

Overview of FRIB's Diagnostics Controls System

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Background

- The Diagnostics controls system is composed of several kinds of devices:
 - Fast μ TCA digitizer cards: picoammeter, Beam Position Monitor, Beam Current Monitor.
 - Devices that generate a lot of network traffic, such as Gigabit Cameras.
 - Other devices such as fast thermometers, motor controllers and A/D and D/A converters.
- Also, there are several “soft” IOC's for monitoring and data processing.
- In total, there are currently 28 different types of Diagnostics IOC's with 157 individual instances deployed.

- The large amount of different software pieces require a great degree of automation to be maintainable



Figure 1: A μ TCA crate with MCH, CPU, Event Receiver, Pico8, BPM and BCM cards.

Monitoring and data processing IOC's

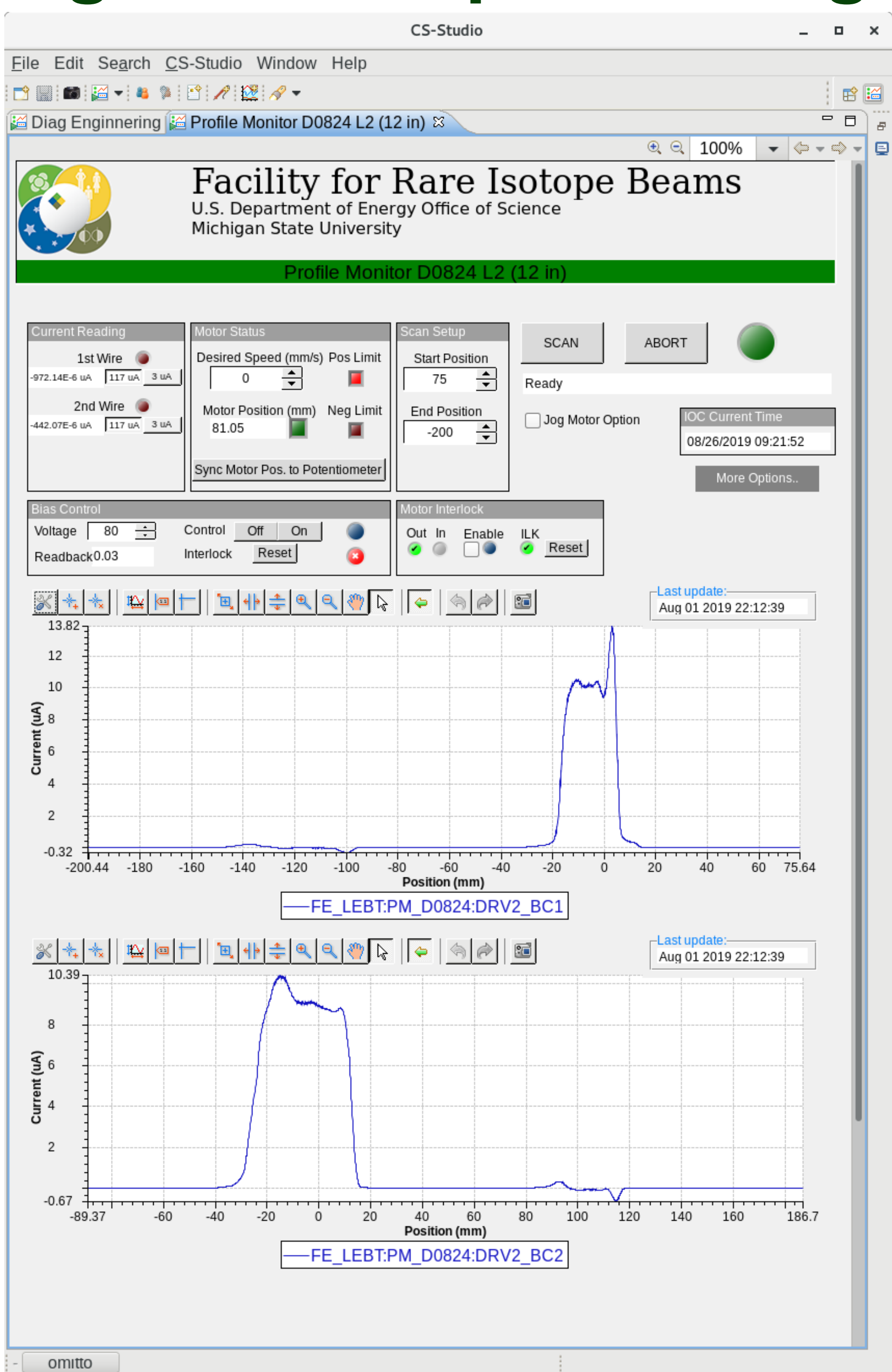


Figure 2: Profile Monitor “soft” IOC

- Most of the Diagnostics IOC's are, in fact, “soft” IOC's, which are used for:
 - Status monitoring of certain systems
 - Data processing
 - Combining different physical devices into a higher level abstract device.
- Most of these “soft” IOC's have their logic implemented in Python, by using pyDevSup, so they can have access to powerful Python libraries such as numpy and scipy.
- A good example of such “soft” IOC is the Profile Monitor IOC, which combines PVs from Motor Controllers, PLC Interlocks, A/D converters and picoammeters to provide a cohesive set of PVs for scanning the beam profile and returning the collected wire position vs current reading data correlated in time.

Standardization and Continuous Deployment / Delivery

- All Diagnostics IOC's and their hosts are managed centrally. The IOC's have a common set of modules included and configured automatically by using a special, in-house developed EPICS module called *fribdiagstd*.
 - For example, all IOC's automatically include the iocStats module, which makes it easy to develop overview screens such as the one seen in Figure 3.
- Supporting software, such as EPICS base and modules (asyn, autosave, etc) are built and deployed as Debian packages by a Continuous Deployment / Delivery pipeline built with Jenkins, Aptly and Puppet.

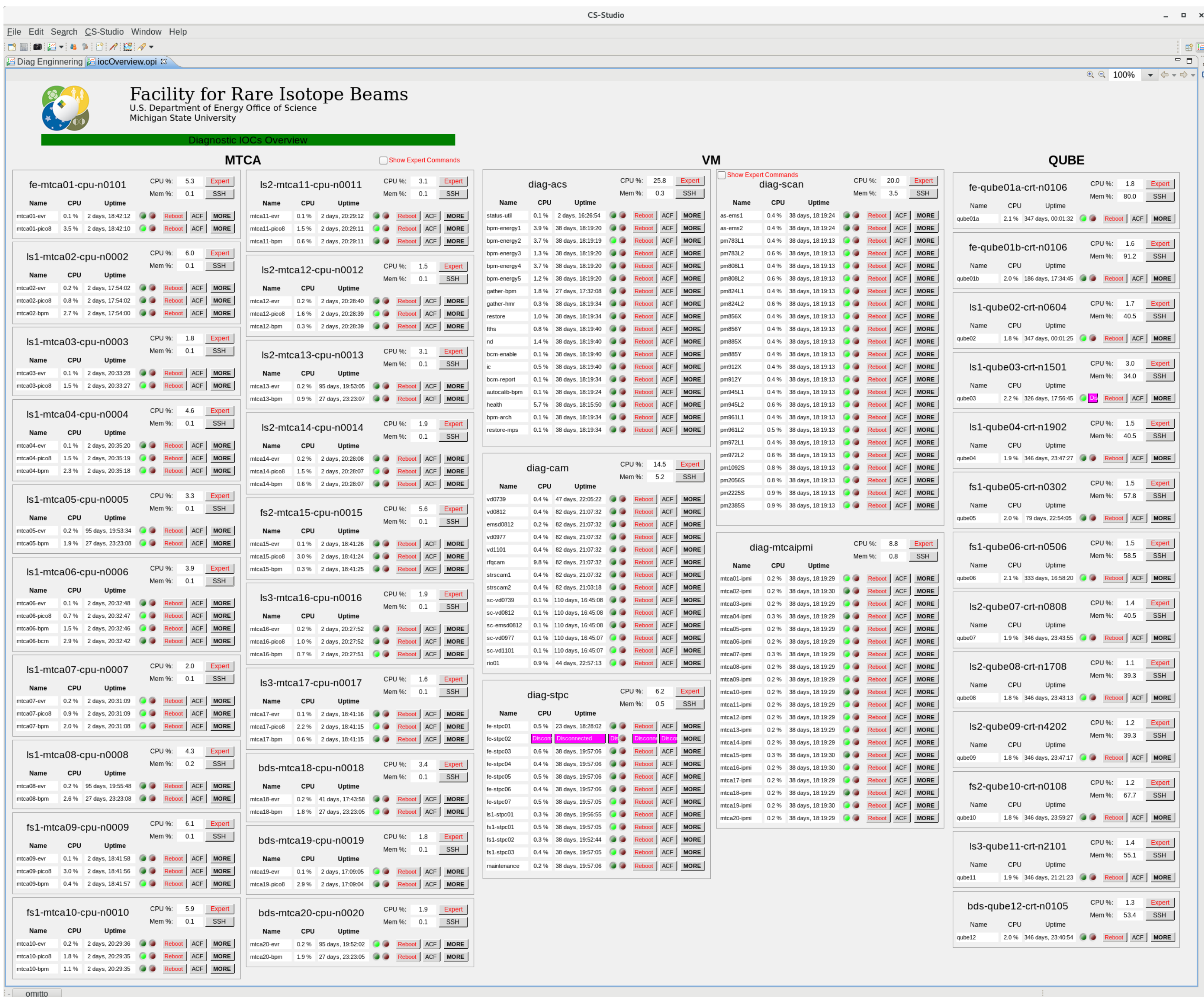


Figure 3: Overview of the status of all IOC's