MICE OnMon/OnRec/C&M

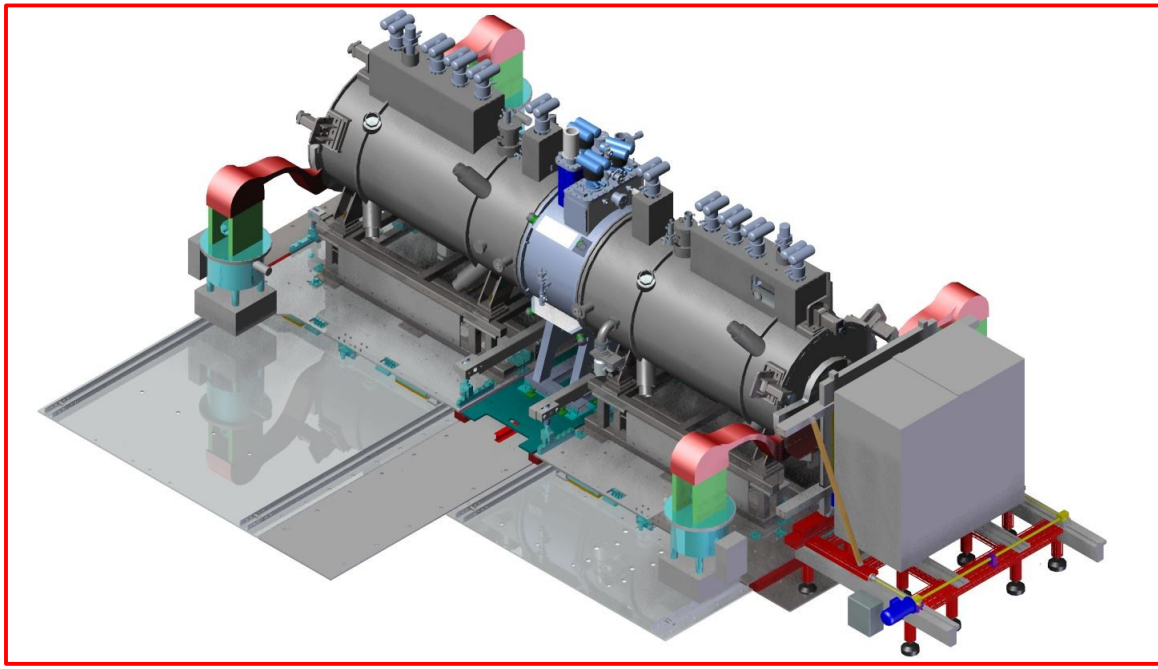
Pierrick Hanlet

ILLINOIS INSTITUTE OF TECHNOLOGY

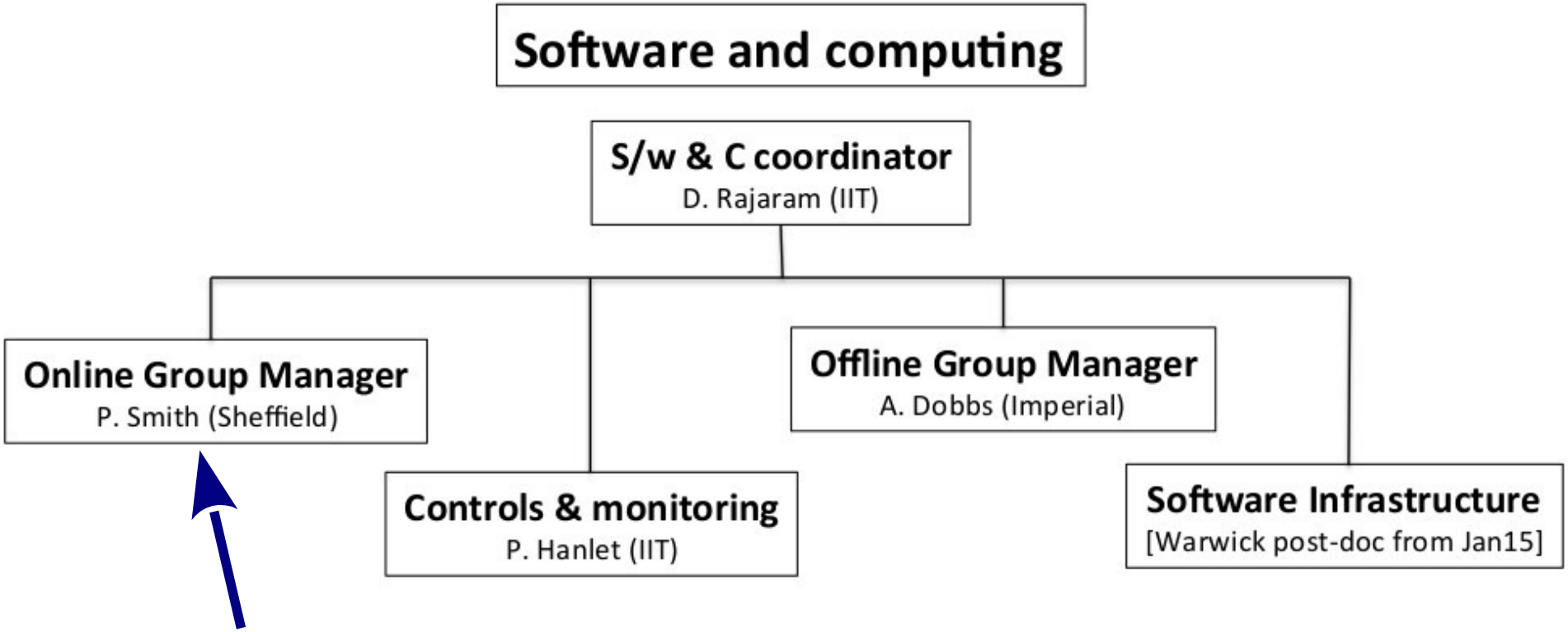
6 December 2014

Outline

- Introduction
- Online Monitoring
- Online Reconstruction
- C&M Update



Introduction



- **Online Monitoring – OnMon**
- **Online Reconstruction – OnRec**

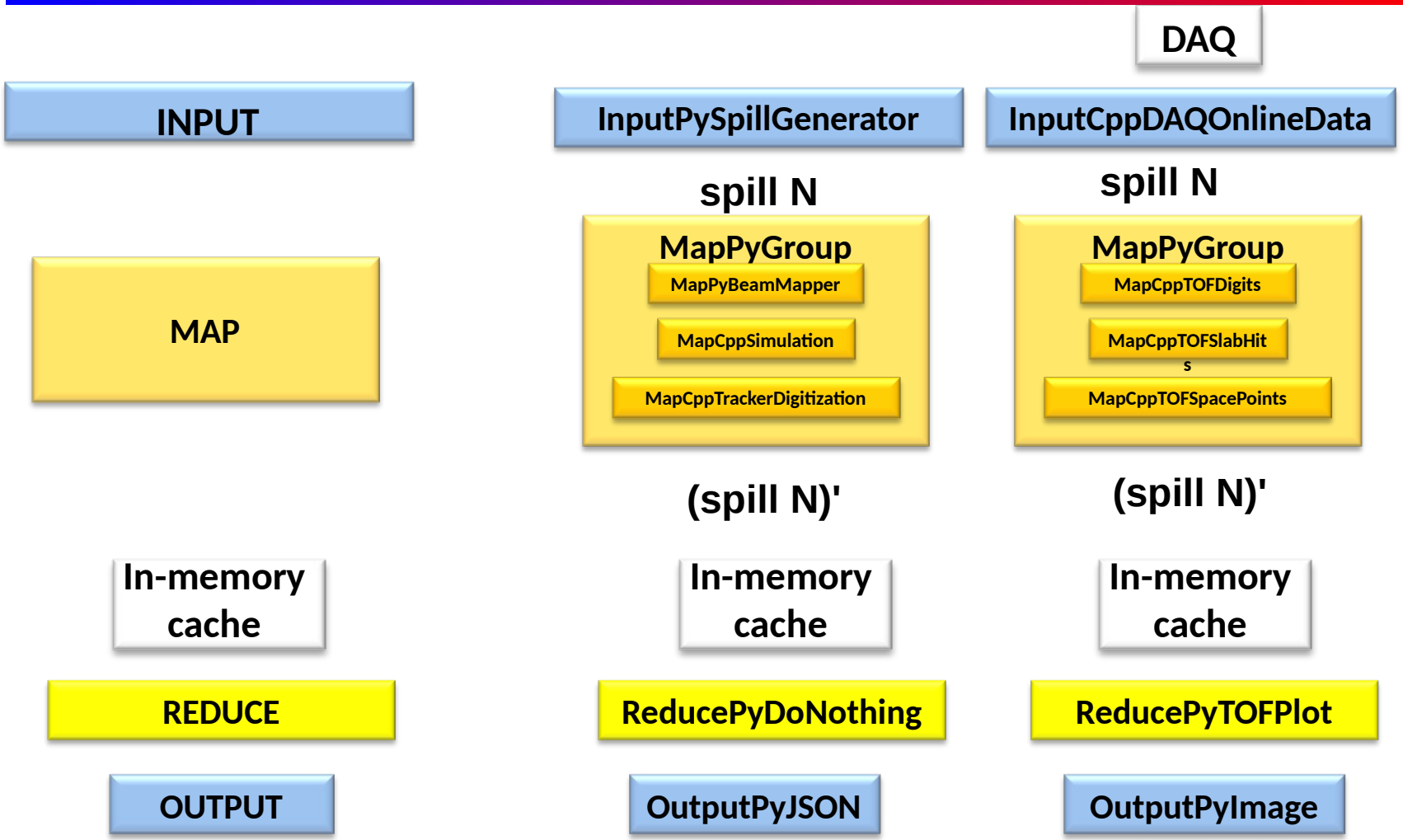
Introduction

- **Online Monitoring – Provides an immediate, low-level diagnostic monitoring capability for all DAQ hardware. Monitors DAQ performance and allows individual channel-by-channel assessment of detector behavior.**

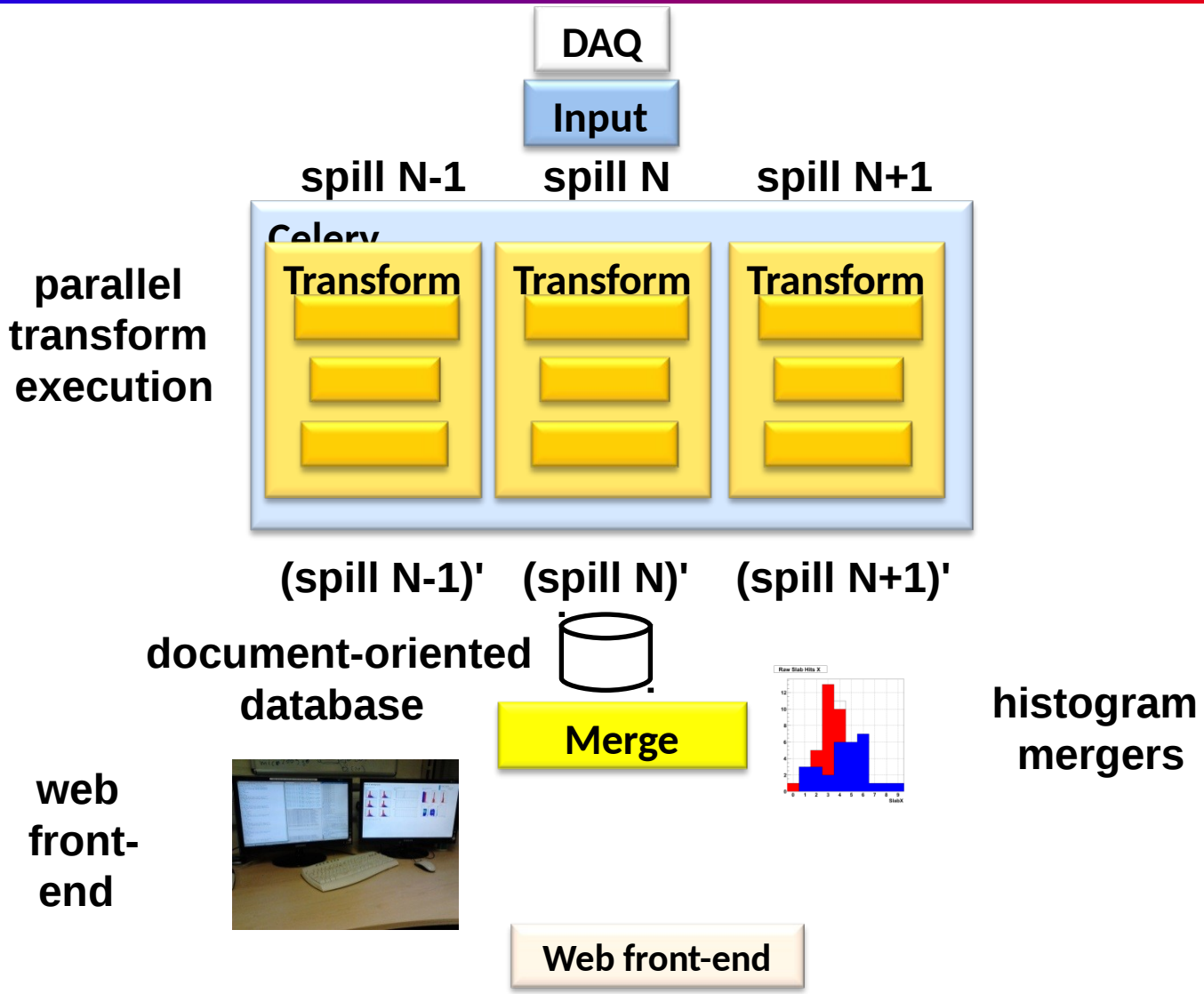
- **Online Reconstruction – Provides real-time physics information during data-taking, immediate feedback to experimenters, and a first look at analysis quantities. Includes a fixed set of histograms filled during data-taking for checks of data quality, beam dynamics, and detector function. Necessarily interfaces with the MICE Offline Software.**

- **Controls & Monitoring – Provides controls and monitoring of all MICE systems including the beamline, detectors, MICE channel, environment, and facilities; also audible alarms, data archiving, and remote read-only access**

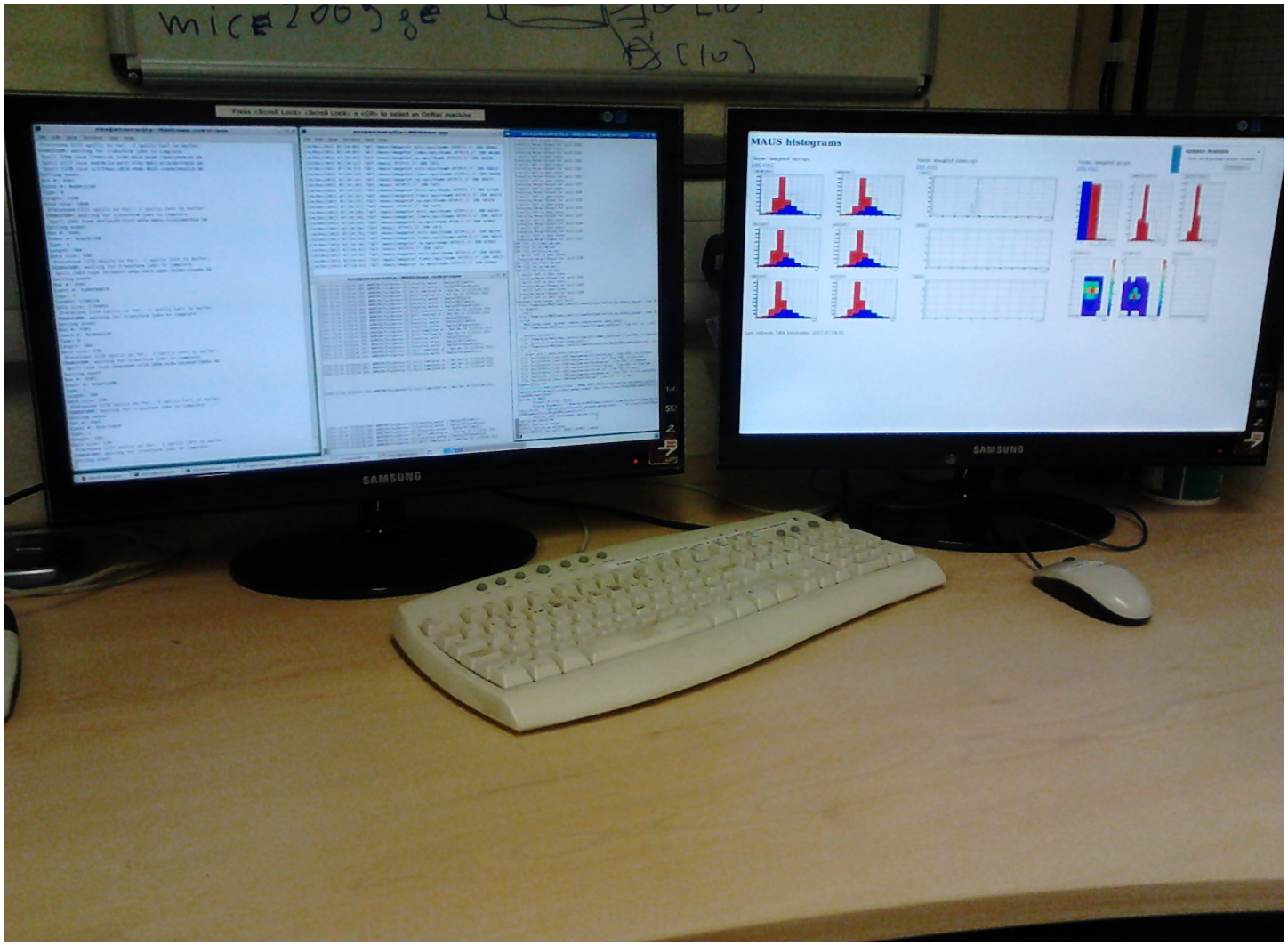
OnMon/OnRec Process



OnMon/OnRec Process



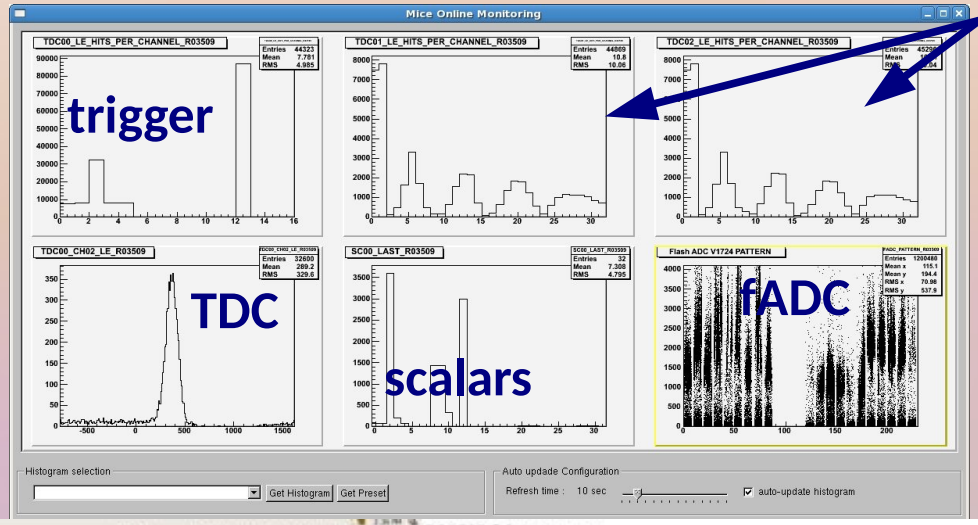
OnMon/OnRec in MLCR



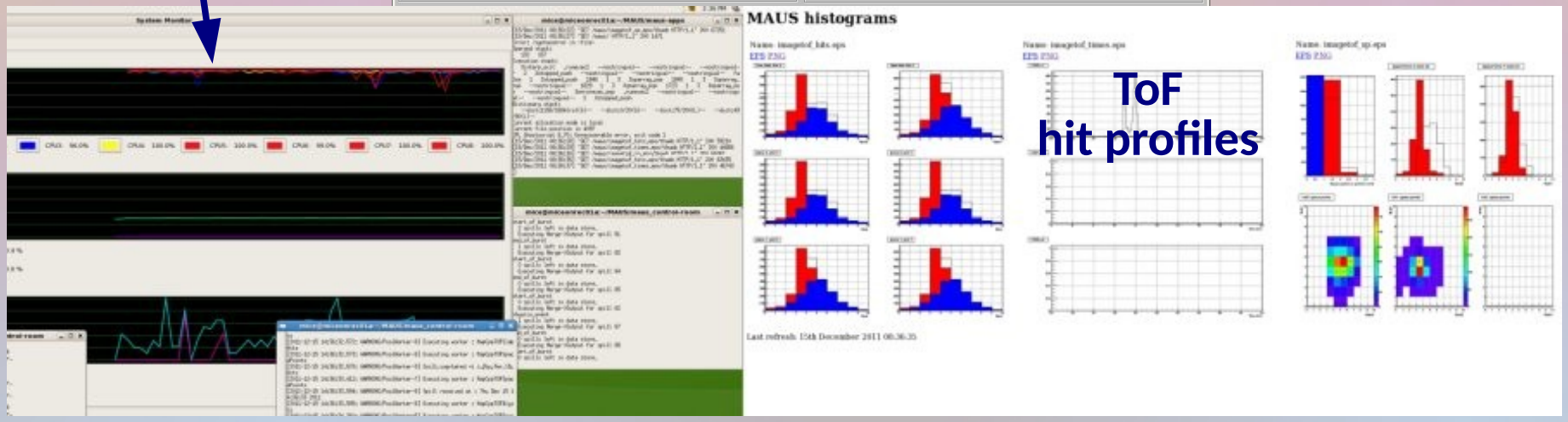
Online Monitoring

- new unpacking software

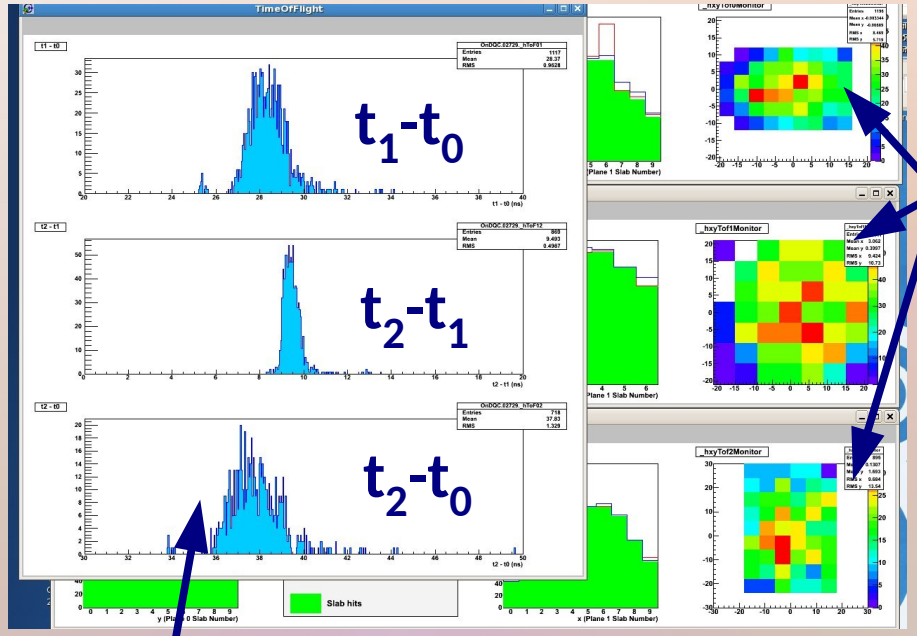
ToF hit profiles



CPU monitor parallelization



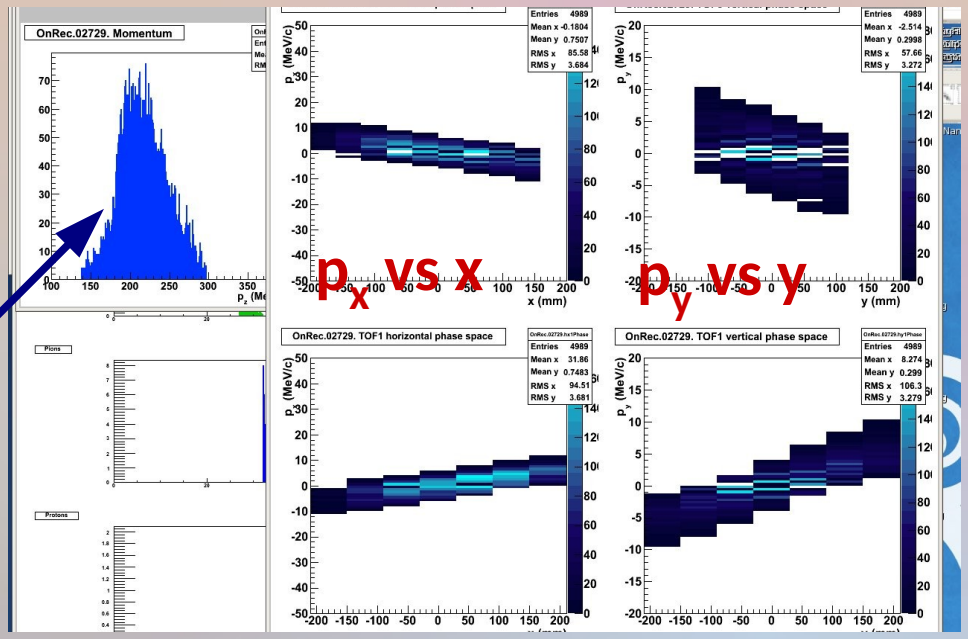
Online Reconstruction



ToF 2D profiles

trace-space distributions

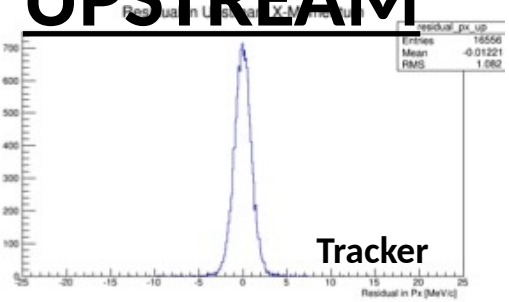
Δt distributions



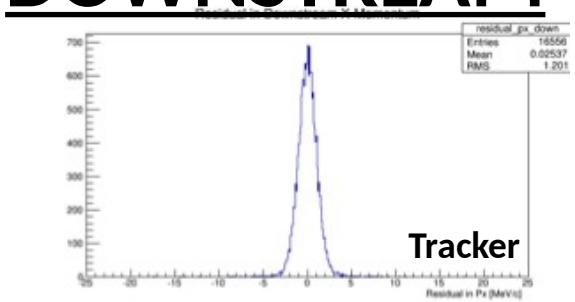
μ momentum

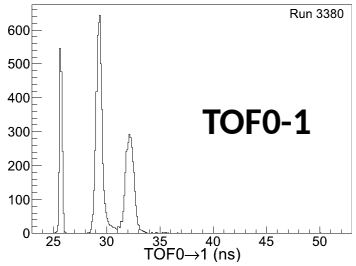
Offline Summary

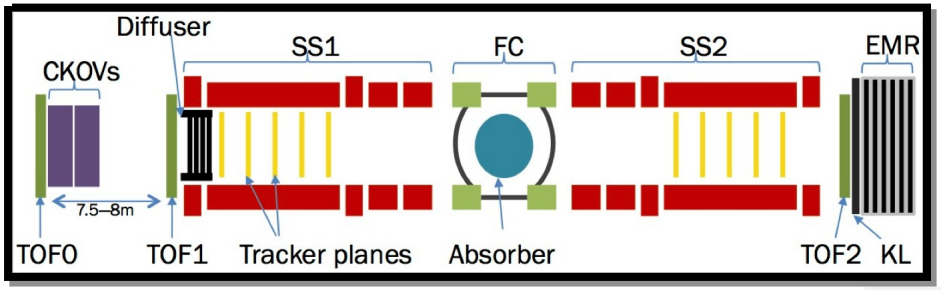
UPSTREAM

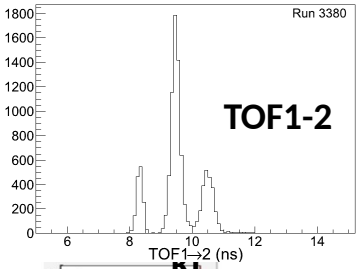


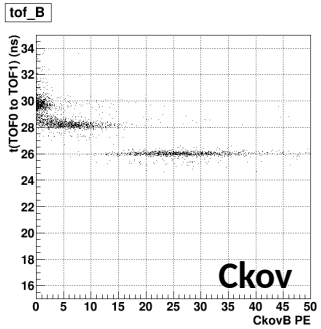
DOWNSTREAM

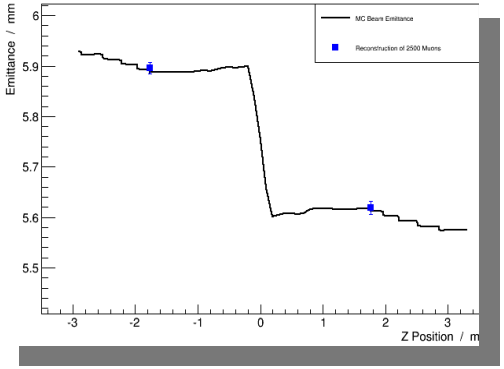


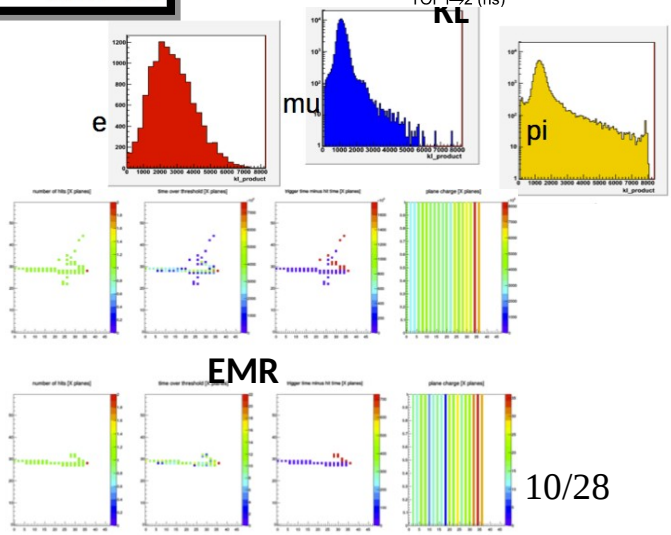




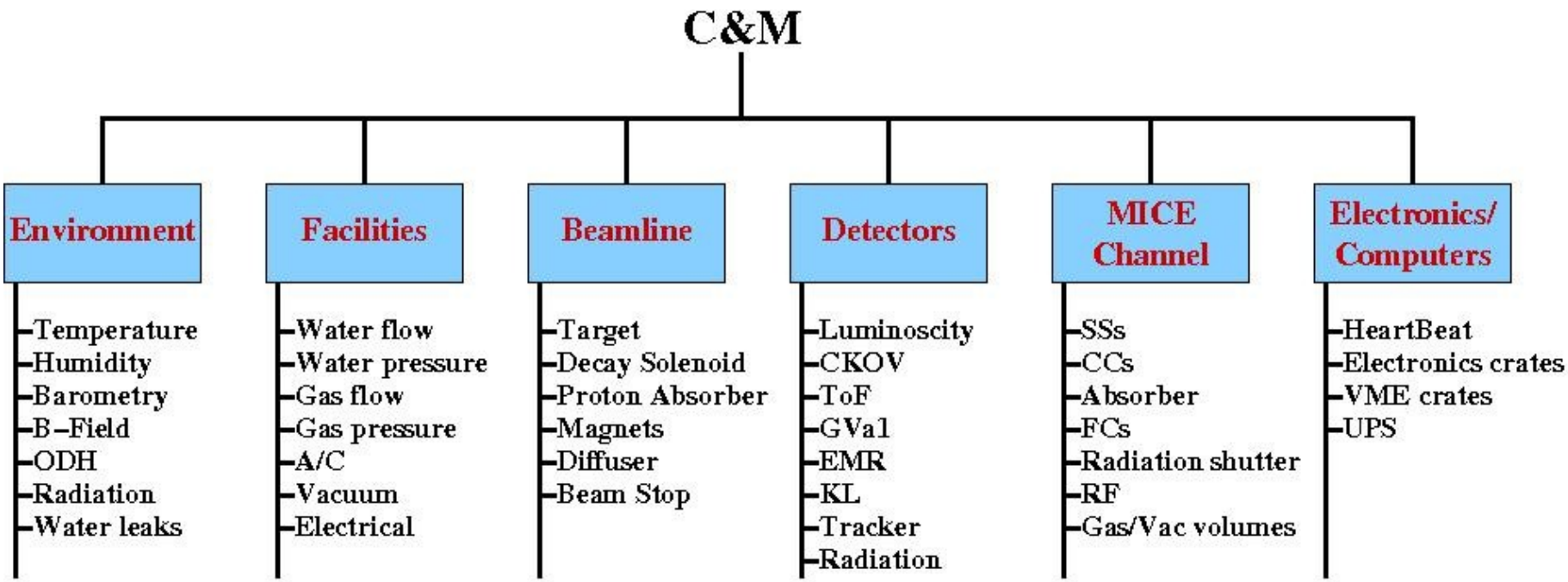


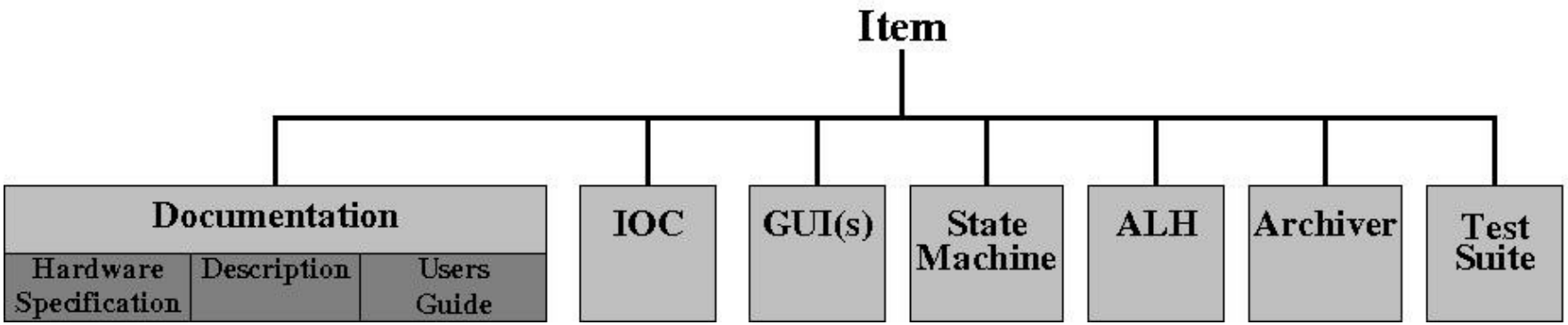




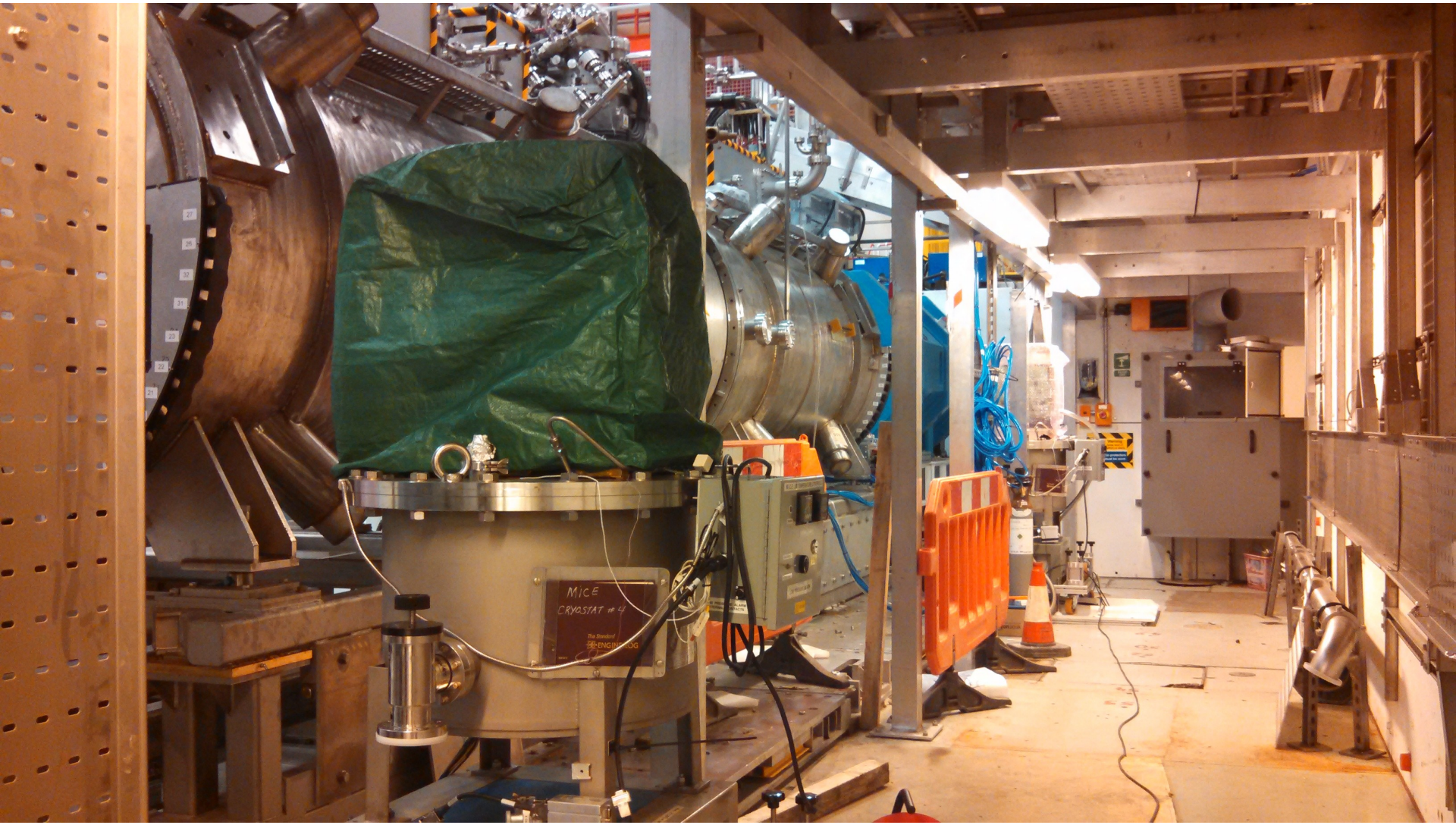


C&M Organization



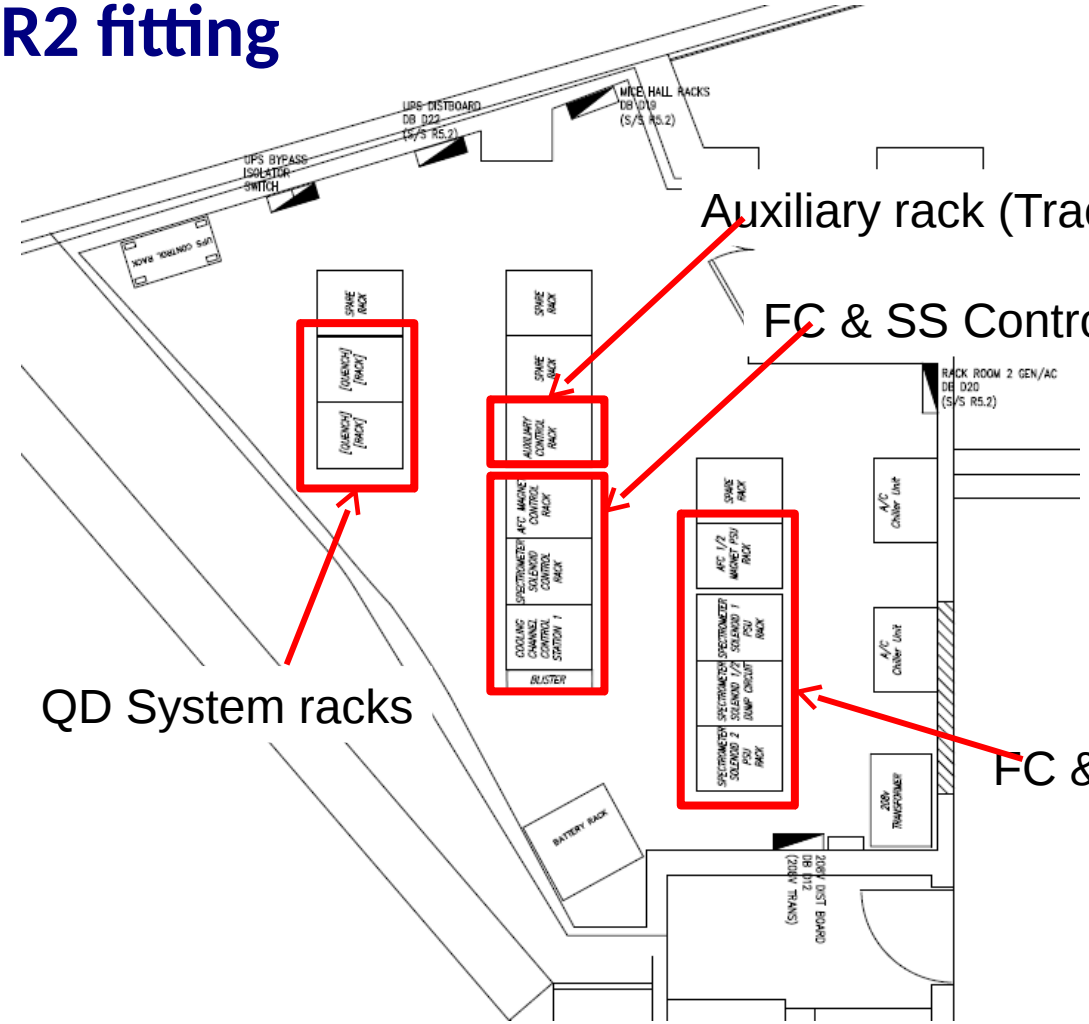


Installation



Controls

- **RR2 fitting**



Controls

FC & Diffuser/Tracker

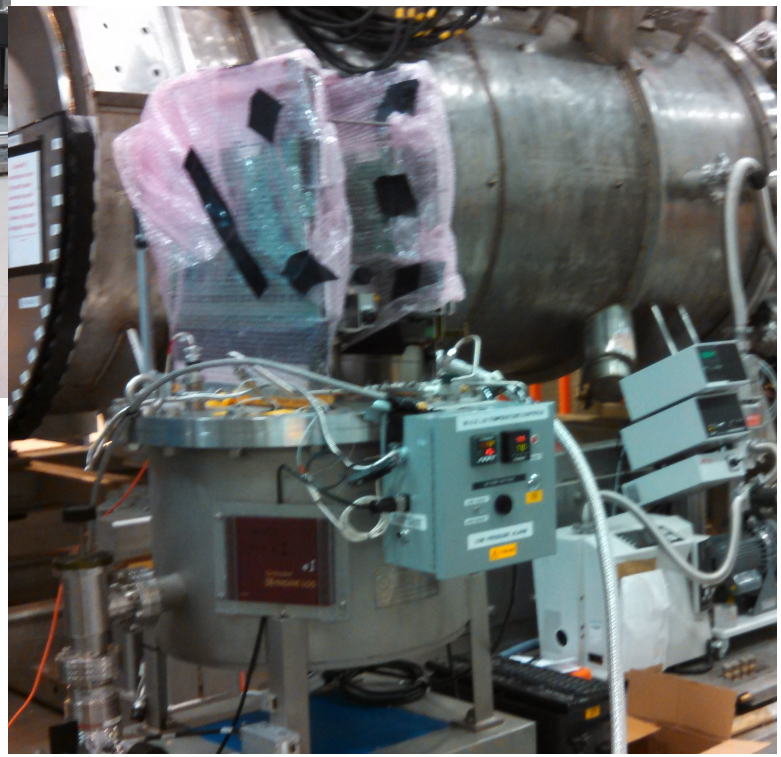
SS Instrumentation, PSs, & Energy Absorbers

To be delivered to RAL next week

Compressors/Vacuum

Vacuum & Compressors

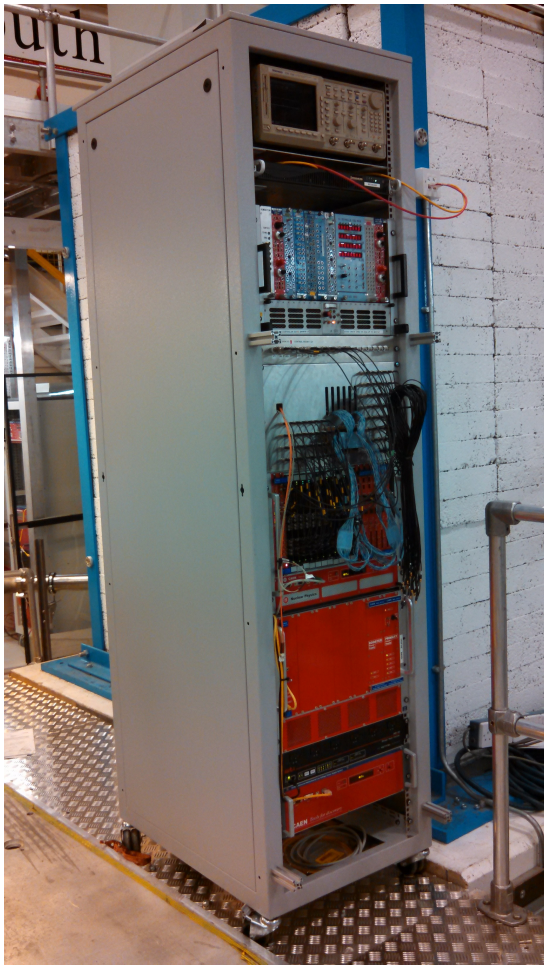
Installation – Trackers



Tracker integration

- Interlocks complete
- Initial connections to instrumentation
- 3 IOCs
  - DL: interlocks, instrumentation, compressors
  - 1 for TKU 1553 controls
  - 1 for TKD 1553 controls
- user interface plan developed and implementation in progress
- state machine development in progress

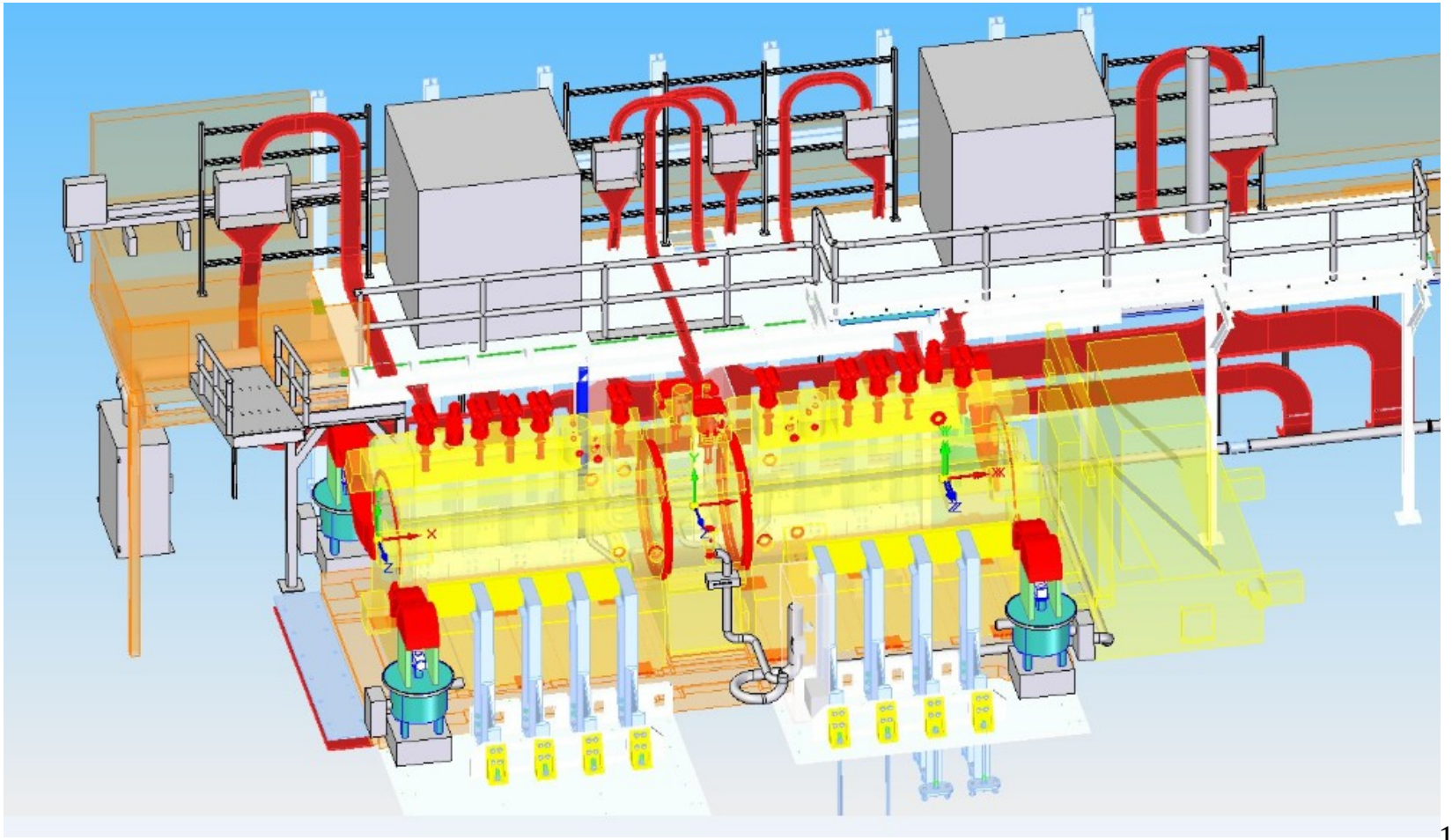
Installation – Detectors



- University of Geneva team
  - DL installed new EMR rack
  - October – installed EMR equipment into rack
  - work incomplete due to some equipment not working
  - work in progress for:
    - rack power control
    - HV control
    - LV control
    - VME monitoring
    - detector volume & rack temperatures
- ToF team
  - October – ToF1 shielding plan finalized

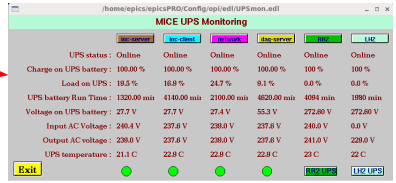
Cable Management

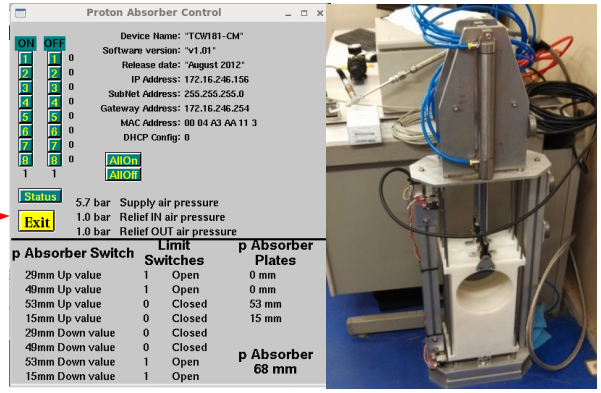
Cable management for DC cables and link boxes for SS & FC

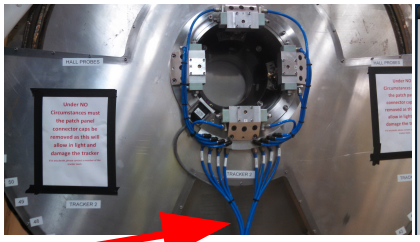


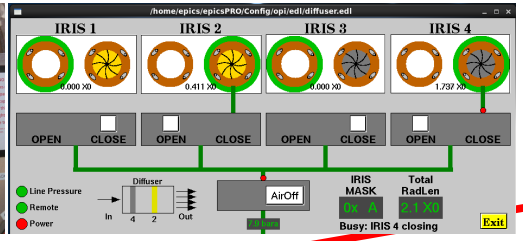
Controls

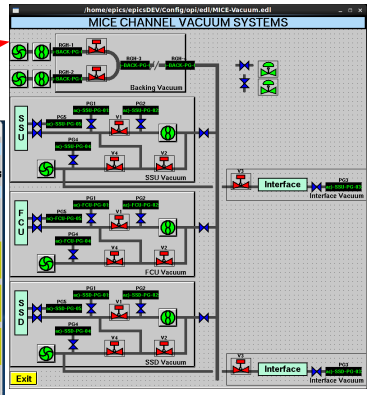
- Production version of epics
- New paradigm for IOCs
- UPS monitoring
- A/C unit monitoring
- p Absorber
- EMR
- CKOV
- Diffuser
- Vacuum
- FC2 State Machine
- ISIS beam loss

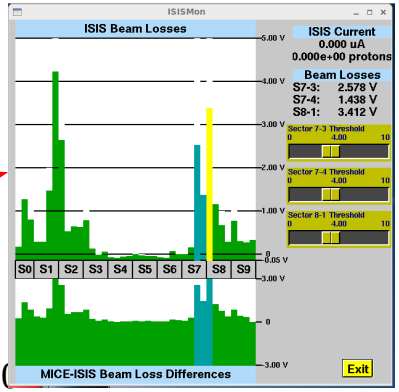












Higher Level Operation

With installation/commissioning of the new controls HW (DL), the subsystems must be able to operate together, share resources, and not adversely affect each other. These are handled by:

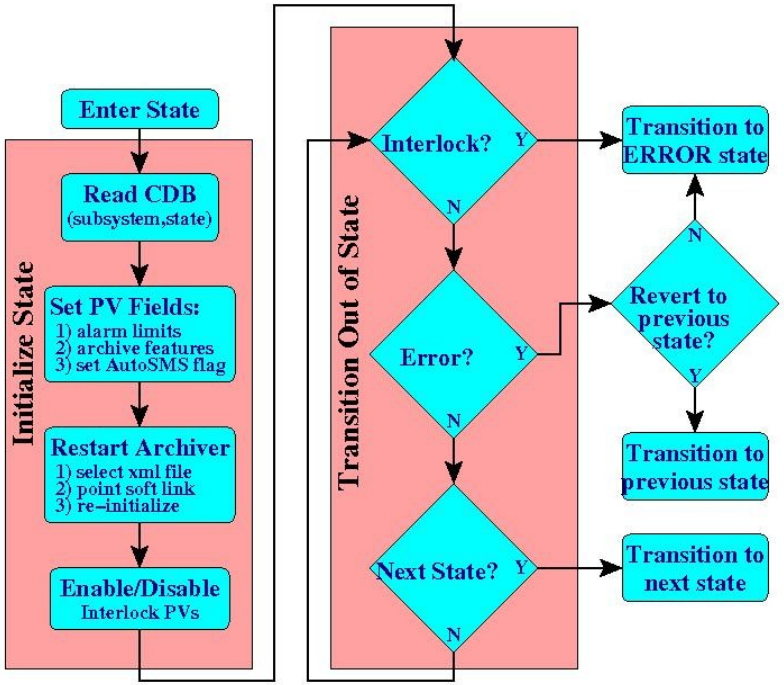
- **State Machines (SM) for each major subsystem**
- **Run Control (RC)**

State Machines

Subsystem Owners must enumerate the states and provide for each state:

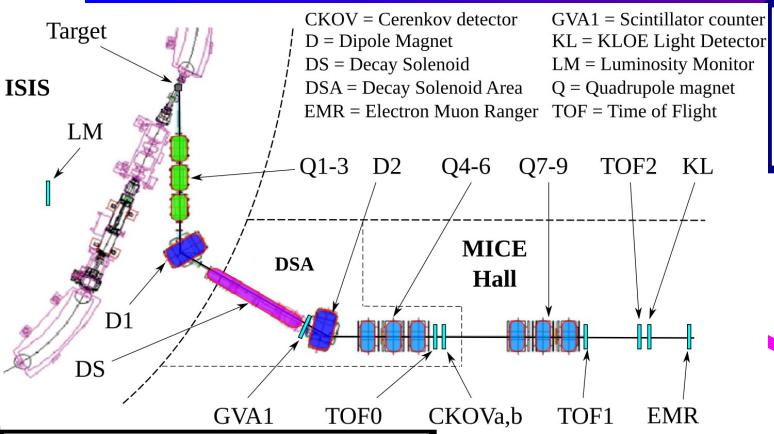
1) Description of state
2) Transition into state
3) PVs of interest
4) Alarm limits for PVs
5) Archiving features for PVs
6) AutoSMS (auto dialer) flag
7) Hardware interlocks*
8) Software "interlocks" (enables)

- Required for each state
- Stored in the CDB



- States static/dynamic
- Transitions manual/automatic

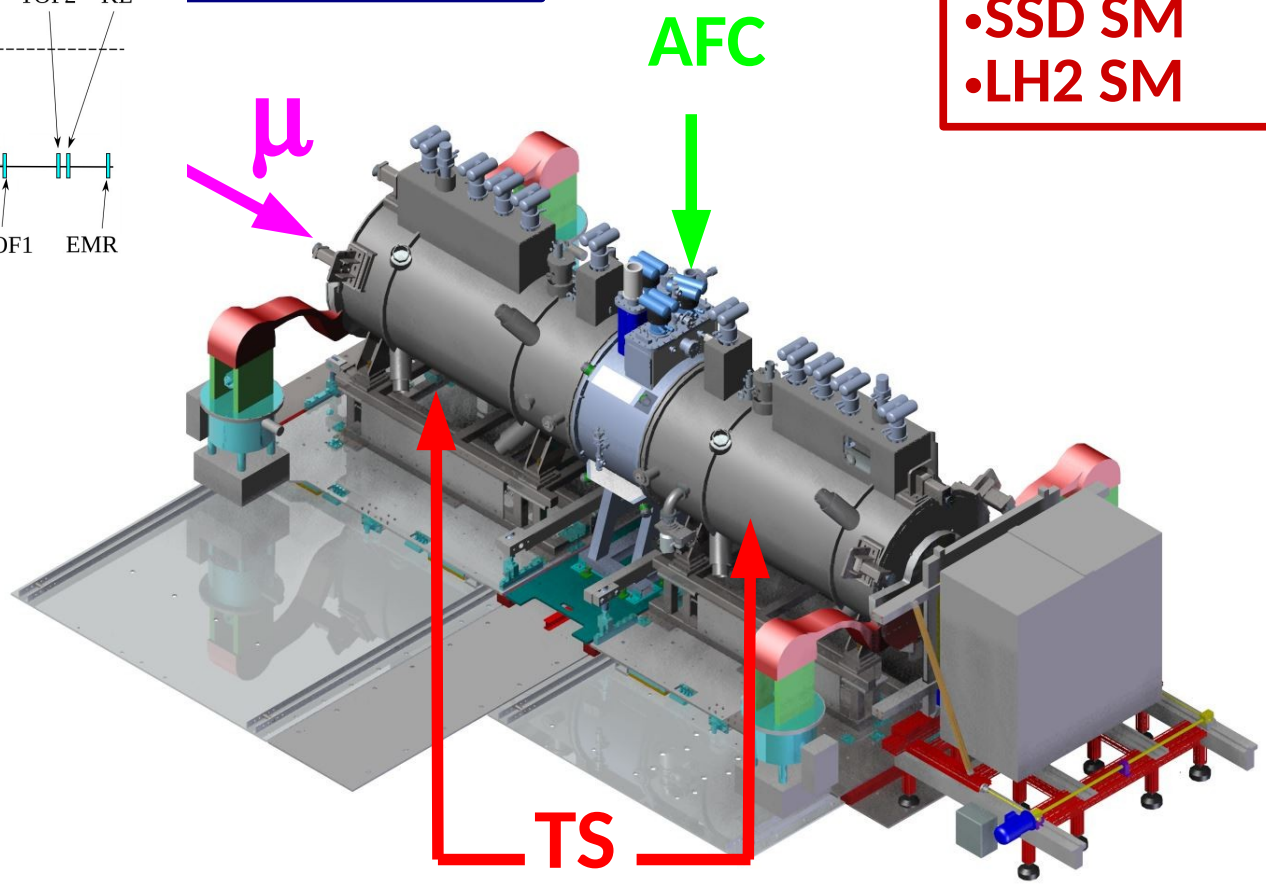
Beamline & Channel SMs



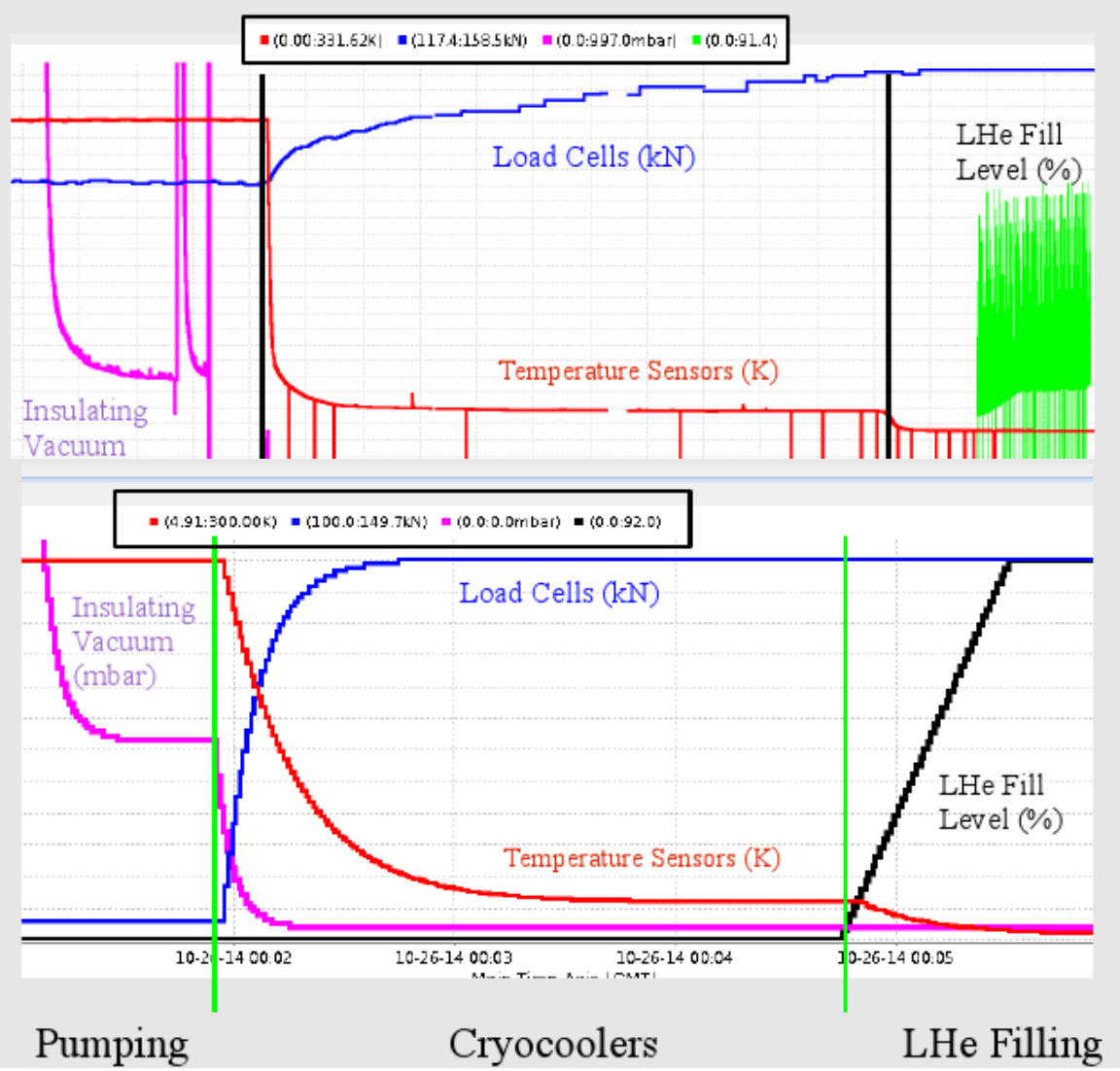
- Tracker SM
- PID SM

- SSU SM
- FC SM
- SSD SM
- LH2 SM

- Target SM
- DS SM
- Beamline SM



IOC Simulations



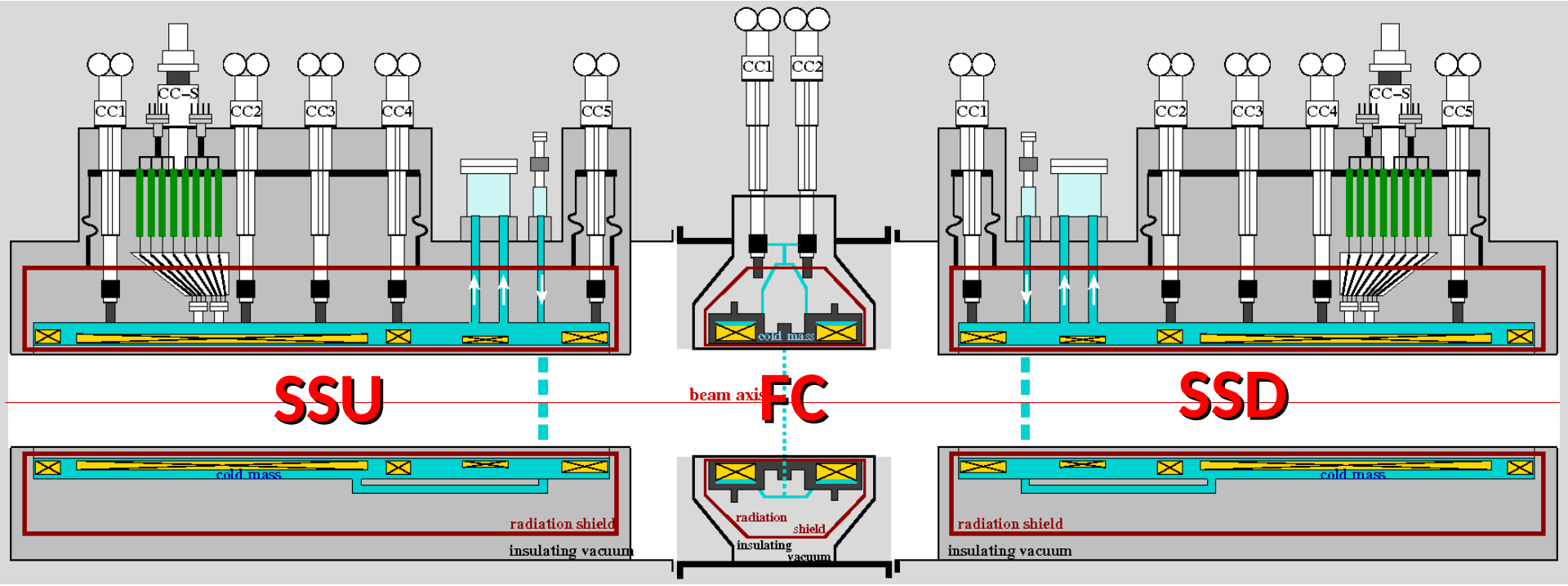
Data from Archiver

Simulation

Preparing for Mock Data Run

- Commissioning meeting
- Mock data run 21st January – welcome focus for C&M
- Need functional:
  - BeamLine
  - PID
  - DAQ
  - RunControl
    - State machines for BeamLine, PID, and DAQ
- Biggest challenges are EMR and RC

Step IV Operations



- Vacuum
- Compressors
- Cryogenics
- Pressure
- Power Supply

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- Pressure
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Run Control

Checks readiness of all required subsystems

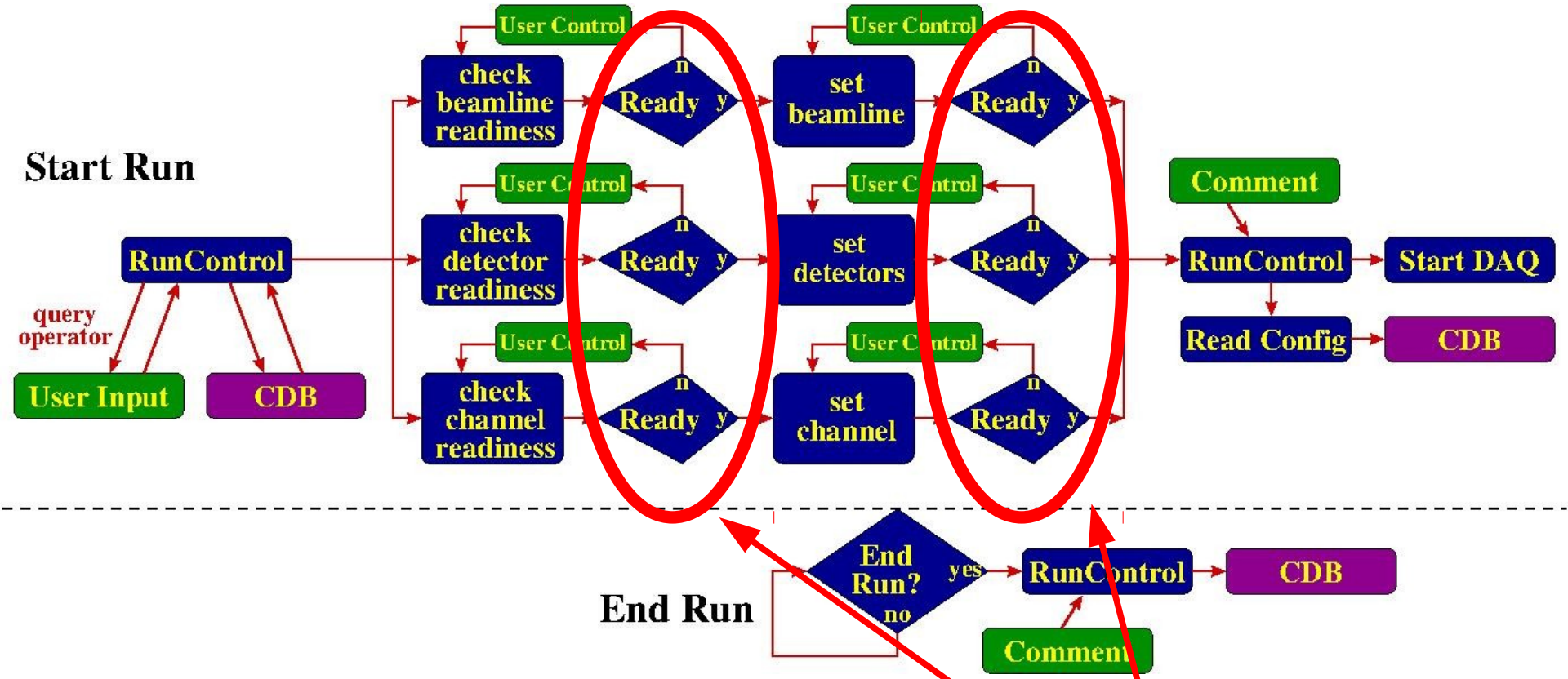
Serves to control

- **Beamline magnets, target, diffuser, etc.**
- **Particle ID detectors**
- **Trackers**
- **Absorber(s)**
- **Channel magnets power supplies**
- **RF (Final MICE configuration)**

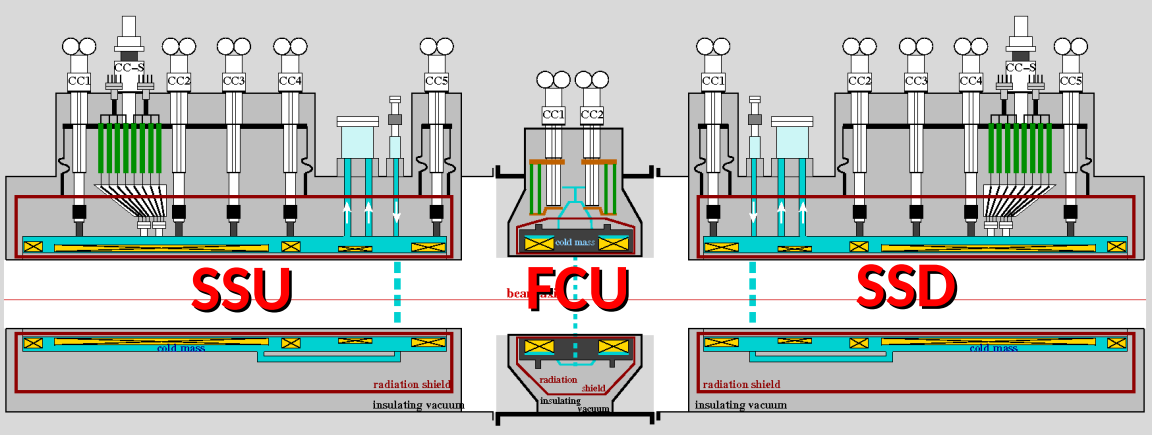
Integrates:

- **Beamline**
- **DAQ**
- **target**
- **tracker**
- **absorbers**
- **SC magnets**

State Machine interface with RunControl



State machines greatly reduce complexity of RunControl. RC need only check state of each system to ascertain equipment status.

Conclusions

- Much progress since last MAP CM
- Integrated HW plan in place and being carried out
- Priorities drive schedule
- Hardware installation progressing
- State machines and Run Control progressing
- Intermediate milestones help keep focus on the goal