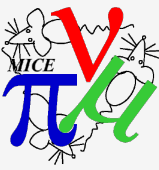# COMPUTING & SOFTWARE

Durga Rajaram
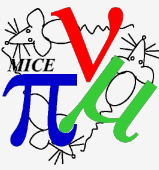
MICE CM 49
Oct 4, 2017

CONTROLS & MONITORING

- Lots of improvements since last CM
  - Remote monitoring for LH_2
    - IOC, GUI
    - Adding run-by-run LH_2 parameters to the CDB needs a post-processor later
  - Major improvements to the alarm limits & ALH implementation
  - Run control has features but is stable during running
- More from Ajit Kurup…

ONLINE

- Trigger & DAQ readout
  - Trigger, readout & software: stable
  - Major intervention in April/May with tracker cryostats
    - Several dead channels → waveguide reconfiguration to optimize
  - Issue with EMR readout during 2017-02 startup
    - EMR VRB(s) failed to initialize, then later died on first event
    - Still not clear if issue with VRB or the DBB-VRB communication
    - DAQ automatically stops when readout drops out
  - Tracker veto timing is not optimized, results in readout mismatch unpacking errors at high instantaneous rates

- Online Monitoring
  - Working as advertised
  - Traps unpacking/corrupt data errors & raises alarm
  - Requires shifter intervention to stop run if alarm status remains "serious"

- Online Reconstruction
  - Automatic
  - Runs in multithreading mode, occasional crashes which are not seen in single threaded mode. Restarts by itself after a crash
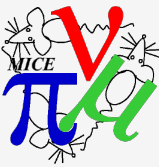
OFFLINE

- ## Reconstruction
  - Currently @ MAUS v3.0.0
  - Detectors:
    - Rolling review of trackers to focus on improving efficiency. Changes to pattern recognition fitter
    - Issues with tracker calibrations post-remapping are being addressed
    - TOF2 inefficiency, offset & MC-data discrepancy need to be resolved
  - Globals:
    - Global (track matching) in MAUS
    - Performance (speed) is a resource issue: ~x3-5 slower
    - Performance (efficiency) needs to be studied
    - Fitting & PID need to come in
- ## Geometry & Fields:
    - Bugs in diffuser description (thickness, materials, z-order) – resolved
    - Issue with interpretation of alignment corrections – fixed, but needs to go into production geometry
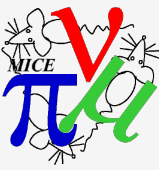
INFRASTRUCTURE (SPARES)

- Need to ensure availability of hot-swappable spares
  - Tracker:
    - Need working left & right AFE boards
    - Spares available, but need to be flashed. Can be done only from the hall
  - EMR:
    - During startup we were hampered by lack of working spare readout modules.
    - Since then, have identified spares at INFN Trieste
  - DAQ:
    - Failover computer in place & up-to-date but requires tweaking for switch-over
  - CDB:
    - Failover has been tested & documented

DATA PROCESSING

- Offline reconstruction routinely done in MLCR
  - Automatically triggered at the end of each run
  - Online reconstruction plots bundled with output
  - Added "globals version" of reconstruction as a second parallel production task
- Reprocessing currently being done in MLCR
  - Takes ~ week
  - Step4 data will be reprocessed with new MAUS after data-taking & tracker calibrations are finalized
- GRID:
  - the current job scheduling interface is being retired
  - Ray & Dimitrije have tested submissions with the DIRAC framework – MC productions now with new framework
  - Our Grid load at the moment is just MC
  - Post-MLCR, plan is to use PPD nodes for batch reprocessing
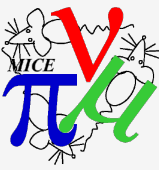
MC PROCESSING

- Dimitrije has been pushing MC requests to the Grid & turn around time is ~ < 1 day

- Status & issues:

  – Have generated beam libraries for the now-standard pion-beam currents & "tuned" currents

  – Submission successfully framework moved from WMS (which is being retired) to DIRAC

  – Production for LH2 MC needs to be done

  – Need to check framework for running non-standard MC (for analysis systematics)
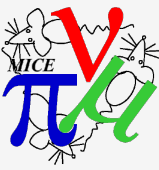
PUBLICATIONS

- ## MICE Software publication:

  – Covers *MAUS* framework, simulation & reconstruction software

  – Does not cover DAQ, C&M, CDB, Data-handling – could consider separate publications for those

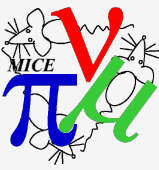 – Comments on draft 1 from KL – to be implemented

Contents

SUMMARY

- Lots of improvements
  - LH2 monitoring, alarm handler, state machines..
  - DAQ stable, must understand dead channels in tracker
  - Remaining inefficiencies & calibration issues in track reconstruction being addressed
  - Beam description in MC being understood & improved
  - Fast-reconstruction in MLCR routine
  - Production with global track matching has been implemented
  - Overall stable operation pushing data out for analysis