

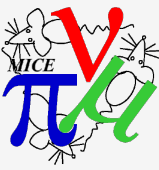


COMPUTING & SOFTWARE

Durga Rajaram

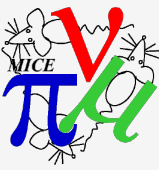
CM 45

July 30, 2016



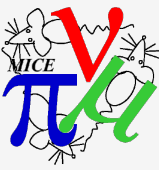
COMPUTING & SOFTWARE

- Controls & Monitoring
 - H/w controls, Run Control, archiver, alarm handler....
- Online
 - Trigger, DAQ, Readout monitoring, online reconstruction
- Offline
 - Detector reconstruction, simulation, globals
- Infrastructure
 - Data curation, processing, database, networking



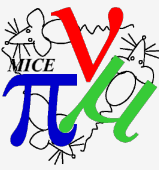
ONLINE

- DAQ readout & software:
 - Stable
 - Now have rollback functionality
 - “Daily” tracker calibration ~ automated
 - Hall probe readout now in raw data
 - + Updated unpacker & data structure
- Trigger:
 - New firmware developed to support prescaled triggers
 - Tracker readout being updated [gate generation, timing...], needs to be integrated & tested
 - Bug found during data-taking, rolled back, now being debugged
 - Note: will introduce changes in reconstruction of TOFs, so needs data + lead time for development & testing
 - <https://indico.cern.ch/event/548887/contributions/2256436/attachments/1317362/1973952/DAQ.pdf> (Yordan Karadzhov)
 - https://indico.cern.ch/event/548887/contributions/2256454/attachments/1317386/1974138/MICE_CM45_TrackerReadout.pdf (Ed Overton)

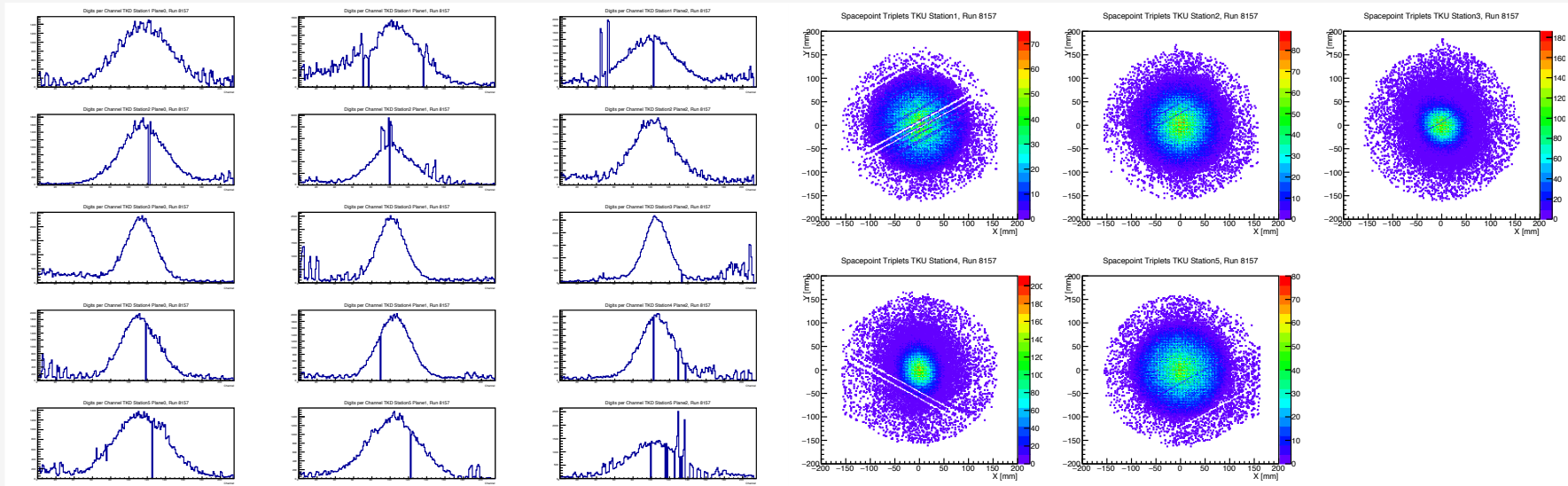
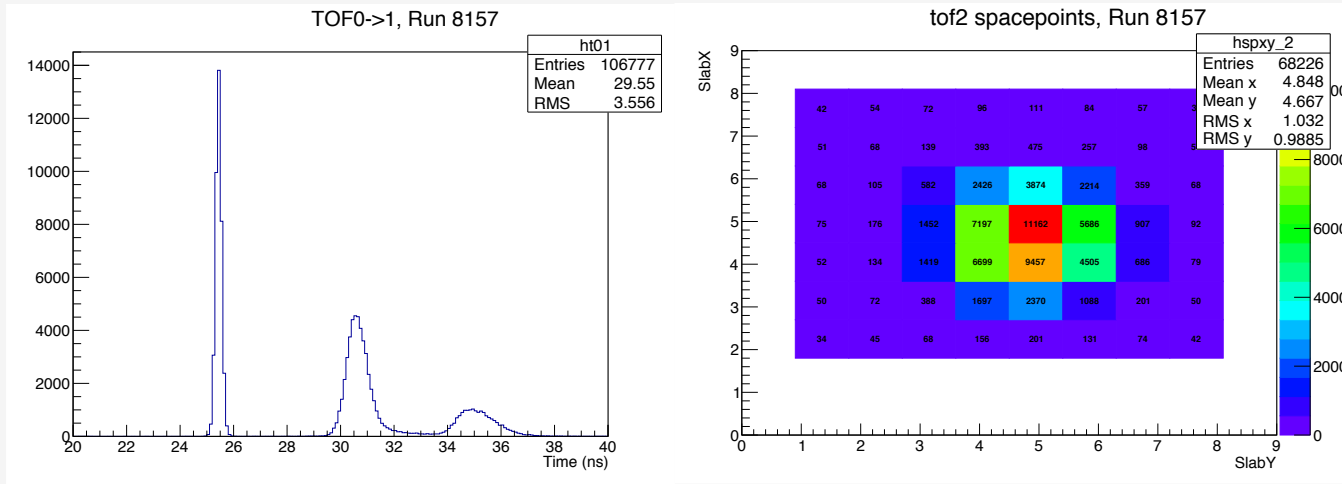


ONLINE RECONSTRUCTION

- Multi-threaded framework
 - Runs against MAUS release
 - Persistent running
 - No start/stop from shifter
 - Plots visualizable from MLCR & remotely
 - ROOT canvases stored in file for each run
 - <http://reco.mice.rl.ac.uk/Onrec/>
- New API developed, to be deployed shortly
 - <https://indico.cern.ch/event/548887/contributions/2256439/attachments/1317366/1973957/OnRec.pdf> (Yordan)
- To do:
 - Structural tweaks to pick up geometry run-by-run
 - Bundle plots with recon output
 - Links to plots from recon browser



ONLINE RECONSTRUCTION





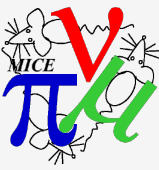
OFFLINE

- Reconstruction
 - Currently @ MAUS v2.5.1
 - Detectors reconstruction software stable
 - Tracker:
 - Kalman filter improvement, ‘final’ fixes in
 - PR straight tracks optimized
 - Recent field-on data being analyzed
 - Globals now in MAUS, allows us to use, debug, fix, improve it
 - Data-structure issue holding up inclusion in official production
 - Field-handling:
 - Fields generated from SS currents for run
 - Default field map does not include PRY effect
 - Needs looking at
 - Event-viewer development: v1 now shipped with MAUS
 - Working on integrating it with online framework



INFRASTRUCTURE (NETWORK, SPARES..)

- Need to ensure availability of hot-swappable spares
 - And the failover must be tested
 - Done for EPICS servers, IOCs, Configurations database, DHCP server
 - But some have slipped through the cracks
 - Target control, Tracker IOC
 - Tracker: Need h/w card for tracker IOC to be hot-swappable
 - Tracker: Need spare fully working VME buffer board
 - Target: Target1 computer crashed, need for replacement being evaluated



INFRASTRUCTURE (DATABASE)

- Absorber table implemented & information being written to by Run Control
- Geometry corrections table designed
 - For analysis-based corrections to surveys, Implemented on PreProd, being tested
- Reconstruction quality table: designed, to be tested
- Cooling channel information now in viewer

Run Number: 8157

Summary Download Geometry

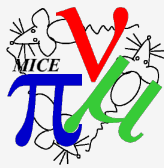
Coolingchannel Details Geometry Details

Valid From Time: 2016-07-27 08:17:20.64753

Valid Until Time:

Magnets:

| Name | Mode | Polarity | | | | |
|--------|-------------|----------|------------|-----------|--------|------|
| FCU | solenoid | 1 | | | | |
| coil | calibration | ilim | iset | stability | rate | vlim |
| FCU-C | 0.0268 | 50.0 | 44.700001 | 95.0 | 0.025 | 8.0 |
| SSD | solenoid | 1 | | | | |
| coil | calibration | ilim | iset | stability | rate | vlim |
| SSD-E2 | 0.0451 | 60.0 | 140.024399 | 0.0 | 0.0025 | 5.0 |
| SSD-E1 | 0.0407 | 60.0 | 140.023193 | 0.0 | 0.0025 | 5.0 |
| SSD-M2 | 0.0201 | 290.0 | -6.0E-4 | 95.0 | 0.025 | 7.0 |
| SSD-M1 | 0.0302 | 290.0 | -0.0227 | 95.0 | 0.025 | 7.0 |
| SSD-C | 0.0147 | 290.0 | 139.998505 | 95.0 | 0.025 | 16.0 |
| SSU | solenoid | 1 | | | | |
| coil | calibration | ilim | iset | stability | rate | vlim |
| SSU-E2 | 0.0451 | 60.0 | 139.999603 | 0.0 | 0.0025 | 5.0 |
| SSU-E1 | 0.0407 | 60.0 | 140.021103 | 0.0 | 0.0025 | 5.0 |
| SSU-M2 | 0.0201 | 290.0 | 0.003 | 95.0 | 0.025 | 7.0 |
| SSU-M1 | 0.0302 | 290.0 | -0.0012 | 95.0 | 0.025 | 7.0 |
| SSU-C | 0.0147 | 290.0 | 139.998703 | 95.0 | 0.025 | 16.0 |



DATA PROCESSING

- Offline reconstruction now routinely done in MLCR
 - Bundled with ROOT output, logs, geometry...
 - Automatically triggered at the end of each run
 - Official recon output available for use shortly after a run ends

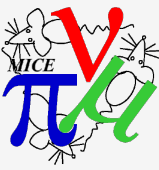
reco.mice.rl.ac.uk

MICE Reconstructed Data

Show 25 entries Search:

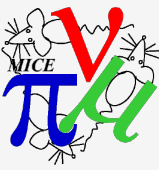
| Run Number | Run Date | Optics | Triggers | Reco Version | Download | Reco Date |
|------------|------------------------|----------------|----------|-----------------|--|------------------------|
| 8196 | 2016-07-28 20:35:35 | 3-140+M3-Test2 | 84604 | MAUS- v2.5.1 | 08196_offline.tar (1018.8 MB) (md5) | 2016-07-28 21:47:51 |
| 8195 | 2016-07-28 19:34:25 | 3-200+M3-Test1 | 179159 | MAUS- v2.5.1 | 08195_offline.tar (1.6 GB) (md5) | 2016-07-28 20:56:39 |
| 8194 | 2016-07-28 18:46:20 | 3-240+M3-Test1 | 196538 | MAUS- v2.5.1 | 08194_offline.tar (1.7 GB) (md5) | 2016-07-28 19:58:21 |
| 8193 | 2016-07-28 18:12:47 | 300MeV+pi_pa82 | 173110 | MAUS- v2.5.1 | 08193_offline.tar (1.9 GB) (md5) | 2016-07-28 19:20:08 |

- Want to make this better
 - Include reconstruction plots with output bundle
 - Reconstruction quality flags will be tested & deployed during shutdown



MC PROCESSING

- Since CM44
 - Have MC production manager (Dimitrije Maletic)
 - Now able to push simulations through GRID
 - <http://micewww.pp.rl.ac.uk/projects/analysis/wiki/MCProduction>
 - Improvements in how output data is presented to users
- Issues
 - MC speed remains an issue though not a problem on GRID
 - Need to be able to react faster to production requests
 - Beam-input is the main inefficiency now
 - Limited libraries available
 - No libraries (yet) for the “pion beam” settings
 - Inefficiency in Beam-to-GEANT interface



SUMMARY

- Major improvements in all areas
 - Run Control, channel IOCs, network stability
 - DAQ stable, prescale trigger capability in development
 - Improvements & optimizations in track recon.
 - Fast-reconstruction routine & stable
 - MC production taking off
- More effectively serving physics