

Beam Dynamics Aspects

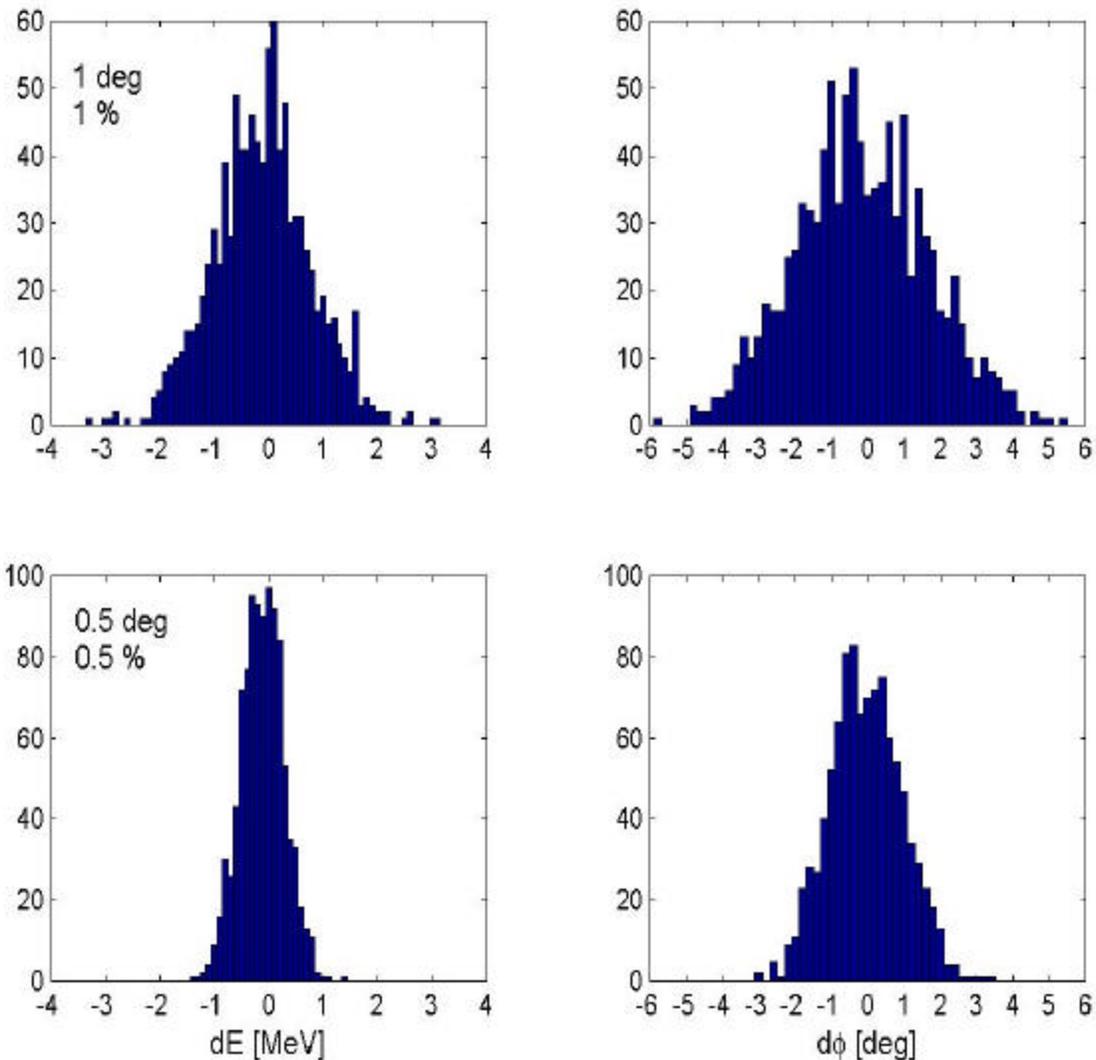
D. Jeon, H. Takeda, J. Stovall, K. Crandall

October 8, 2002

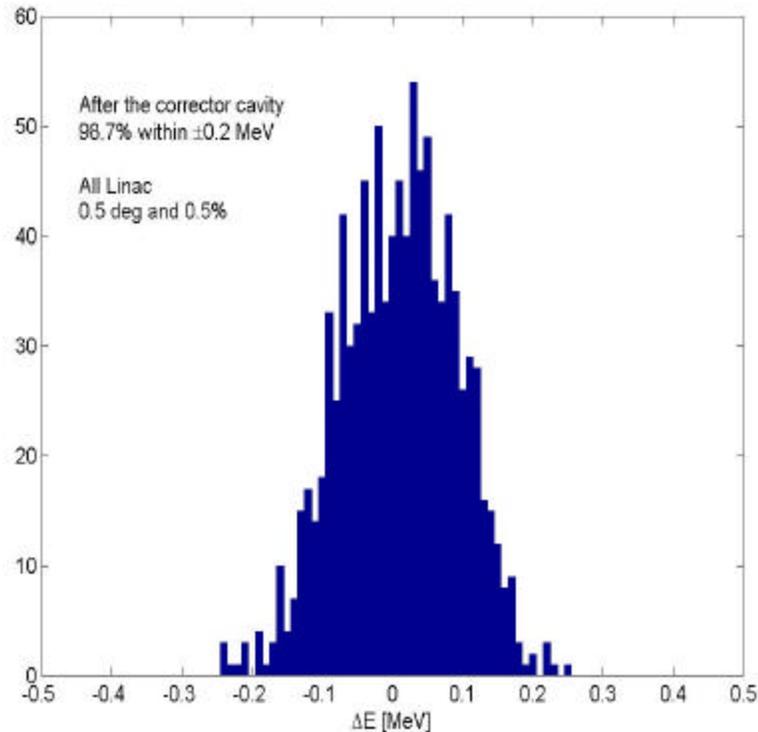
When the LLRF control errors are relaxed for the entire Linac to $\pm 1^\circ$ and $\pm 1\%$ (phase and amplitude).



- beam E, ϕ centroid jitter at the end of SCL

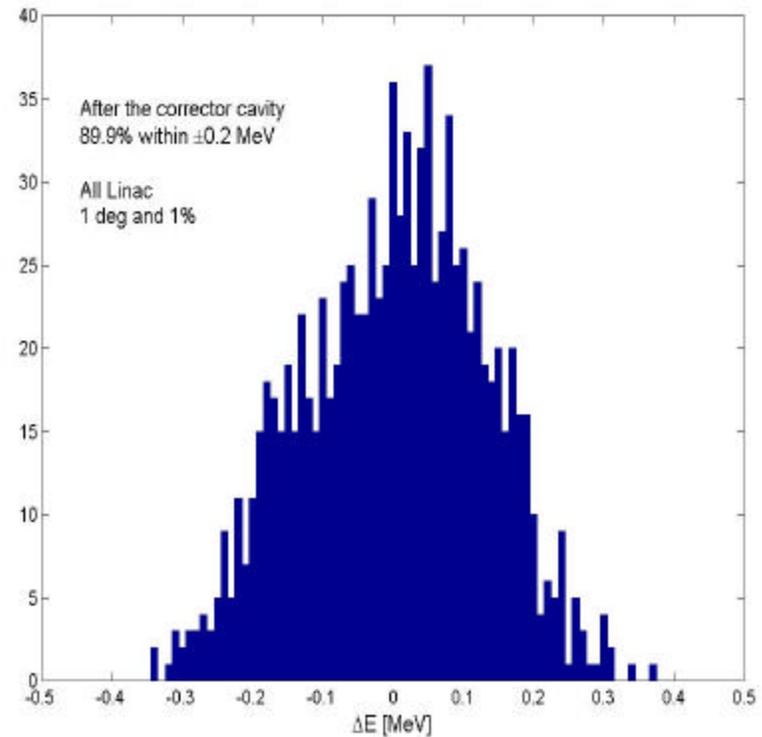


Beam centroid energy jitter after passing through the energy corrector cavity



0.5° and 0.5% phase and
amplitude jitter of LLRF

98.7% are within ± 0.2 MeV



LLRF control errors are relaxed
to 1.0° and 1.0% for entire linac

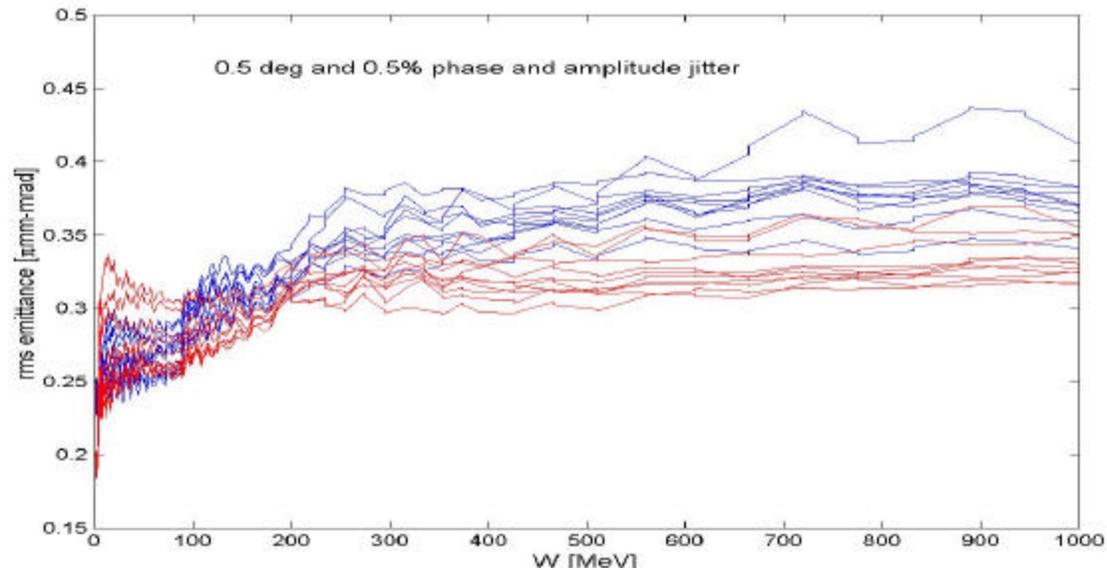
89.9% are within ± 0.2 MeV

Transverse rms emittances grow 10% when relaxing LLRF control errors

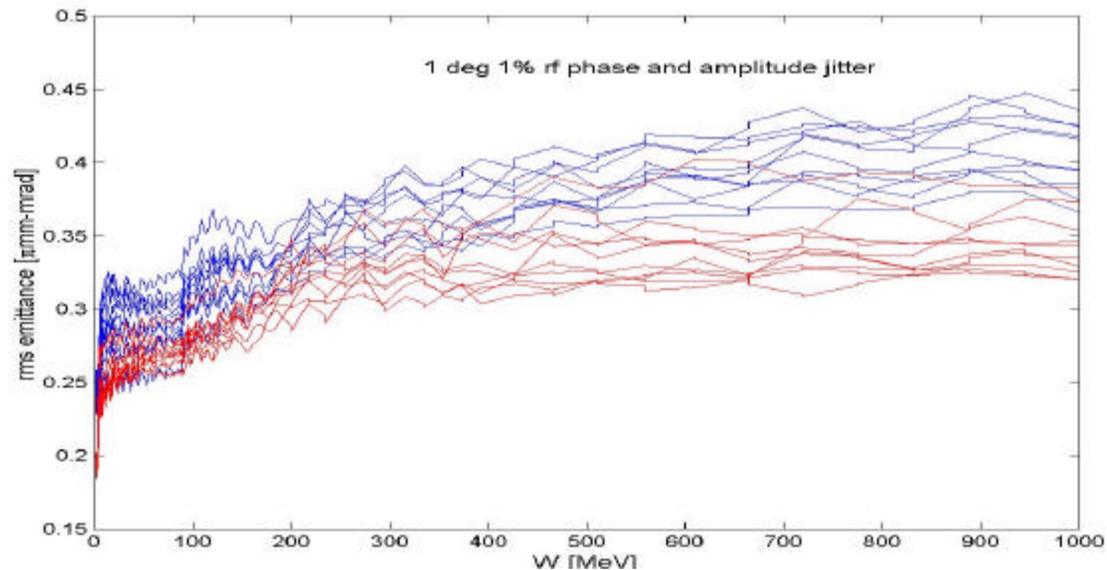


10 linac runs

0.5°, 0.5%



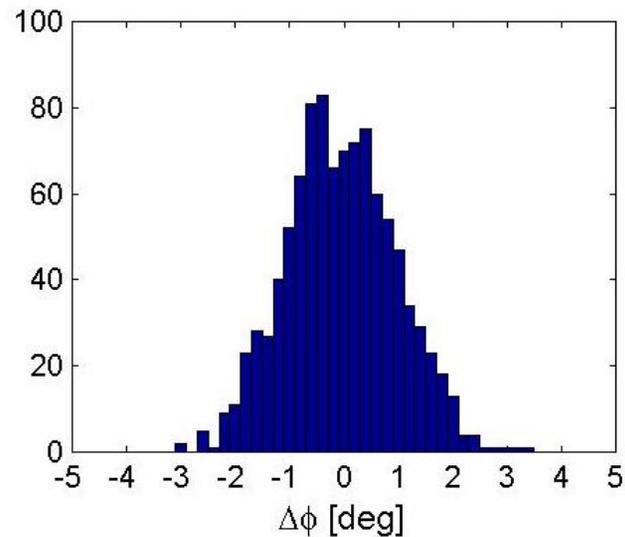
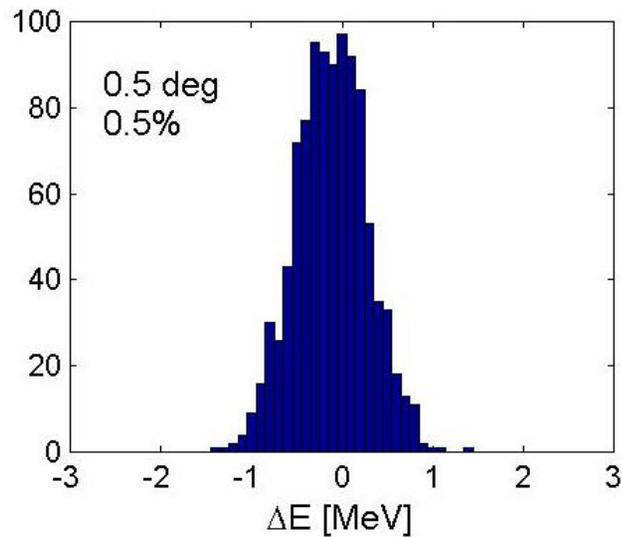
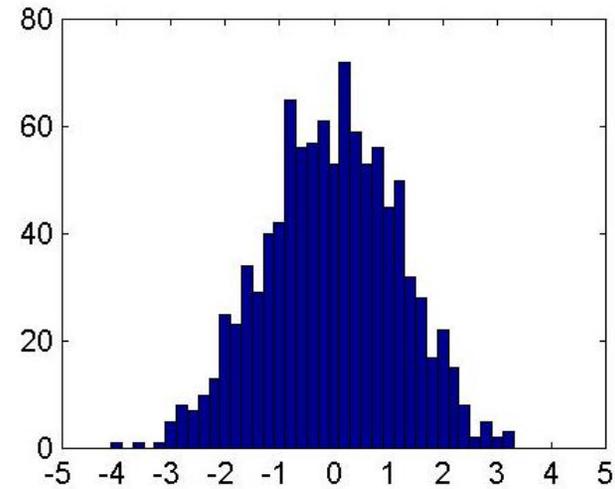
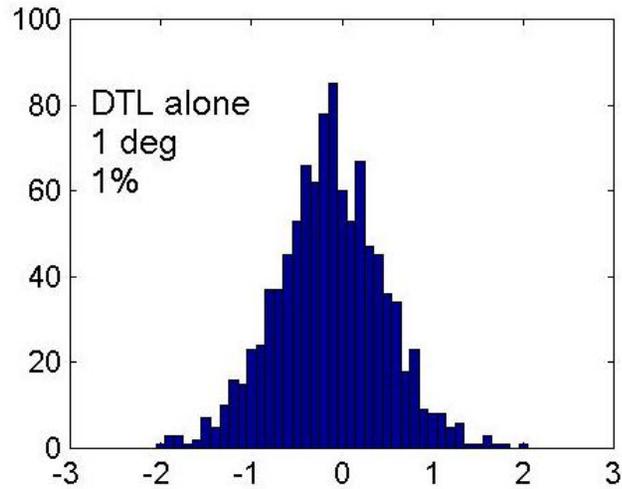
1.0°, 1.0%



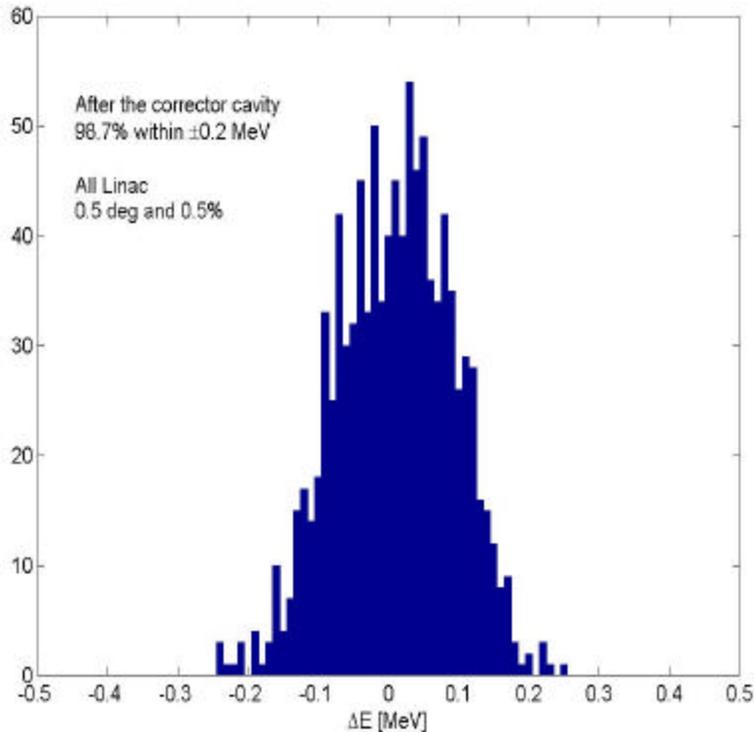
When the LLRF control errors are relaxed only for DTL



At the end of the SCL

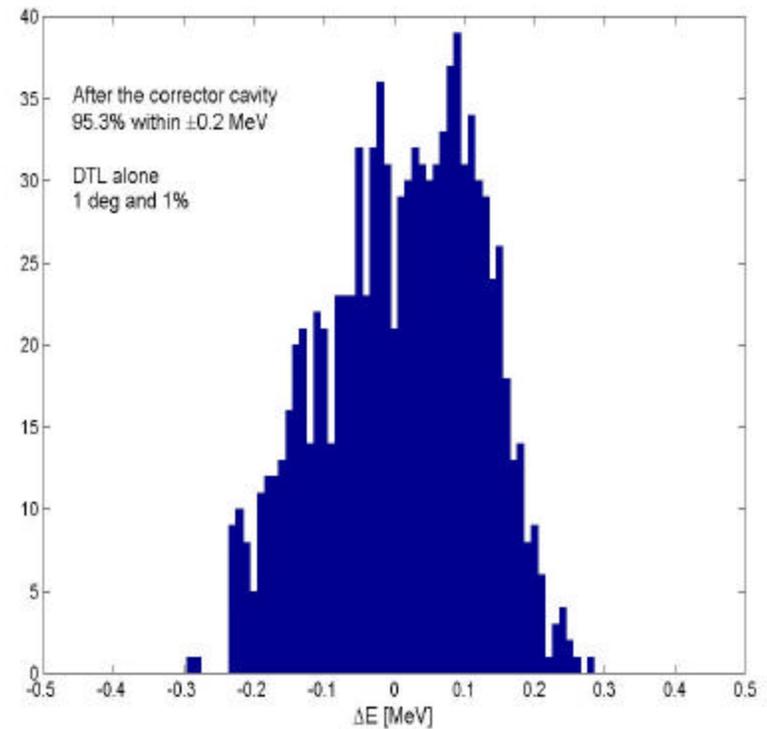


Beam centroid energy jitter after passing through the energy corrector cavity



0.5° and 0.5% phase and amplitude jitter of LLRF

98.7% are within ± 0.2 MeV



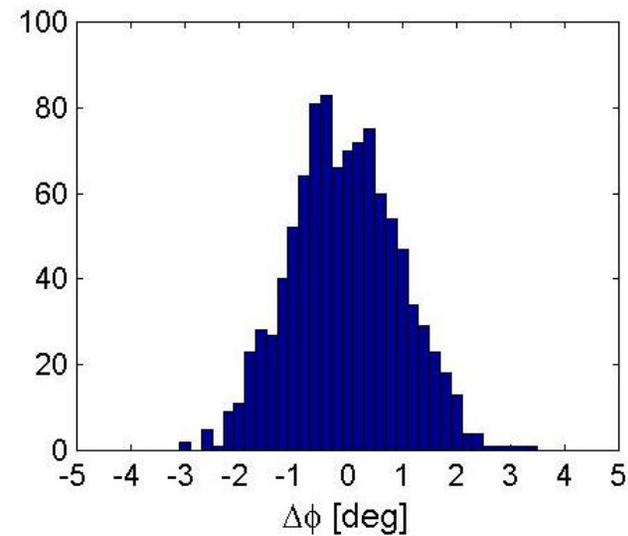
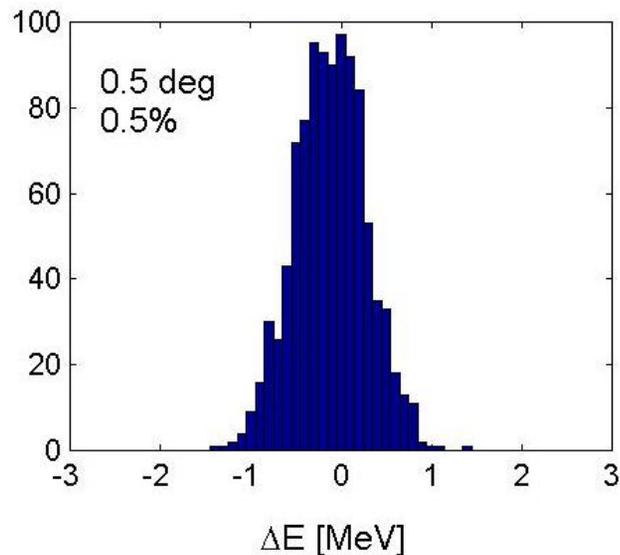
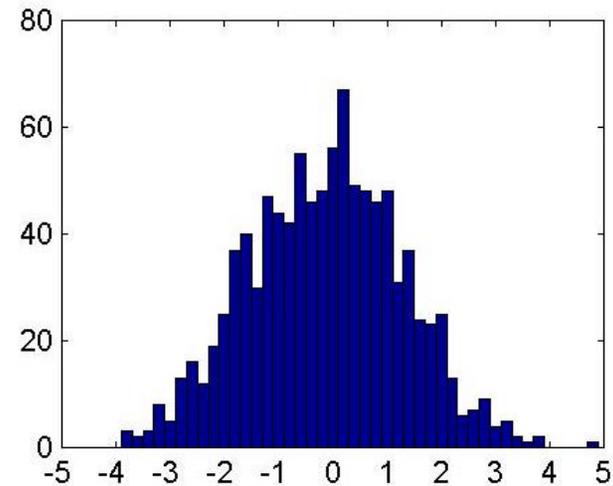
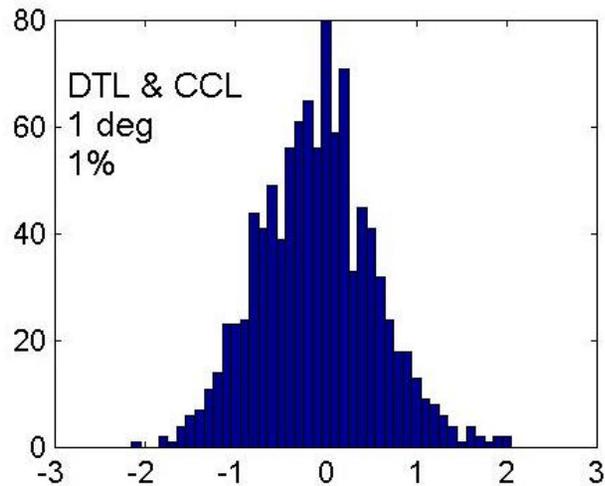
LLRF control errors are relaxed to 1.0° and 1.0% only for DTL

95.3% are within ± 0.2 MeV

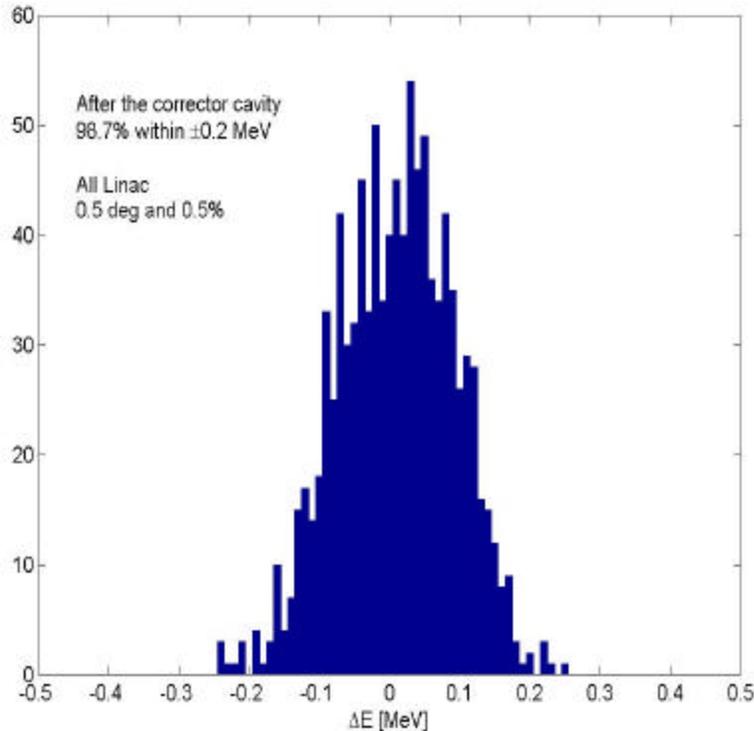
When the LLRF control errors are relaxed only for DTL and CCL



At the end of SCL

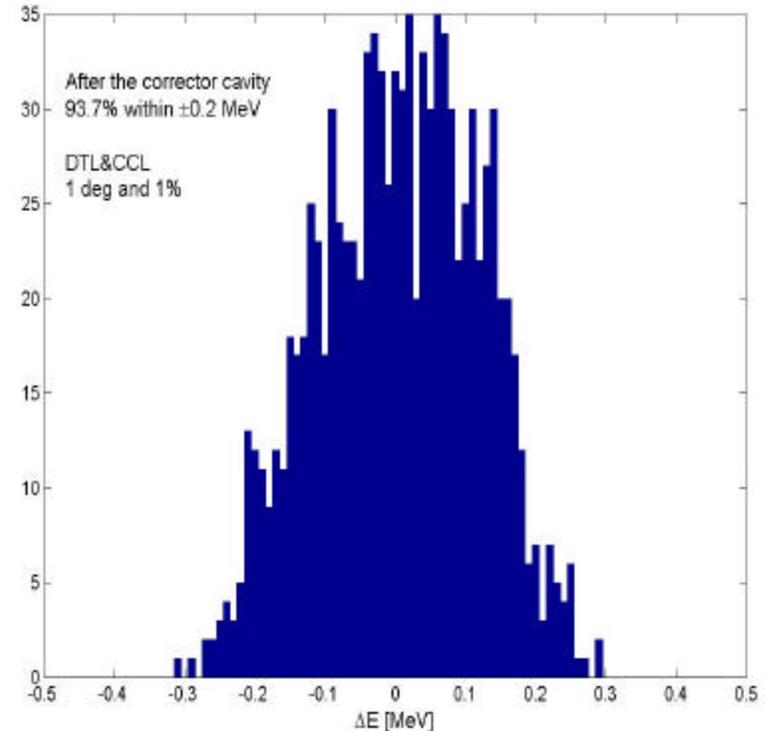


Beam centroid energy jitter after passing through the energy corrector cavity



0.5° and 0.5% phase and
amplitude jitter of LLRF

98.7% are within ± 0.2 MeV



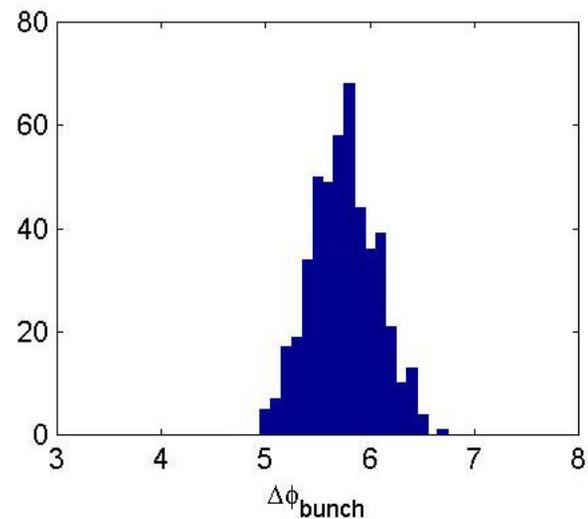
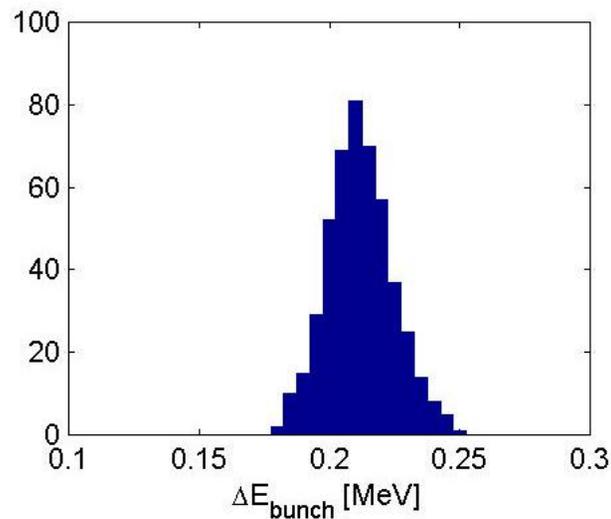
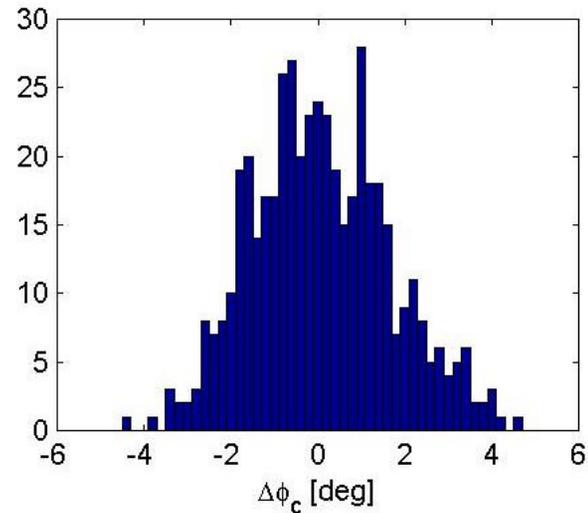
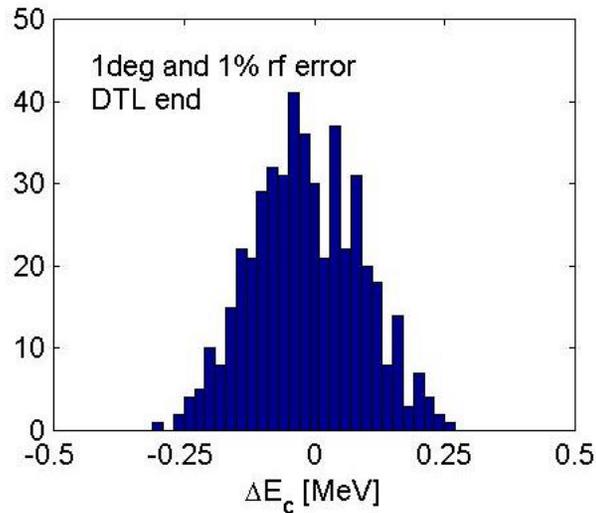
LLRF control errors are relaxed
to 1.0° and 1.0% for DTL/CCL

93.7% are within ± 0.2 MeV

Simulated centroid energy and phase jitter at the DTL end with $\pm 1^\circ$ and $\pm 1\%$ rf error



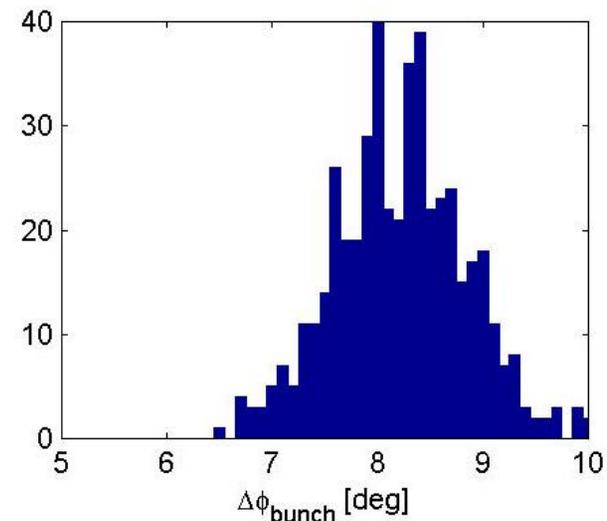
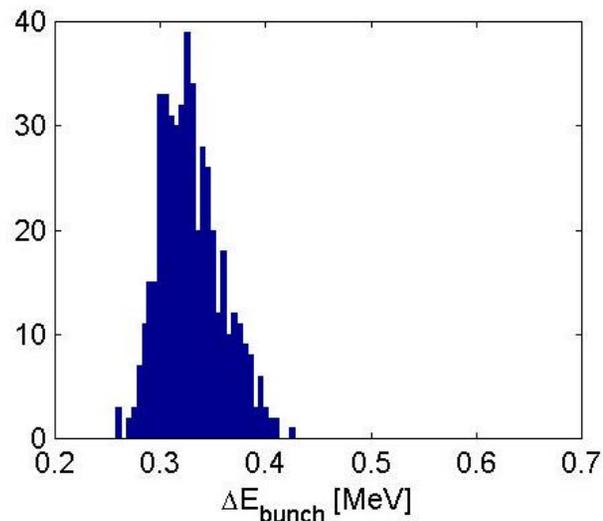
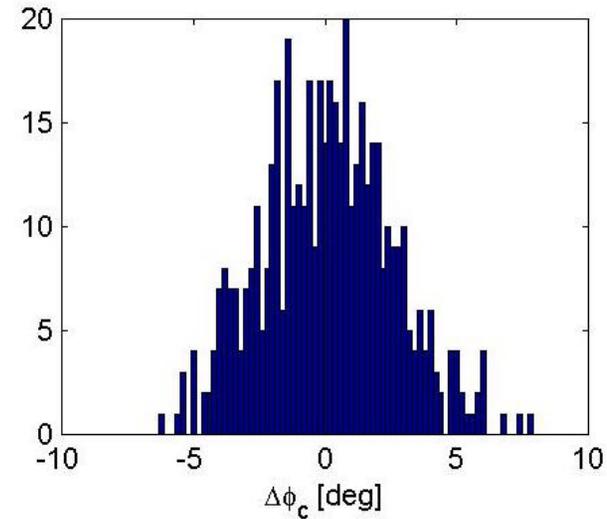
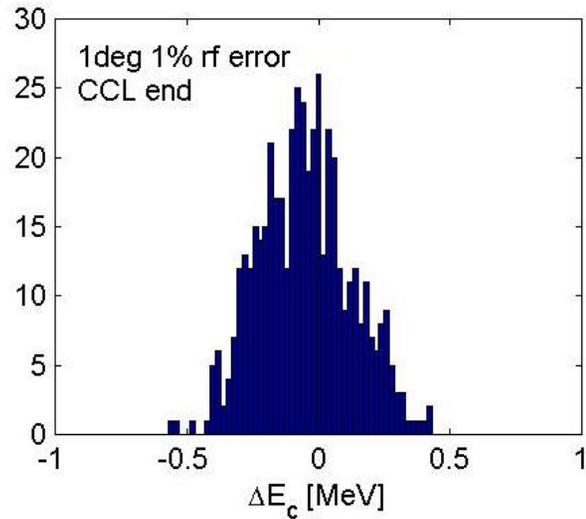
$\pm 4.5^\circ$ and $\pm 0.01\text{MeV}$ injection beam jitter are assumed



Simulated centroid energy and phase jitter at the CCL end with $\pm 1^\circ$ and $\pm 1\%$ rf error



$\pm 4.5^\circ$ and $\pm 0.01\text{MeV}$ injection beam jitter are assumed



- Commissioning DTL and CCL with $\pm 1^\circ$ and $\pm 1\%$ rf error seems doable.
- Work in progress
- Multiparticle tracking studies using Parmila are under way.