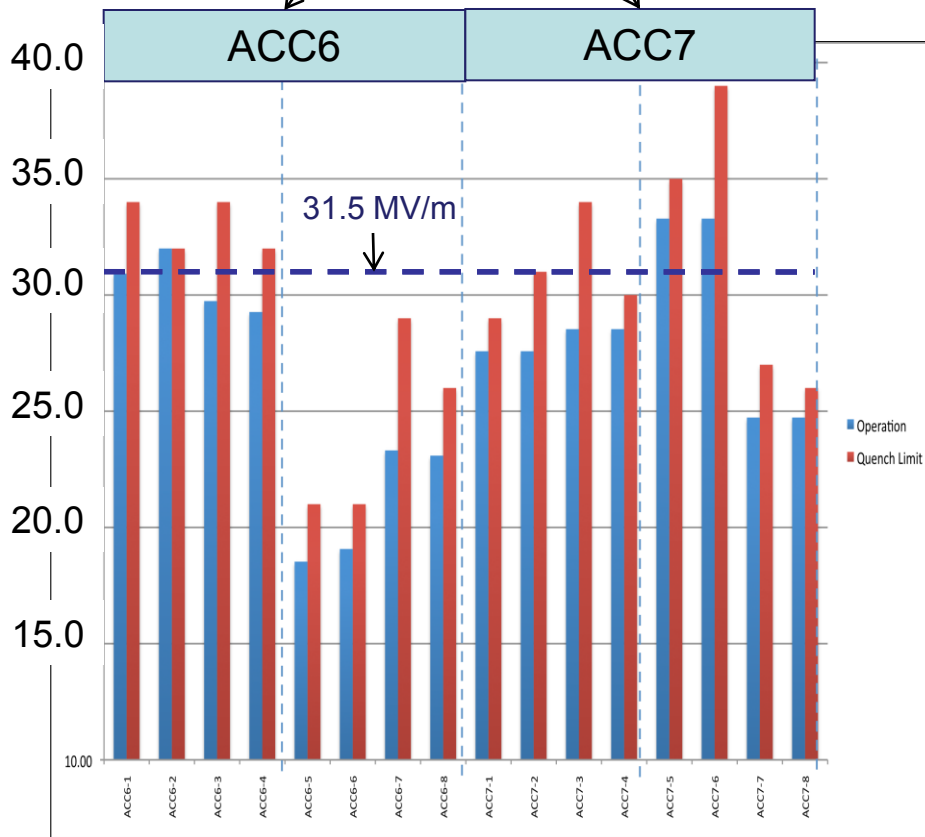
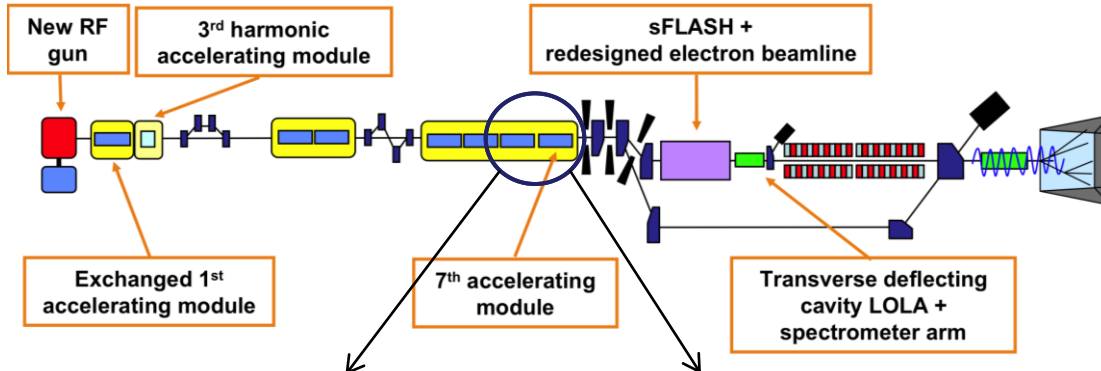




Recent FLASH Results

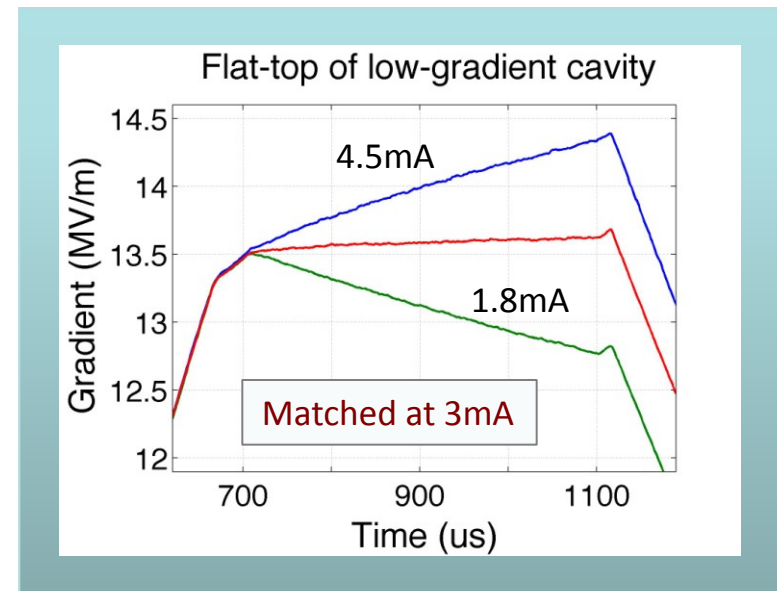


- **Operation with Gradient Spread**
 - From single RF source
 - now baseline
- **Specifically: achieving constant gradients for each individual cavity during beam pulse**
 - to within few percent
 - close to gradient limits



FLASH: Goal of Feb. Studies

- **Understanding RF parameter solutions**
 - RF power to cavities
 - Adjustment of loaded Q
- **Compensation of Lorentz-Force Detuning via fast piezo-tuners**
 - LFD is proportional to g^2
- **Calibration (benchmarking) of simulation model(s)**
- **Better characterisation of errors, calibration and tuning precision**
- **Establishing best-approach tuning algorithms close to gradient limits**
 - with a view to automation
 - without quenching cavities

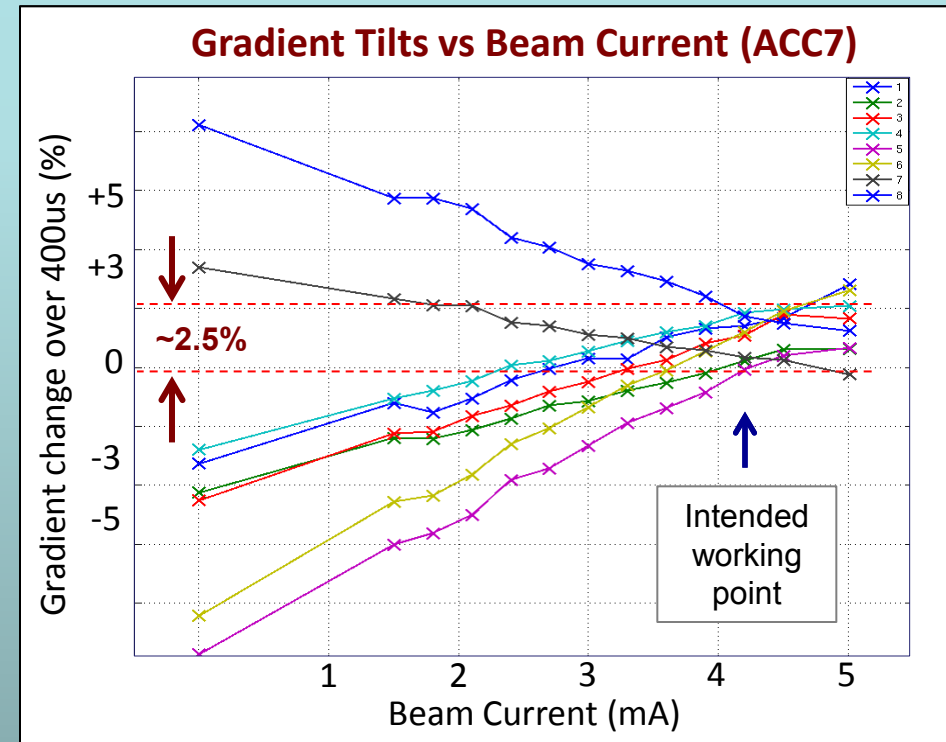
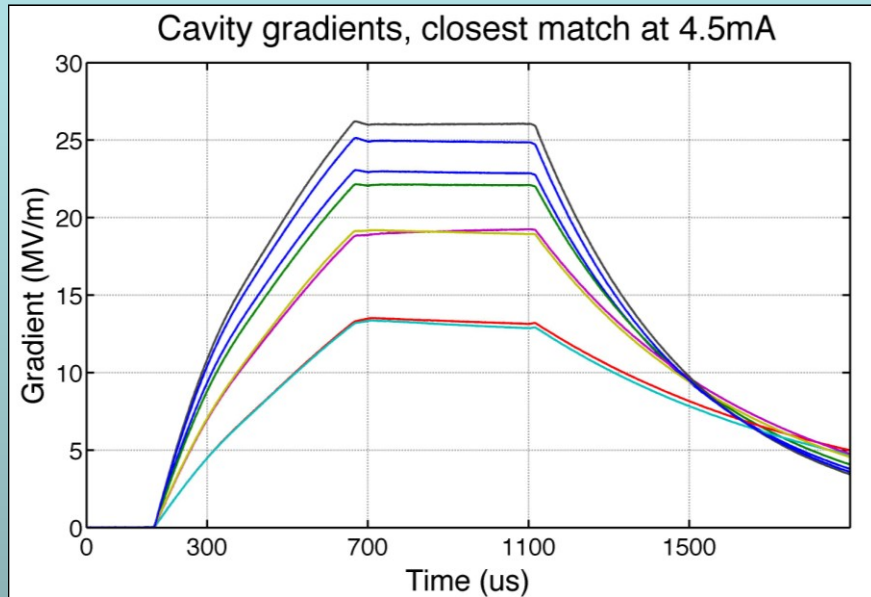


cavity field over 400us bunch train with different beam loading

*note: 400 μ s beam pulse limited by RF gun



Example Experimental Results



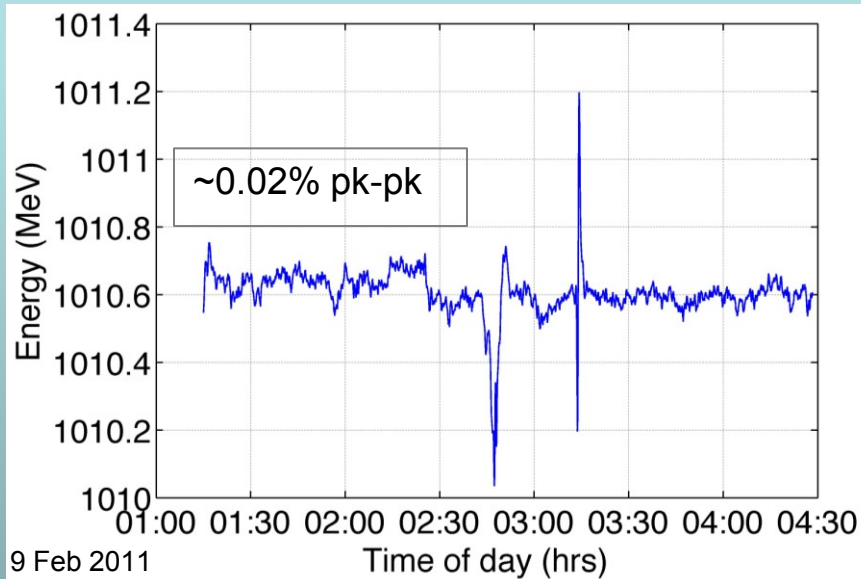
- **Flat gradient solution achieved**
 - 4.5 mA beam

- **Characterisation of solution by scanning beam current**
 - model benchmarking



FLASH: Stability

Energy stability over 3hrs with 4.5mA



- **15 consecutive studies shifts (120hrs), and with no downtime**
- **Time to restore 400us bunch-trains after beam-off studies: ~10mins**
- **Energy stability with beam loading over periods of hours: ~0.02%**
- **Individual cavity “tilts” equally stable**