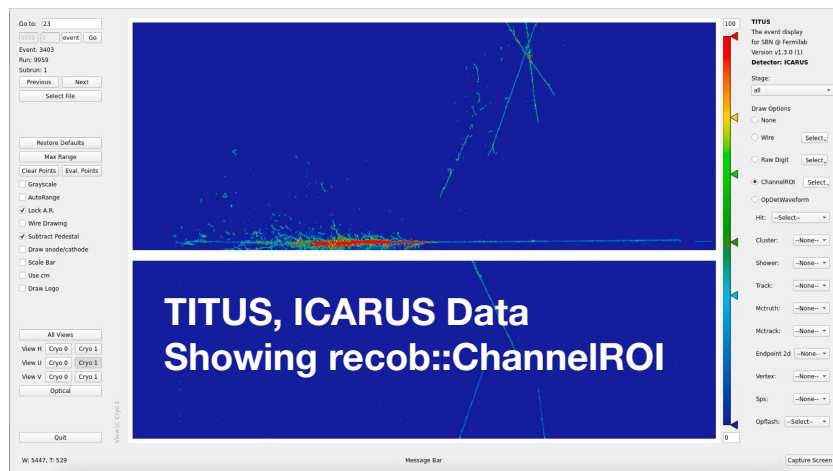


GENIE systematics syncing between SBND/ICARUS

- Overlap with topic #3, some more details there
- SBND currently uses SBNEventWeight, while ICARUS uses nusystematics
 - Both rely upon GENIE Reweight "under the hood"
 - nusystematics preferred for performance and maintainability
- Steven G did inventory of existing nusystematics fcls in icaruscode
 - Many updates for GENIE v3.4.0, compatibility with our chosen model set (AR23_20i_00_000)
- Related updates from Jaesung + Afro, see topic #3 closeout

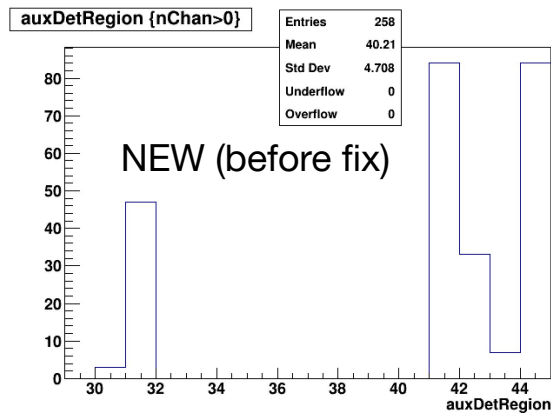
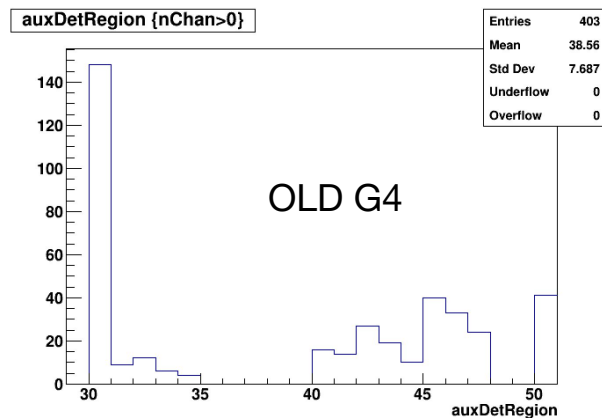
ICARUS-SBND Low Level Reconstruction Syncing (Joseph)

- ICARUS's signal processing writes recob::ChannelROIs and **NOT** recob::Wires
 - recob::Wires store floats, recob::ChannelROI store short ints
 - Reduces product size by >2x
 - recob::ChannelROI is currently defined in ICARUSCode
- Moved to SBNObj and added converter from recob::Wires to recob::ChannelROI

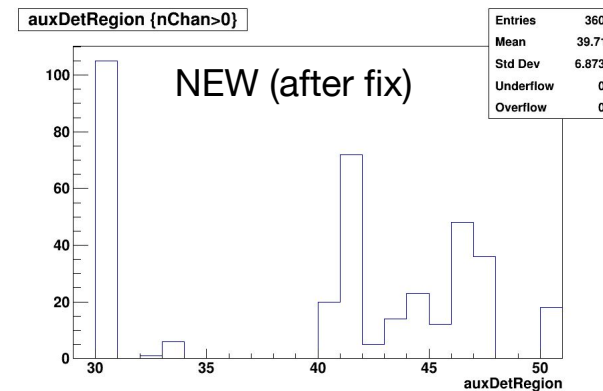


Geant4 refactoring in ICARUS

- Status reminder (docdb 31054): TPC and PMT simulation results roughly compatible with old version. CRT simulation was missing large number of hits.
- During the workshop a major issue was identified and fixed, resulting in more similar results in terms of CRT sim channels
 - thanks to A. Mastbaum and F. Poppi for the help!
- Residual discrepancies and issues with downstream modules still under investigation.



Plots from CRTSimAnalysis module



Blip reconstruction integration in SBN (Will)

- Tools from MicroBooNE (“BlipReco”) upgraded from LArSoft v08_05_00 → v09_75_03 and ported into **SBNDCode** (Will F)
 - Flexible algorithm class for reconstructing MeV-scale blip features — with options for hit filtering, vetoing hits around tracks, blip energy reconstruction, lifetime/SCE corrections, etc
 - branch: feature/wforeman_blipreco
 - Avinay will help to validate and debug
- Next step: migrate up to **SBNCode**
 - Figuring out which detector-specific functionality needs to be factorized into custom functions living within **sbncode** / **icaruscode** (Jacob will help with this)
 - Truth-matching? SBND and uB use ‘gaushitTruthMatch’... what about ICARUS?
 - Drift coordinate ‘X’ reco?
 - Electron lifetime retrieval? Calorimetry? Other charge/energy corrections?
 - Dealing with multiple *cryostats* in ICARUS!
- Need to decide how this will be integrated into workflows
 - Short term: run reco directly in CAF/AnaTree module (lightweight and *quick*, ~0.1 sec per event)
 - Longer term: run reco upstream & save SpacePoints or custom ‘Blip’ data objects into events

Discussions and notes

Validation

https://docs.google.com/document/d/1KuRD6yXrHDL-I-7guRUG8FV_QI3Y0VEzyme44yDk8d8/edit?usp=sharing

Pandora

<https://docs.google.com/document/d/1FzYXeijnBKOZY3qz84s9IbOv7er73yMURjyBrG62xGE/edit?usp=sharing>

Cosmic Overlay

<https://docs.google.com/document/d/1PQ3JKgzuLS7YBvPa0JbZy-hOOTAXt8QIFn5PsEOltlg/edit?usp=sharing>

ML workflow in SBN

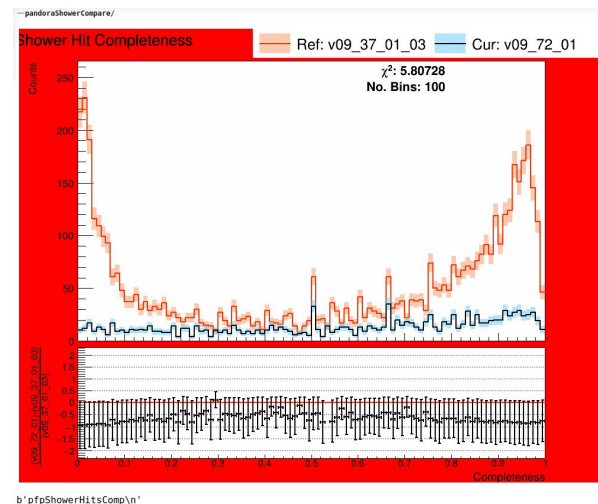
<https://docs.google.com/document/d/1NnkwTKTHy2B-fHXu2nCZM75AVIJTUvGaVkw4bgwe8U/edit?usp=sharing>

Validation discussion

- Web-based tools for validation and continuous integration exist, under-utilized resource
 - Need personpower to update, maintain
 - Working group participation to set up validation plots (reconstruction, generator, ...) would be valuable
- Will help to ensure pull requests are high-quality when they reach release managers
 - System could have caught some issues encountered in workshop production effort if it was used

Multiplatform Continuous Integration for Test

Build	Start Time	Build Type	checkout_github	build	unit_test	install	ci_tests	ci_validation_lite
icarus_ci_test/46 (ICARUS)	2023-05-08 23:22:33	slf7 e20-prof	✓	⚠	✓	✓	✓	⚠
icarus_ci_test/45 (ICARUS)	2023-05-08 08:19:16	slf7 e20-prof	✓	⚠	✓	✓	✓	✓
icarus_ci_test/44 (ICARUS)	2023-05-08 01:19:46	slf7 e20-prof	✓	⚠	✓	✓	✓	✓
icarus_ci_test/43 (ICARUS)	2023-05-07 23:59:04	slf7 e20-prof	✓	⚠	✓	✓	✓	✓
icarus_ci_test/42 (ICARUS)	2023-05-07 23:58:39	slf7 e20-prof	✓	⚠	✓	✓	✓	✓
icarus_ci_test/41 (ICARUS)	2023-05-07 20:28:57	slf7 e20-prof	✓	⚠	✓	✓	✓	✓
icarus_ci_test/40 (ICARUS)	2023-05-07 18:43:23	slf7 e20-prof	✓	⚠	✓	✓	✓	✓
icarus_ci_test/39 (ICARUS)	2023-05-07 17:50:08	slf7 e20-prof	✓	⚠	✓	✓	✓	✓
icarus_ci_test/38 (ICARUS)	2023-05-07 17:02:02	slf7 e20-prof	✓	⚠	✓	✓	✓	✗
icarus_ci_test/37 (ICARUS)	2023-05-07 14:30:55	slf7 e20-prof	✓	⚠	✓	✓	✓	✗



Cosmic overlay discussion

- Pros/cons of overlays still being explored, we want to establish technical capability to use this option
- Some questions about the overall strategy identified
 - How much re-use of off-beam data can we tolerate? Do we have enough?
 - Workflow: NOvA-style (merge after making MC sample) or MicroBooNE-style (add sim to data file)? How does truth filtering play into this?
- Near-term work plan involves cleaning up Bruce's branch and using validation framework to understand the results
 - Practical experience will help to inform design of workflow

Backup