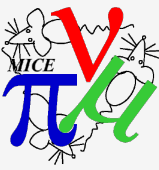


# COMPUTING & SOFTWARE

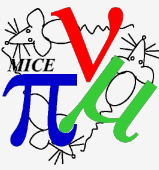
Durga Rajaram

MICE CM 48  
June 29, 2017



# 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



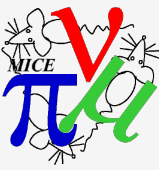
# CONTROLS & MONITORING

- Lots of improvements & ongoing work
  - Now have stable development & “pro” environments
  - Fixes to SS state machine
  - Restructuring of archiver & alarm handler configurations
  - Updated spreadsheets & parameters for alarm handler
  - Run control has been stable during running
  - For 2017/02 - need LH<sub>2</sub> monitoring
    - & a way to get it into the CDB: analysis/MC will need temperature, pressure, level
- C&M review to address autonomous ramp finally closed out.
  - <http://micewww.pp.rl.ac.uk/projects/memo/wiki/CAM-Rolling-Review-2017>
- More from Ajit Kurup...



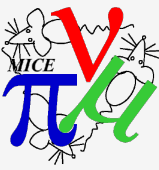
# ONLINE

- Trigger & DAQ readout
  - Trigger, readout & software: stable
  - Hall probes – one dead probe
  - Major intervention in April/May with tracker cryostats
    - Recovered a lot of dead channels, mapped & recalibrated
    - Need to understand impact/options with remaining dead regions
- Online Recon: automagically runs, plots saved run-by-run
- Personnel: Need a new Ed
  - Many thanks and best wishes
- More from Ed...



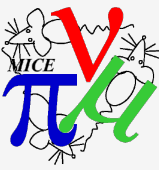
# OFFLINE

- Reconstruction
  - Currently @ MAUS v2.9.1 (new, this week)
  - Detectors: focus is now more on details & improvements
    - Highest priority is remaining inefficiency in track reconstruction
    - Being pushed by a rolling review of the tracker software & several ideas generated – different fitting algorithms for the circle & longitudinal fits
    - TOF2 inefficiency & offset
  - Globals:
    - Global (matching) ~ ready for MAUS
    - Performance (speed) is a resource issue – ~x3-5 slower – can solve by running reco on Grid and keep a 'sample' for MLCR reco (?)
    - Performance (efficiency) needs to be studied
    - Fitting & PID need to come in
- Geometry & Fields:
  - Latest surveys incorporated – need to generate new alignment constants after reprocessing
  - Bugs in diffuser description (thickness, materials, z-order) – in progress



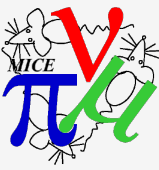
# INFRASTRUCTURE (SPARES)

- Need to ensure availability of hot-swappable spares
  - Target:
    - RATS has been built on spare target computer
    - Need to verify we have documentation for failover
  - Tracker:
    - Need h/w card for tracker IOC to be hot-swappable (PCI card & crate controller)
    - Need spare fully working VME buffer board
  - DAQ:
    - Failover computer now in place & up-to-date
    - Need to check documentation
  - CDB:
    - Failover has been tested & documented



# INFRASTRUCTURE (DATABASE)

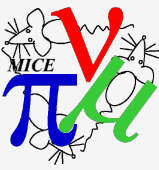
- Improvements aimed at making it more user-friendly
  - CDB viewer updated to show cooling channel & absorber info for each run
  - Cooling channel “tag” added to the data structure so analysis user can check/select runs based on tag
  - New C++ API for cabling & calibrations – makes it simpler & more ‘native’ to implement lookups in MAUS c++ codes
- Reconstruction quality table:
  - Table designed, implemented to hold a quality hex flag for each detector per run
  - Tested on pre-prod DB with TOF, EMR
  - Intention is offline reco to run a check & write flag for each reco version



# DATA PROCESSING

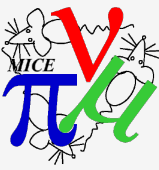
- Offline reconstruction now routinely done in MLCR
  - Automatically triggered at the end of each run
  - Online reconstruction plots bundled with output
- Reprocessing currently being done in MLCR
  - Takes ~ week
  - Step4 data will be reprocessed with new MAUS 2.9.1 once new TOF calibration & geometry bug fixes come in
- GRID:
  - the current job scheduling interface is being retired
  - Ray & Dimitrije have been testing submissions with the DIRAC framework
  - Our Grid load at the moment is just MC, but we may have to look into running some reco on the Grid due to globals load





# MC PROCESSING

- Dimitrije has been pushing MC requests to the Grid & turn around time is  $\sim < 1$  day
- Status & issues:
  - Have generated beam libraries for the now-standard pion-beam currents & have run MC against those
  - Some discrepancies still noted between generated beam & data
  - CR/PF tuned dipole currents ‘by hand’ in the G4BL deck – seems to be an improvement
  - G4BL libraries with the tuned currents need to be generated & MC needs to be run on those (with tracker, tof improvements & geometry fixes)
  - Need to check framework for running non-standard MC (for analysis systematics)
- More from Dimitrije...



# PUBLICATIONS

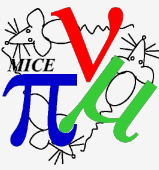
- MICE Software publication:
  - Covers MAUS framework, simulation & reconstruction software
  - More progress recently thanks to help from AD
  - DR cleaning up 1<sup>st</sup> draft
  - Will have it done for internal review next week
- Does not cover DAQ, C&M, CDB, Data-handling – could consider separate publications for those

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# SUMMARY

- Lots of improvements & ongoing work
  - Alarm handlers, state machine, archiver..
  - DAQ stable, must understand dead channels in tracker
  - Remaining inefficiencies in track reconstruction being addressed
  - Global track matching will shortly be in official MAUS
  - Fast-reconstruction in MLCR routine
  - Beam description in MC being understood & improved
- Look forward to more data