Lock Configuration and Management

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Outline

- Slow Locks (< 1Hz)
  - Generic (PID) Locks
  - Current Locks
  - Orbit Locks
  - Energy Locks
- Fast Feedback (FFB) (>> 1 Hz)
  - Existing Systems
  - New Hall D System

Generic Locks

- On-demand PID and Matrix Locks
- Software unchanged from the 6 GeV era
- Configuration controlled from the GUI and stored in an XML file
- Manually tuned loop gains
- Used in commissioning for temporary orbit locks, FFB tests, etc.
- Fully functional

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Current Locks

- Stabilize beam current delivered to each Hall
- No software changes from the 6GeV era
  - (Same server/GUI as Generic Locks)
- Uses BOOM Buddy for Hall/laser configuration
- Configurable through XML file (limited GUI choices)
- Manually tuned gains
- Used in Hall D commissioning with hybrid config where laser in use was controlled from a Hall D BCM.
- Needs a "real" Hall D lock to be configured
- Otherwise working

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Orbit Locks

- Orbit stabilization throughout the accelerator
- Configured through manual edits of config file
- Automatically calibrates on demand using DC corrector kicks
- Hall D added to configuration
  - Not used initially due to limitations of the stripline BPM software (bpmdr), since remedied
- Fully functional

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Energy Locks

- Energy stabilization in Injector, Arc1, and Arc2
- Total rewrite of the previous locks (server, GUI, CLI, library)
- Now uses Beam Energy Monitor (BEM) for energy calculations
- Locks and BEM get configuration from CED, including live updates
- Used during last two runs
- Fully functional

Energy Locks

- Further Information
  - http://devweb/controls_web/certified/bem/
  - http://devweb/controls_web/certified/energyLocks/

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Fast Feedback

- Stabilization of position and energy for Hall A or C (or D!)
- Hall A/C System ported to new EPICS version, some configuration changes
- BPMs, correctors configurable through EDM
- Self-calibrating on demand
- Hall A system tested successfully in position mode
- Energy mode not tested due to time constraints
  - Modified to use new gradient vernier interface to C100
- Hall C system running, but not tested

Fast Feedback

- Hall D System uses completely new hardware
- Can use stripline BPMs, cavity BPMs, and Active Collimator as inputs.
- Inputs, correctors configurable from EDM
- Auto calibration on demand
- Status:
  - Hardware installed
  - Firmware and software still in development
  - Some preliminary testing carried out
  - Used to suppress 60Hz motion using feed-forward and internal oscillator (with PID locks)
- More info:
  - Talk by Trent Allison at 13:45 today

Summary

- Remaining work
  - Configure, commission Hall D Current Lock
  - Commission Hall A FFB in energy mode
  - Commission Hall C FFB
  - Complete, commission Hall D FFB

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