

Robert's Random Musing on MINOS+ Software Issues

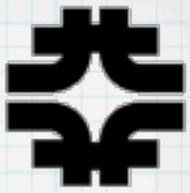
or how I spent Spring Break

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MINOS Collaboration Mtg 2014-04-10



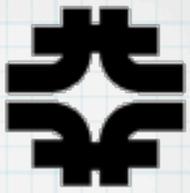
General Plea



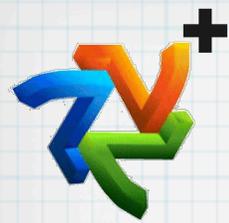
- Software Librarian !
 - tag/build/manage releases
 - backports ... an all too often occurrence recently
 - build ROOT to our needs
 - keep an eye on code going into CVS...help when people do dumb things
 - adjust setup scripts to accommodate transition to CVMFS
- Database Czar (not DBA)
 - help w/ creation of new tables (SQL & C++ row classes)
 - upcoming 5.0 => 5.5 upgrade (testing of that w/ older releases)
- Some changes since last “State of the Software”
 - <http://minos-docdb.fnal.gov:8080/cgi-bin/ShowDocument?docid=10348>
 - See above for previous plea for personnel
 - See above for more information on beam data acquisition



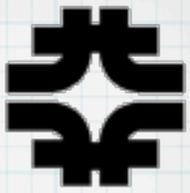
Beam Data (the saga continues (sigh))



- Good news since last meeting: Donatella Torretta!
 - Still learning the ropes (the system *is* complex) but a great start
- Lots of files daily ...
 - NuMI \$A9 related files
 - ~2800 individual files per day; estimated ~70+GB/month
 - but we also get Booster + Weather + HeartBeats ... everything
 - ~20700 files/day; estimate another ~185GB/month
 - files are on /minos/app because /minos/data block size too big
 - like drinking from the fire hose
- Recent Issue (seems these happen more often during collaboration meetings ... crosses fingers)
 - last weekend we had an issue due to “quota” on mindata account
 - I mis-estimated when we’d run out, no one was watching
 - when quota was exceeded one can create files, but no contents
 - outage for ~36hr; took similar time to recover
 - new script will give prior warning for both quota and “df” space
 - shared account/disk so still possible to fill up before anyone can react
- Future work
 - need to have a regular schedule for creating tar files in /minos/data
 - back up tar files to enstore/dcache



Minerva MC on MINOS Data

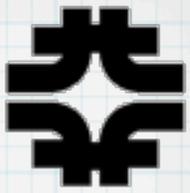


- Simulations of Minerva induced particles in MINOS
 - First set up early 2010
 - people might remember DB issues
- Current state has been deemed... *inadequate*
 - disturbed by a mismatch in apparent efficiency for finding tracks
 - attributed to no pile-up from events in MINOS and rock events
 - recently telling lab management: critical issue delaying publication
 - which results in ...
 - pressure on my supervisor
 - which puts pressure on me
- Two possible approaches
 - Overlay MINOS MC (detector+rock) = pure MC
 - + know how to do this in principle
 - - file handling and overlaying isn't really that easy
 - - questions about noise and other inadequacies
 - Overlay real MINOS data on Minerva MC
 - + fewer uncertainties about dealing with sources of backgrounds
 - - new issues of combining events
 - - a bit of double counting Minerva contribution (small-ish)





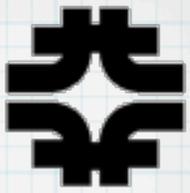
Status



- Simulations of Minerva induced particles in MINOS
 - <http://minerva-docdb.fnal.gov/cgi-bin/ShowDocument?docid=9777>
- Plan seemed so (deceptively) simple:
 - Minerva supplies: HEPEVT records + list of timestamps as text files
 - MINOS simulation phase
 - read HEPEVT + timestamp, find nearest real record (and its timestamp)
 - simulate input particles w/ raw record timestamp
 - append real raw record's RawDigitDataBlock
 - MINOS reconstruction phase
 - continue as-is; assume disjoint sparsification/thresholds small effect



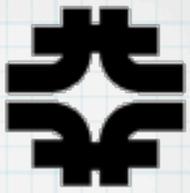
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- Simulations of Minerva induced particles in MINOS
 - <http://minerva-docdb.fnal.gov/cgi-bin/ShowDocument?docid=9777>
- A big ball of wibbly wobbly... time-y wimey... stuff
 - Find the right MINOS file(s) to cover supplied timestamps
 - samweb + dccp
 - Read .mdaq files
 - TChain style, not normal framework I/O; catalogue entries
 - Understand QIE electronics timing and CandDigit times
 - TDC sync from start of second
 - Record headers and crateT0 times (shouldn't have been added)
 - Spill structure: 5 vs. 6 batches, even those not constant shape
 - MINOS code not setup for time within second != 0
 - Precision issues with intermediate “pe” structures
 - Also not setup to allow passing cases with 0 “pe”s = empty spill
 - Overall time skew MINOS spill T0 vs. Minerva MC spill T0
 - NearDet timing calibration doesn't seem to be issue



Status

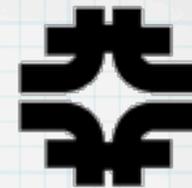


- Simulations of Minerva induced particles in MINOS
 - <http://minerva-docdb.fnal.gov/cgi-bin/ShowDocument?docid=9777>
- Inter-Module communication
 - How does an upstream module pass information to later stages
 - No slot in the record itself (don't want new structure)
 - Put Registry on “whiteboard” TFolder
 - Handy utility for such odd cases ...
 - But generally not the correct data flow mechanism
 - Still ... when you need it ...
 - Eventually in CVS as Util/WhiteBoardRegistry
 - Needed for passing crateT0 to DetSim module
 - Don't want DetSim rummaging around for this in general case

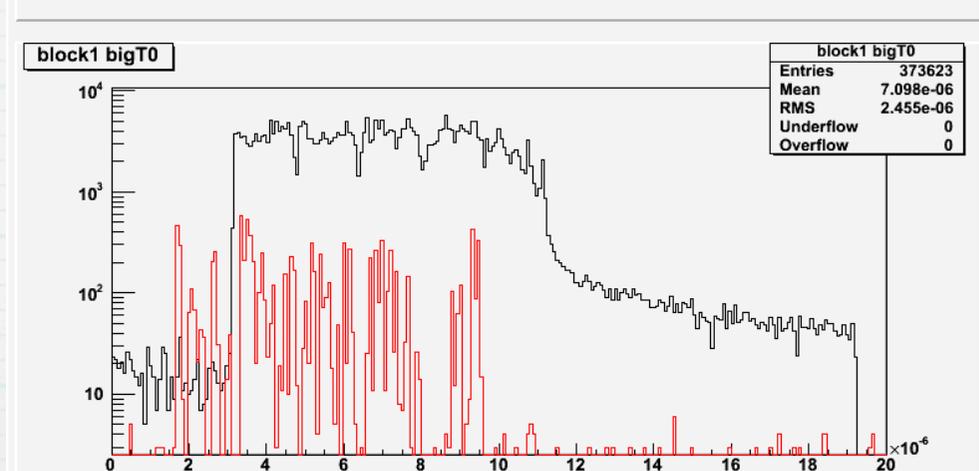
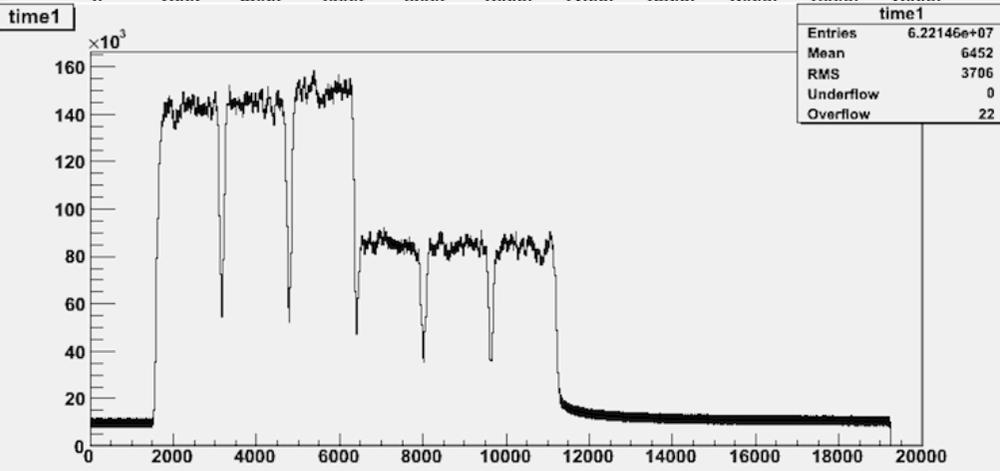
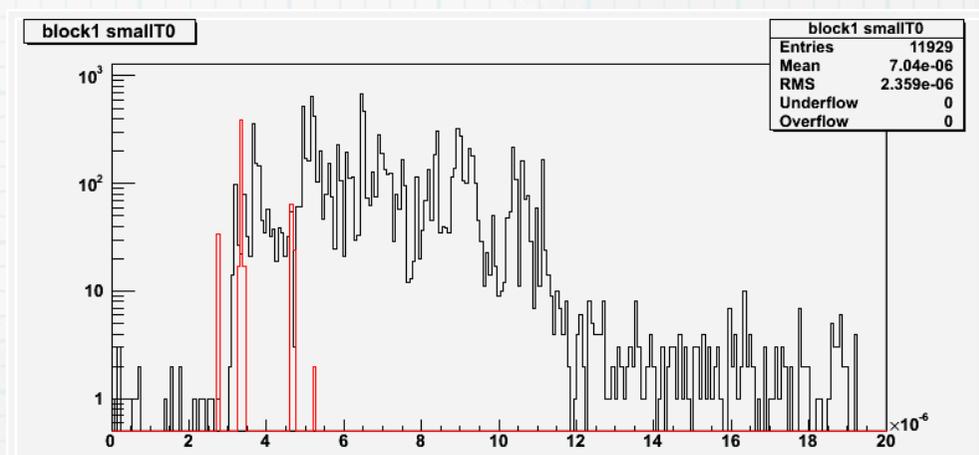
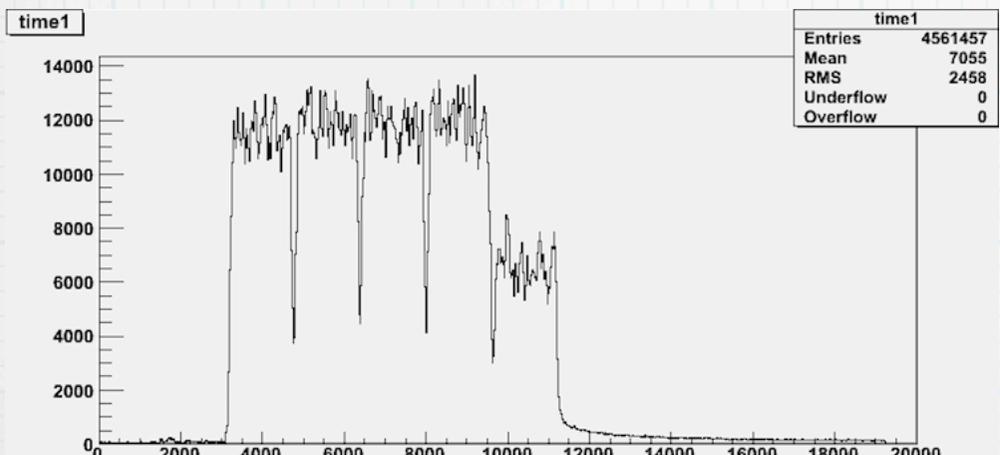


Plots

I was promised plots

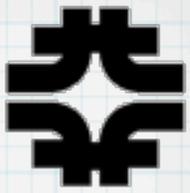


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“Backup Slides”

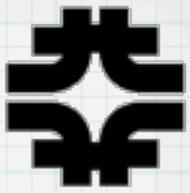


- Dragons. Why'd it have to be dragons?





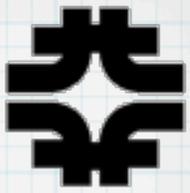
Simulation Plan - Generator



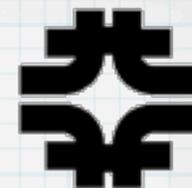
- Goal: move to C++ framework w/ GENIE
 - R-2_8_0 recently tagged/released
 - brings better geometry
- Interface to GENIE
 - “solved problem” in mathematician’s sense
 - re-use/steal code from ART-based “nusoft”
 - adapt to MINOS framework (NOvA CAF structures)
 - need to store sufficient info that one can regenerate GENIE event record structure in order to do reweighting
 - Robert best understands the work needed to be done
 - needs actual time to implement it
 - ~1.5 months work (if minimal interruptions, once started)
 - validation; initially w/ FarDet



Simulation Plan - Overlays



- Goal: move to C++ framework
 - João Coelho has resurrected Kregg Arms' code
 - what exists seems to work
 - develop/validate independent of the src of single evts
 - development of "hops" shouldn't/doesn't block this
- Moving forward
 - read parameters from DB
 - values should be stored as [det | rock] events/POT
 - DataUtil/MCFilePOTInfo[Finder] exists
 - Database table needs to actually be filled
 - ability to sample intensity profile within an run
 - output file has spills of varying intensity
 - record spill-by-spill the intensity
 - use same data structure that the "data" uses
 - above should eliminate the need for MCInfo
 - use of which has been the cause of numerous [μ]DST problems

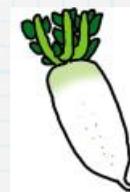


MINOS+ MC

- Time to change over to “hops”?

- **Matrix of code elements**

- {gminos, EvtKin} swim v through geometry
- {neugen, genie} cross-sections & kinematics
- {gminos, PTSim} final state particle propagation



vegetable	v swim	xsec/kine	propagation
daikon	gminos	neugen	gminos
eggplant	gminos (daikon)	neugen (daikon)	PTSim ₀
fava	gminos	genie	gminos
garlic	gminos (fava)	genie (fava)	PTSim ₁
hops	EvtKin (w/ genie)	genie	PTSim ₂

