Some notes from Piezo studies on Saturday AM shift 5 Feb 2011

Scan of flat-top length

Scanned the flat-top length on ACC67 with the intention of measuring the loaded Q from the decay at the end of the flat-top. All scans were from 800us to 20us in 20us steps approximately 4 seconds apart. We scanned at difference energies. We did not change the pre-detuning or retune the cavities when changing gradients. We were running open loop without learning feed-forward

Scan #	Voltage SP	Tstart	Tend	
--	298.5MV	10:09:34	10:12:16	
1	198.5MV	11:13:59	11:16:41	
2	98.5MV	11:20:23	11:23:05	
3	148.5MV	11:24:56	11:27:39	
4	248.5MV	11:29:12	11:31:54	
5	298.5MV	11:33:29	11:36:11	
6	348.5MV	11:37:42	11:40:25	Power ratio was changed from 1.0 to 0.86
7	388.5MV	11:51:51	11:54:34	Power ratio was changed from 0.86 to 0.76

In addition to the DAQ data, I collected some data directly from DOOCS, notably the computed detuning waveforms. The files are all stored in the directory: /home/ttflinac/users/carwar/9ma_studies_Feb2011/matlab/data

Filenames for each scan are

1. flattop_scan_20110205T111359.mat
2. flattop_scan_20110205T112023.mat
3. flattop_scan_20110205T112456.mat
4. flattop_scan_20110205T112912.mat
5. flattop_scan_20110205T113329.mat
6. flattop_scan_20110205T113742.mat
7. flattop_scan_20110205T115151.mat

Scan of Piezo tuner drive parameters

All were performed on ACC6 Cavity 4

Note about the timing for the Piezos

The piezos drivers are triggered from the A6 trigger, which starts 20ms before the beginning of the RF pulse. Trigger delays are relative to that trigger, so a trigger

delay of 19.5ms puts the start of drive waveform 0.5ms before the start of the rf pulse

Note that the optimum value for compensating LFD has been found to be 19.5ms delay (0.5ms before rf pulse). The standard drive amplitude is 20v

Piezo drive DC voltage is zero for all the scans

Before we started the scan, Mariusz was testing his optimization script that attempted to optimize the detuning compensation trigger and amplitude.

Scans

Scan #	Trigger delay	Sinusoid amplitude	Step size	Tstart (approx)	Tend (approx)
1	11ms - 20ms	20v	100us	13:20	13:32
2	19.5ms	0v – 30v	0.5v	13:45	
3	19.5ms	0v – 30v (use)	0.5v	13:57	
4	17.5ms - 20.5ms	7.5v	100us	14:24	

The first time we scanned the voltage (scan #2), the initial value of the drive voltage before we started the scan was 20v, and it was immediately dropped to 0v at the start of the scan. We repeated the scan (scan #3), this time starting with the drive amplitude at zero when we started the scan. I'd suggest not using Scan #2.

Mariusz's objective had been to minimize detuning during the flat-top, while I started looking at the vibration of the cavities as measured by the second piezos in each cavity. Note that these monitoring piezos are what's provided to the DAQ.

Note about the Piezo waveforms. The trigger time is 20ms before the start of the rf pulse. The data is sampled every 325us, and samples from exactly 20ms before the rf pulse and about 60ms after.