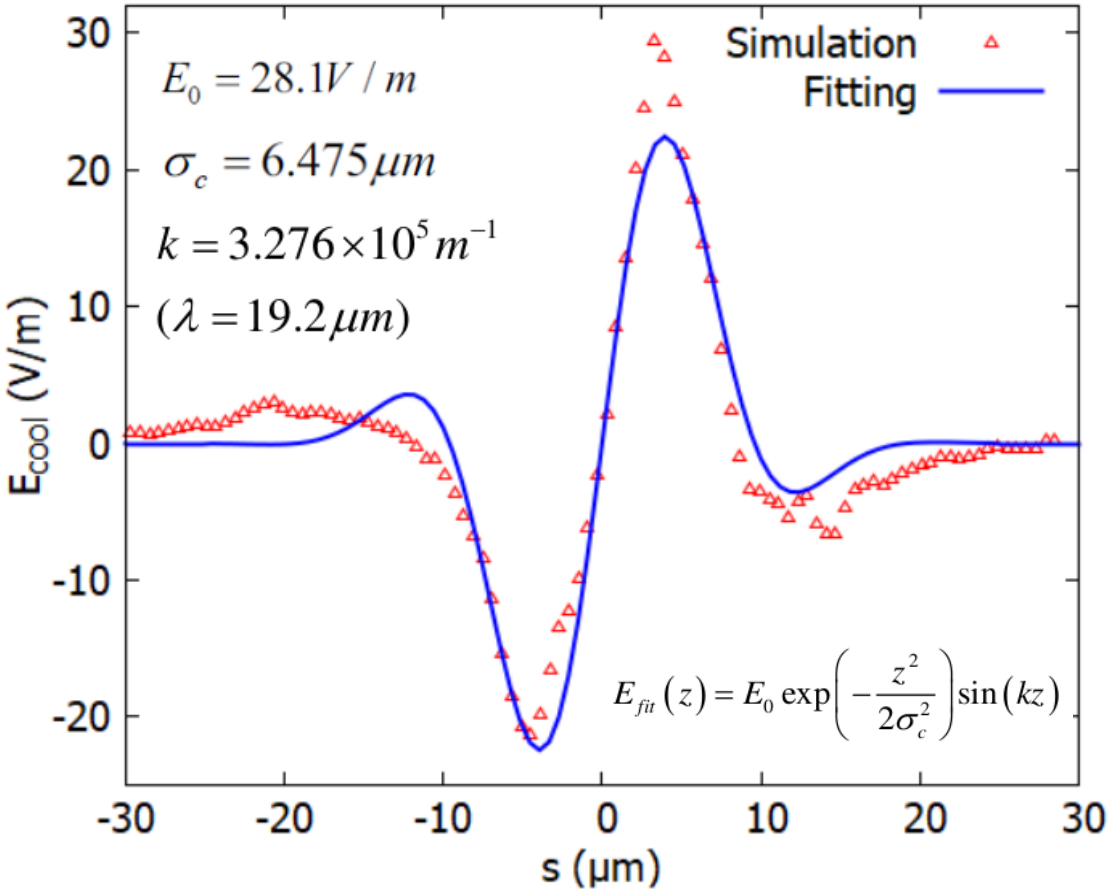
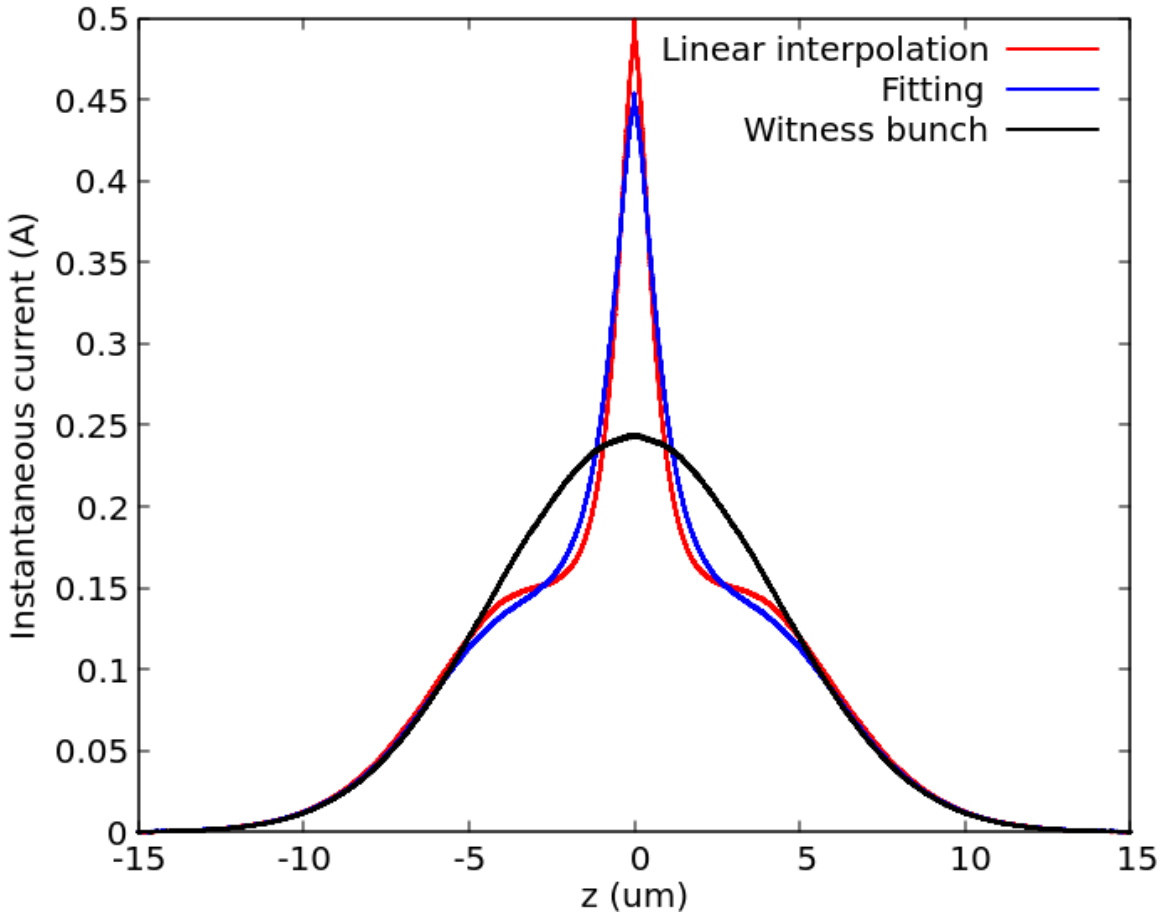
Tracking of the Ions for the CeC experiment with Cooling Force Depending on Longitudinal Location of the Ion

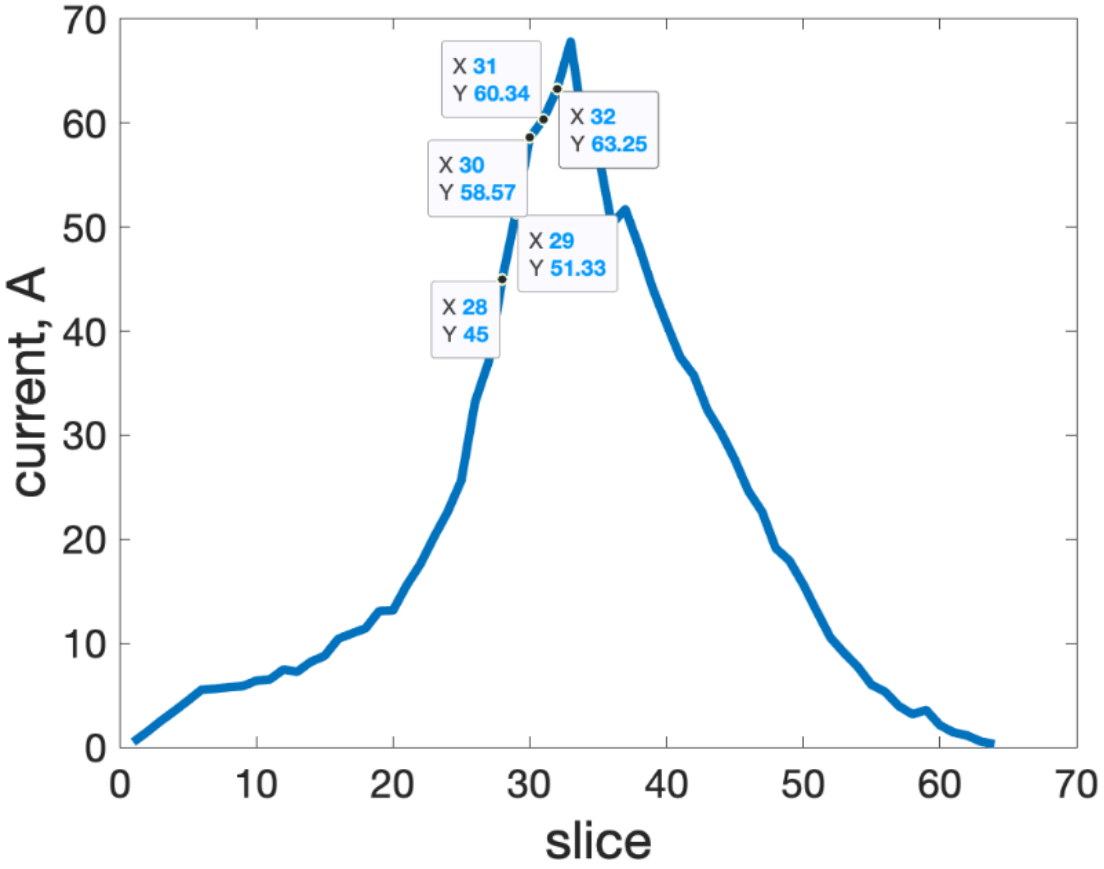
G. Wang

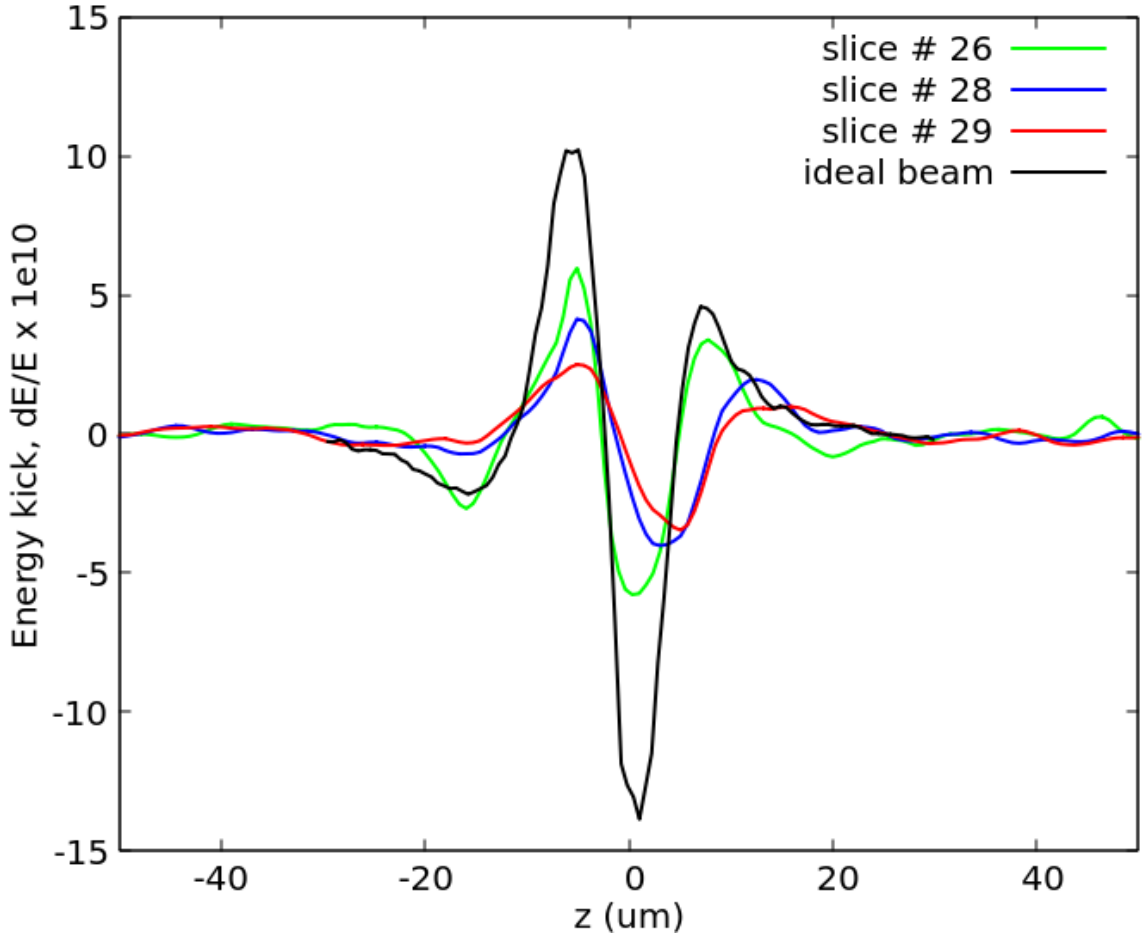
What has been done differently…
Fitting-> linear interpolation



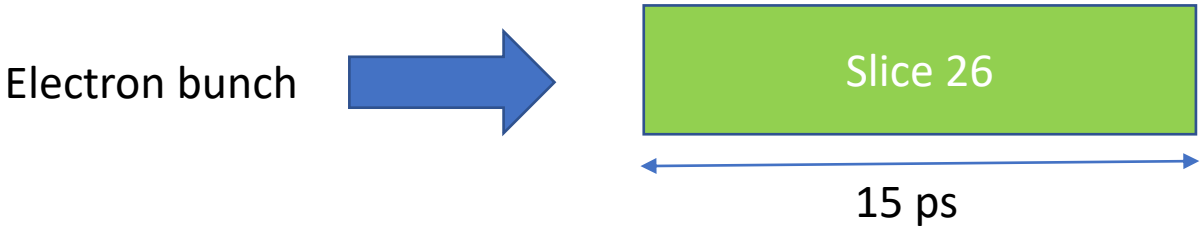


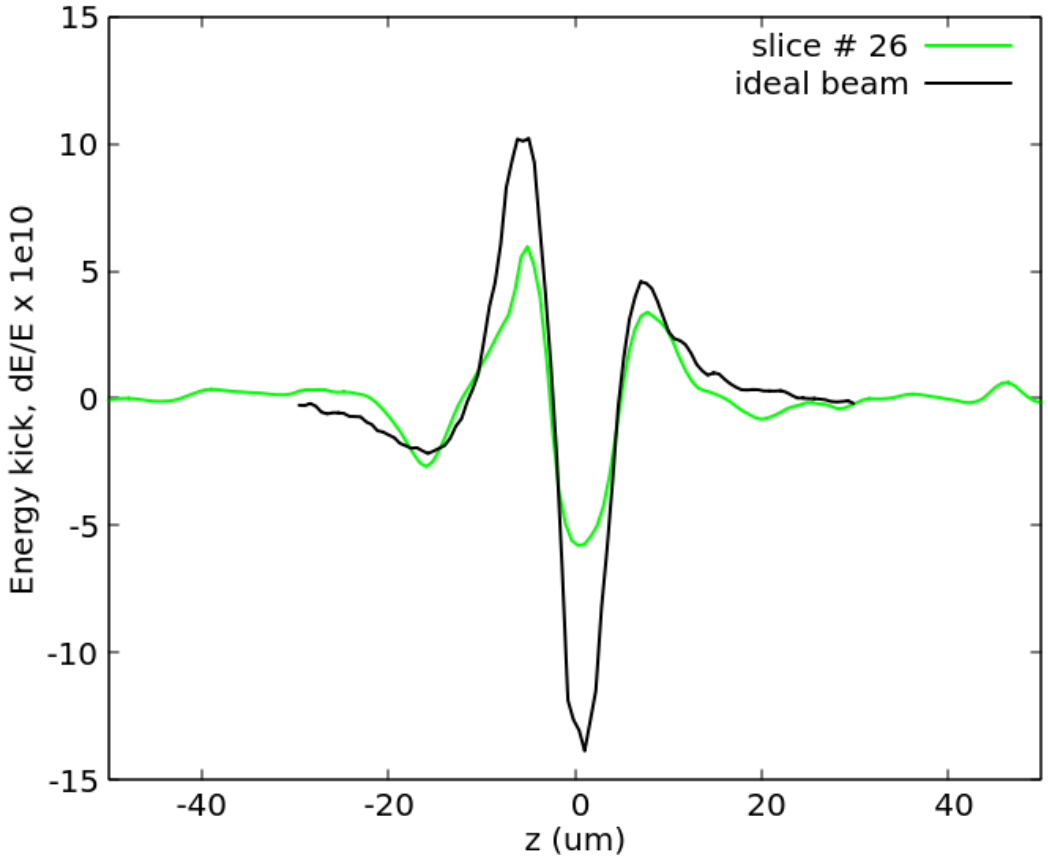
Energy kick from Ideal beam vs Simulated beam

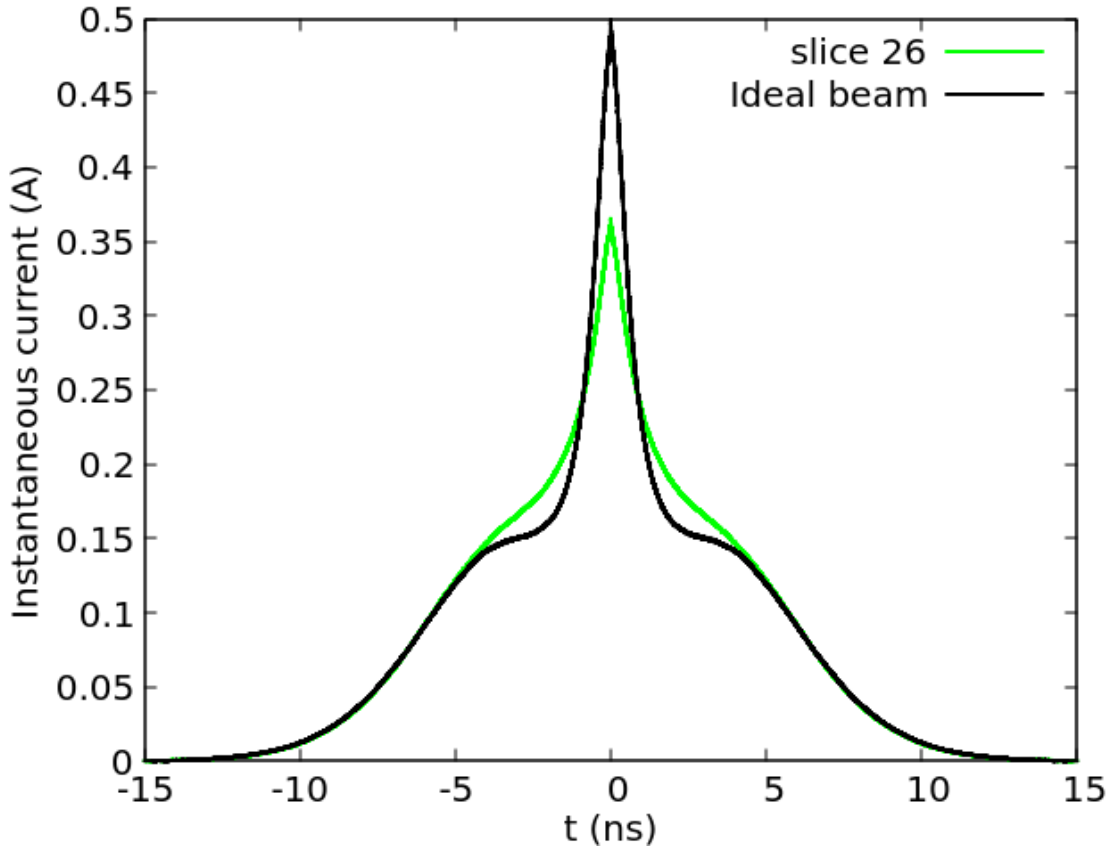




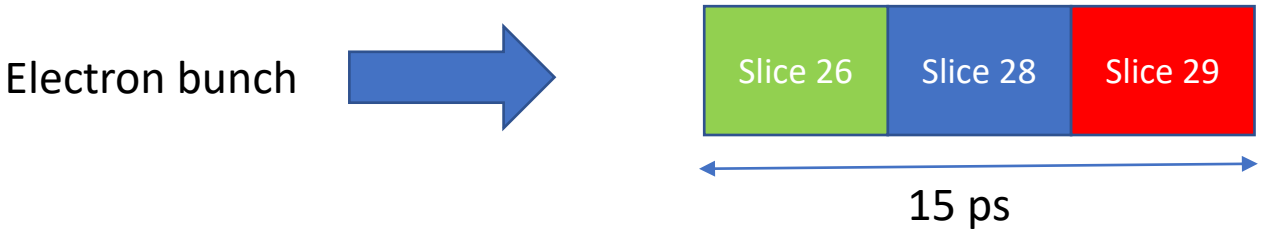
Using energy kick from the best slice, i.e. slice # 26 and assume the kick applies for 15 ps of electrons

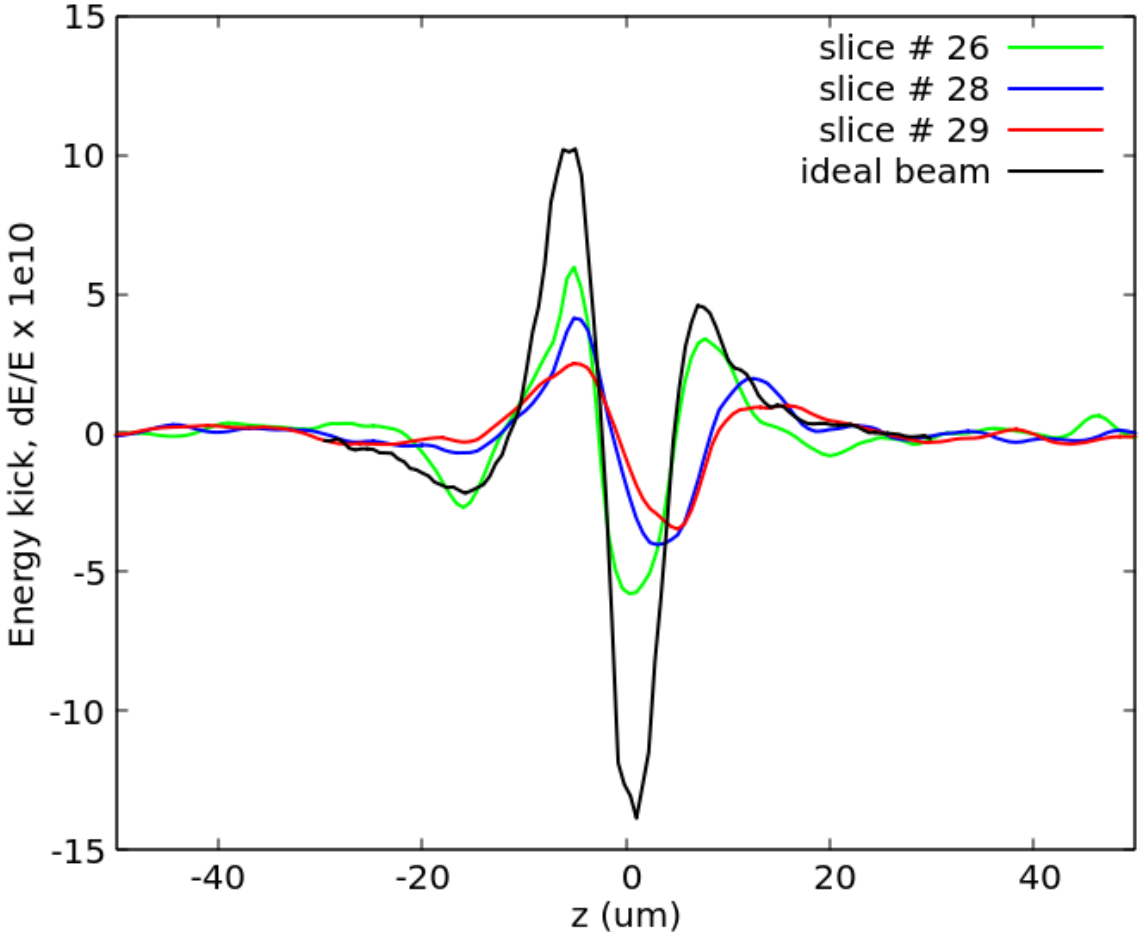


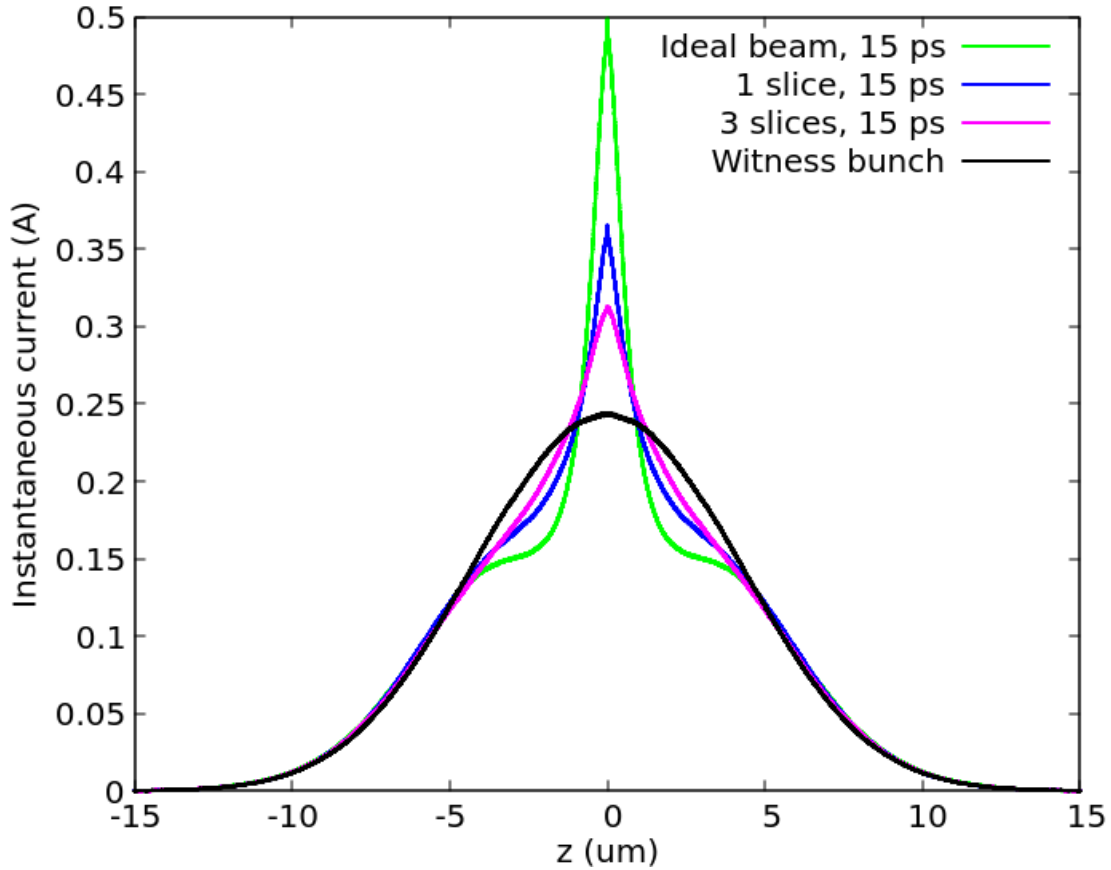




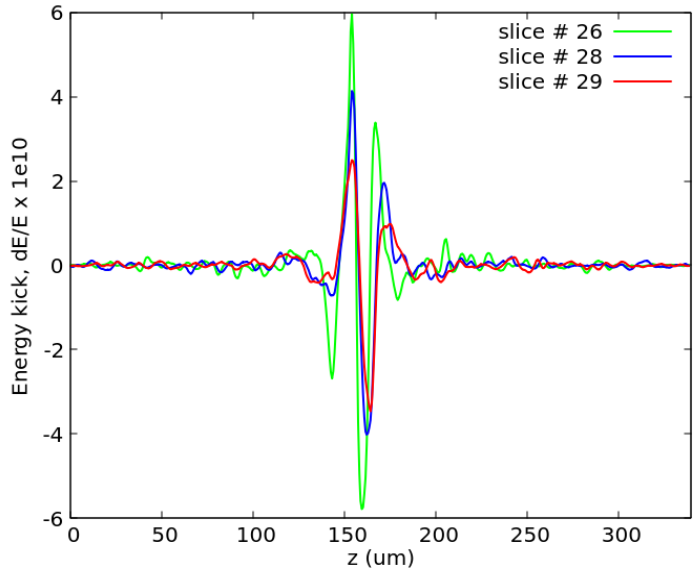
Using kicks from slice 26, 28 and 29 with each slice has 5 ps of duration

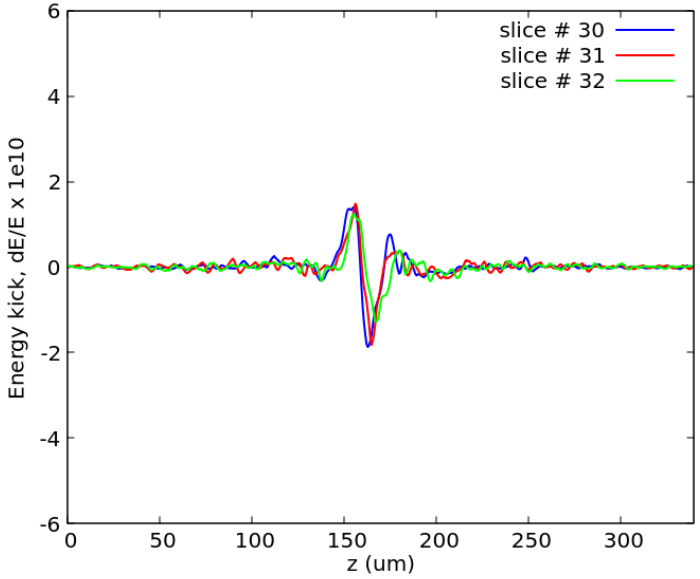




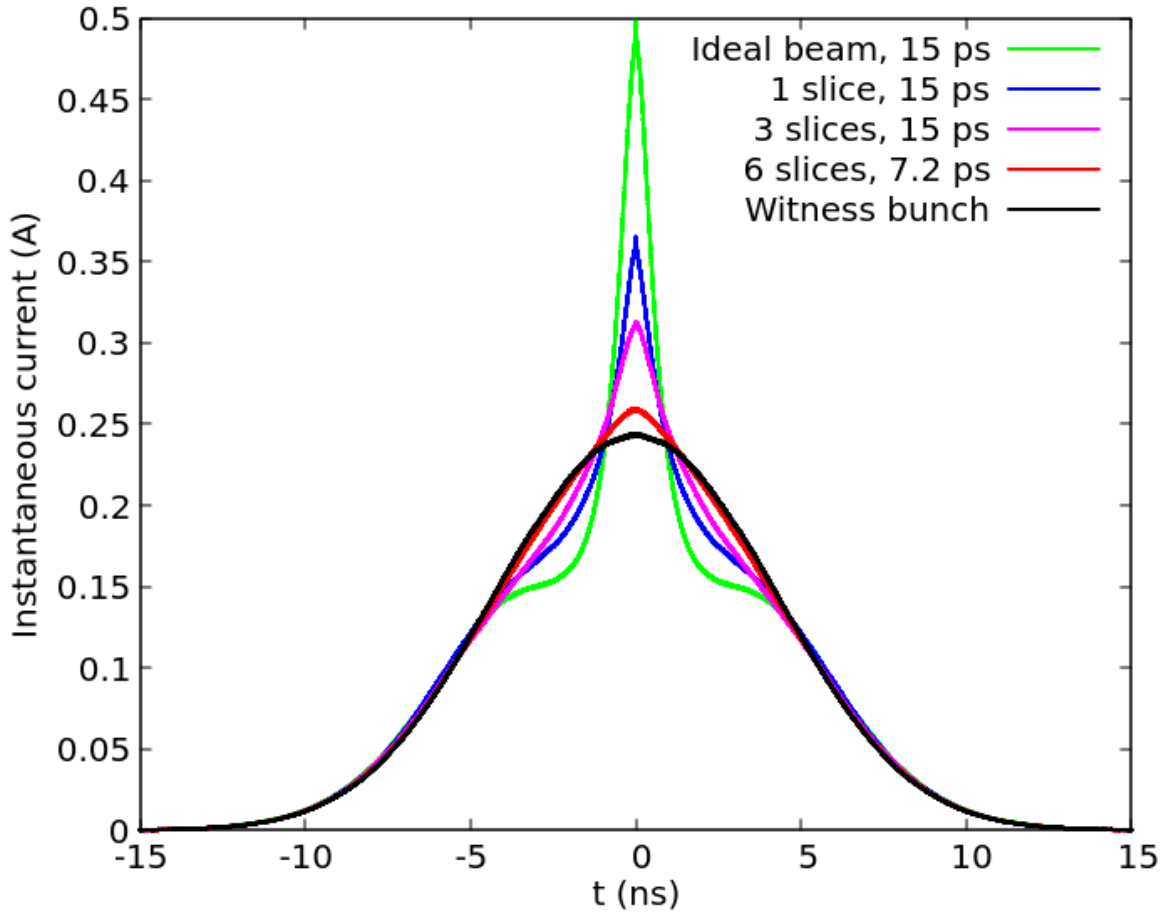


Using kicks from 6 slices with 1.2 ps of duration for each slice





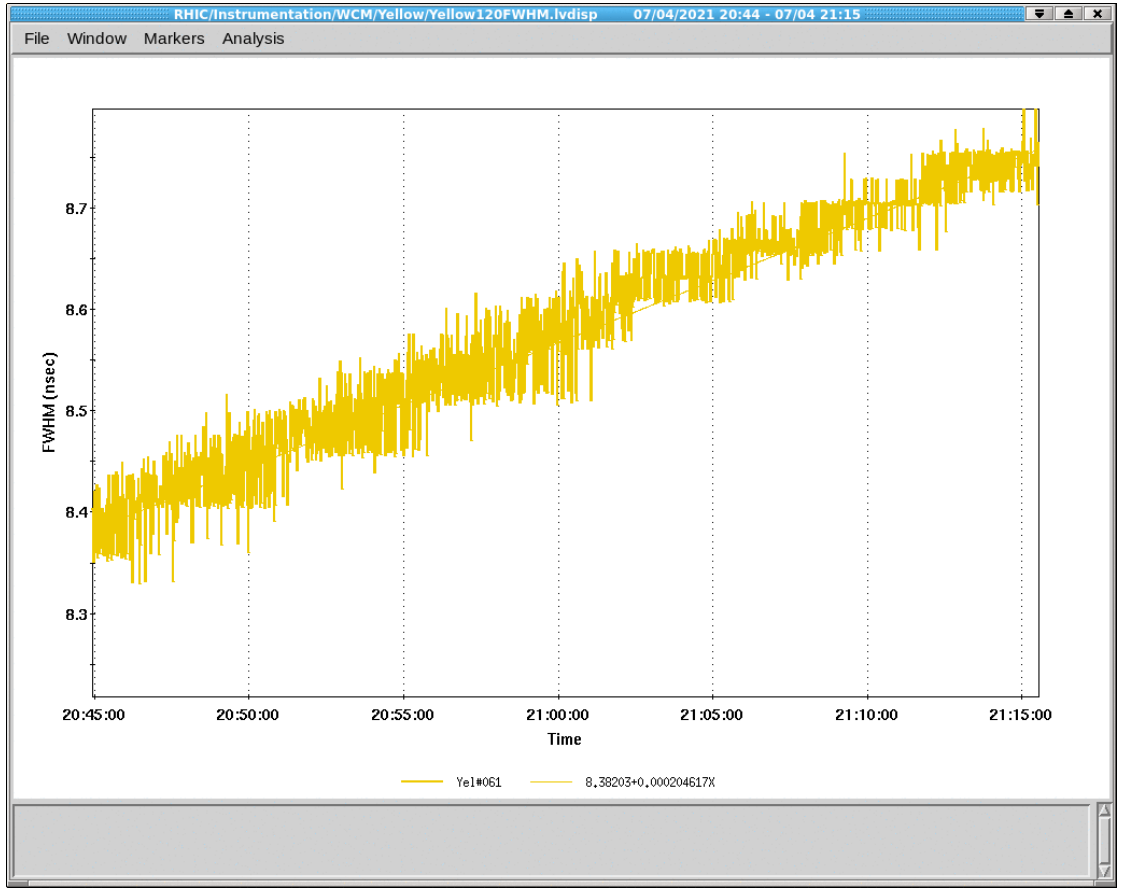
Electron bunch

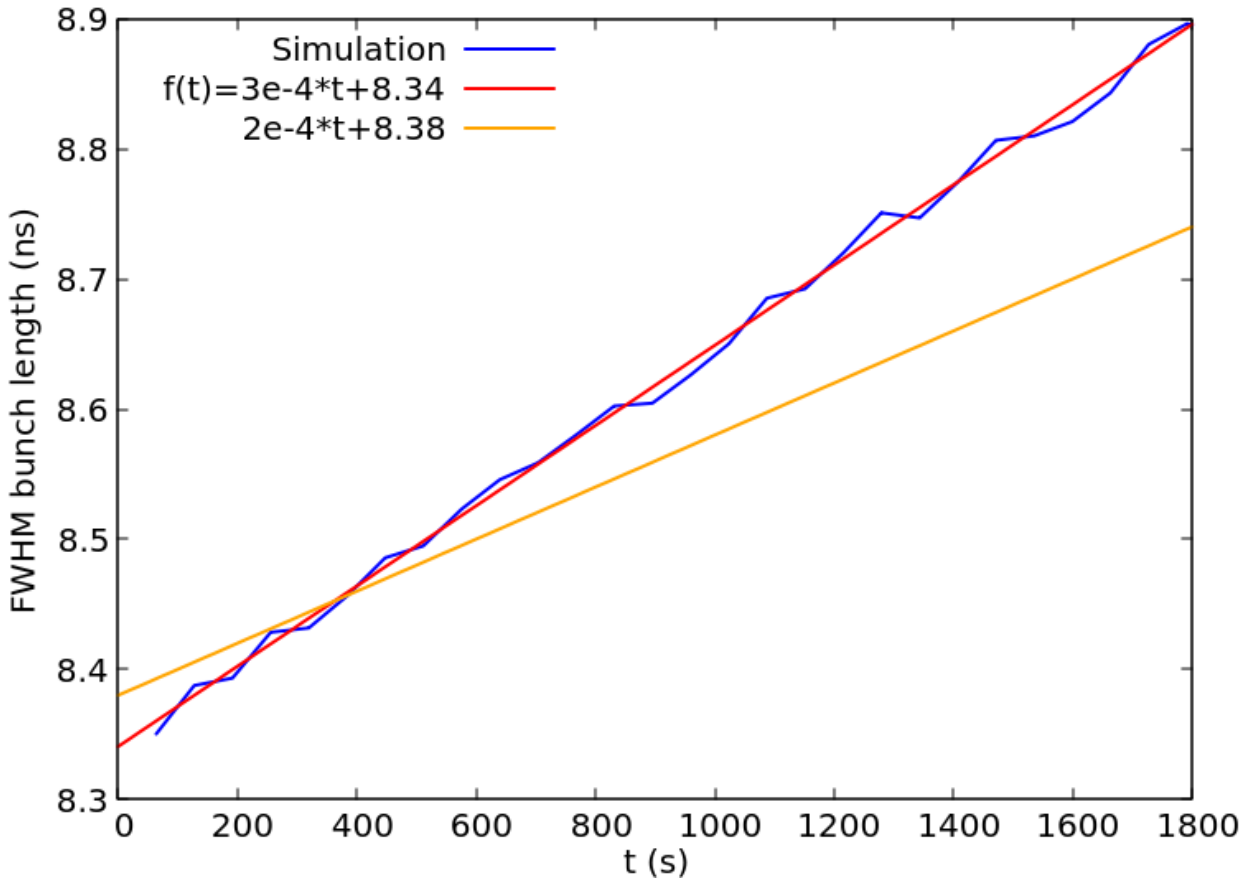


Summary

- The tracking code is updated so that the energy kick calculated from SPACE simulation is directly used with linear interpolation applied between data points.
- It has been implemented into the tracking code that ions sitting at different longitudinal slice of the electron bunch see different form of the cooling force. The cooling force for each slice of electrons depends on the local properties of the electrons and is provided by SPACE simulation.
- According to the simulation, cooling effect is very weak with the electron beam as obtained from the previous beam dynamic simulation, I.e. 7% of peak current increases over 40 minutes, even without energy jitter and other adverse effects.
- We need to improve electron beam quality so that we have 15 ps of duration with energy kick comparable to that of the best slice of the previous simulated electrons, I.e. slice 26.

Check IBS routine with measurement in FY 21 7/4/2021 20:44





I can't find any IPM emittance measurements during CeC dedicated time in Run 21, but the measurement for regular RHIC store looks smaller than 15 mm.mrad