Preparation for Sept 9mA studies: Follow-up items from February

J. Carwardine, 22 May 2012

List of follow-up tasks from Feb 9mA studies

- **Implement the gradient soft limiters on all cavities in ACC4-7**
- **Determine suitable thresholds for the hard and soft limiters, develop procedures on how to use them**
- **Revisit methodology for robust quench detection (the quench server acting at the end of the pulse)**
- **Integrate and improve exception handling for the various interconnected servers (QL server, quench detect, piezo server, gradient flattening algorithm,...)**
- **Various refinements to the Loaded-Q server**
- **Implement an 'operations quality' version of my iterative gradient flattening algorithm**
- **Better (more complete) ways of doing off-line testing of new scripts, servers, automation, etc to reduce the requiring amount of dedicated machine time**
- **Implement Fermilab piezo tuner algorithm at CMTB**

- **Quench threshold identification**
  - Revisit methodology for more robust quench identification

- **Pre-limiter**
  - Principle works very well, we now need more experience with it
  - Where to set the thresholds…?
  - How/when to use it, procedures,

- **Testing automation and operations tools without beam time?**
  - Real-time (pulse to pulse?) online simulator with DOOCS front-end

- **Automation**
  - Implement 'operations-quality' gradient flattening algorithm
  - Cross-linkages between automation tools – **integration**
  - Need better exception handling, better uniformity

- **DAQ**
  - Propose new DAQ specifications (AMTF, XFEL ?)

- **Piezo / Quench / QI**
  - All worked well
  - All can be improved
  - Need for uniformity among servers
    - A centralized / unique QL measurement
    - A centralized / unique detuning measurement
    - Uniformity in various threshold definitions (i.e. low gradients, limiters, pre-limiters, etc…)
  - Need for priority among servers
    - Sequence of action (sequencer ? state machine ?)
      - i.e. wait for cavity tuner before adjusting piezo
      - adjust cavity frequency before adjusting QLs
      - etc…
    - Exception handling (e.g. motor moving, don't change QI)
      - **communication** & **coordination** between automatic servers

- **Auto Ql**
  - all ON / all OFF ability → DONE
  - settings Save/Restore (add to existing sequencer)
  - one-click return to default value (part of Save/Restore)
  - performance assessment (speed, accuracy)
  - automatic tuning strategy
    → flatten cavity tilts (9mA) with exception handling
    → other algorithms ?
  - getting a reliable QL measurement server is key

- **Quench detection**
  - issues with time stamp (quenches detected after 3-4 quenches) → is it OK ?
  - some false alarms → why ?
  - still problems with changing RF flat top length
  - improve operator notification in case of quench
  - getting a reliable QL measurement server is key

- **Auto piezo server**
  - could propose tuning action when DC bias is max
  - settings Save/Restore (add to existing sequencer)
  - needs to include pulse shortening → in the works
  - ability to selectively turn auto piezo ON / OFF
  - better detect 'run-away' situation and exception handling in general
  - getting a reliable detuning measurement is key

- **Highest priority items for the Sept 9mA studies?**
- **Who will do the work?**

- **Then there are some machine issues needing follow-up**
  - We want 800us pulses with at least 6mA