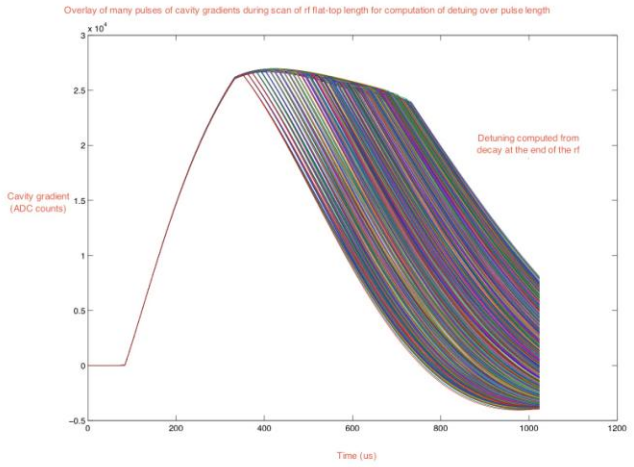
Summary of notable events – 4 February Afternoon shift

Detuning measurements through scans of rf flat-top length.

Time-stamp for DAQ: 17:49:20 – 17:51:30

We wanted to get a reference for the detuning over the duration of the flat-top, which comprises static pre-detuning and Lorentz-force detuning over the pulse, whose amplitude is a function of gradient, and which is time-varying over the pulse. The most reliable way of measuring the detuning (independent of calibration factors) is from the exponential decay at the end of the rf pulse. By progressively shortening the rf flat-top pulse length, we could 'sample the detuning at different parts of the flat-top. See figure below



Part of the motivation was to 'calibrate' the online computation of detuning by the piezo tuner server, which relies on the calibration of the forward power measurement and the field probe. The calculated online detuning is the reference for setting up the piezos for LFD compensation

Two scans performed in ACC67. Note that in both cases, piezo adjustments were ongoing at ACC6, so the data in these scans is valid for ACC7 only.

All piezos were off in ACC7, but several were enable on ACC6. Notably, ACC6 Cavity 1 piezo was on throughout the scan, but with constant drive parameters. I'm not sure whether it was optimized for LFD compensation during this time (Check with Mariusz). Learning feedforward and feedback were both off.

Unfortunately the computed detuning waveforms are not in the daq and were not collected from doocs for this scan, however, they were collected for scans performed on Saturday morning (see that summary file)

We can check the status of the piezos from the daq, which has the monitoring waveforms and the drive parameters as 'Groups' data types in the DAQ. Note that this has to be done with the raw daq_read_svr() matlab command – daq fetch returns the waveforms but not the scalar values, which are stored in the array of 'statistics.' ACC7 vector sum was approximately 150MeV per the monitoring adcs Note that the eLog mentions two scans, but there was actually only one.

21:38 Test of setting detuning to zero at the end of the pulse

Christian tested a script for optimizing the mechanical tuner position of a single cavity to put the cavity on resonance at the end of the rf pulse. This set the pre-detuning. Then he adjusted the forward power ratio to get a flat cavity gradient on that same cavity. See plot at 21:39 for the end result – the gradient amplitude and phase were both remarkably flat for the cavity of interest (C1/ACC7, which was running at a gradient of ~20 MeV. The plot at 21:47 shows the computed detuning from the piezo server for C1/ACC7 after this optimization. Interestingly, the end result after adjustment of the forward power ratio was that the cavity was on resonance at around the middle of the rf pulse.

21:46 Optimization of Piezo tuners for ACC6

Mariusz set up the piezo tuners for compensation of ACC6 DFD. See the elog entries for 21:46 and 21:59 for example of computed detuning waveforms for ACC6/C1 with piezos optimized for zero detuning