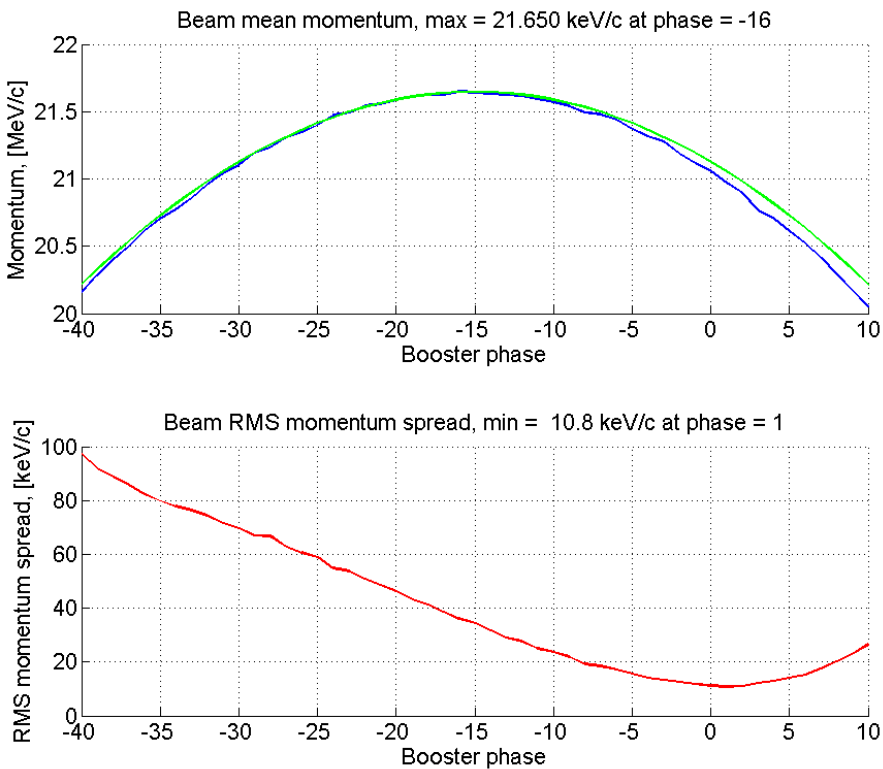


Last measurements in July 9 - 10

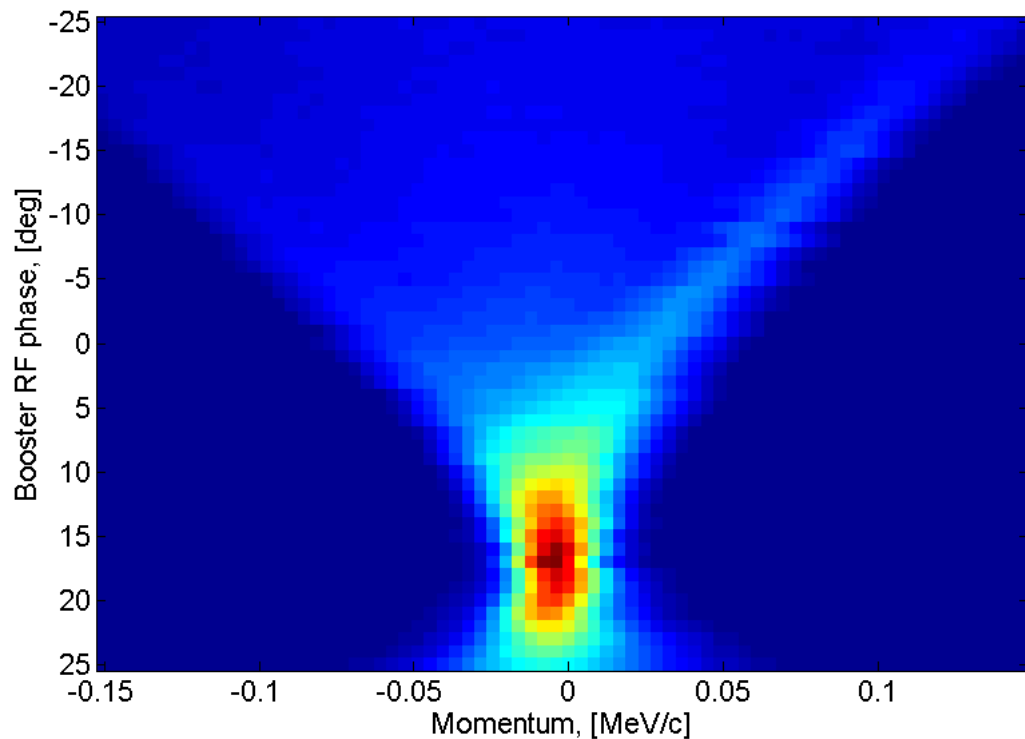
- ✓ 20 pC bunch charge
- ✓ 700 pC bunch charge

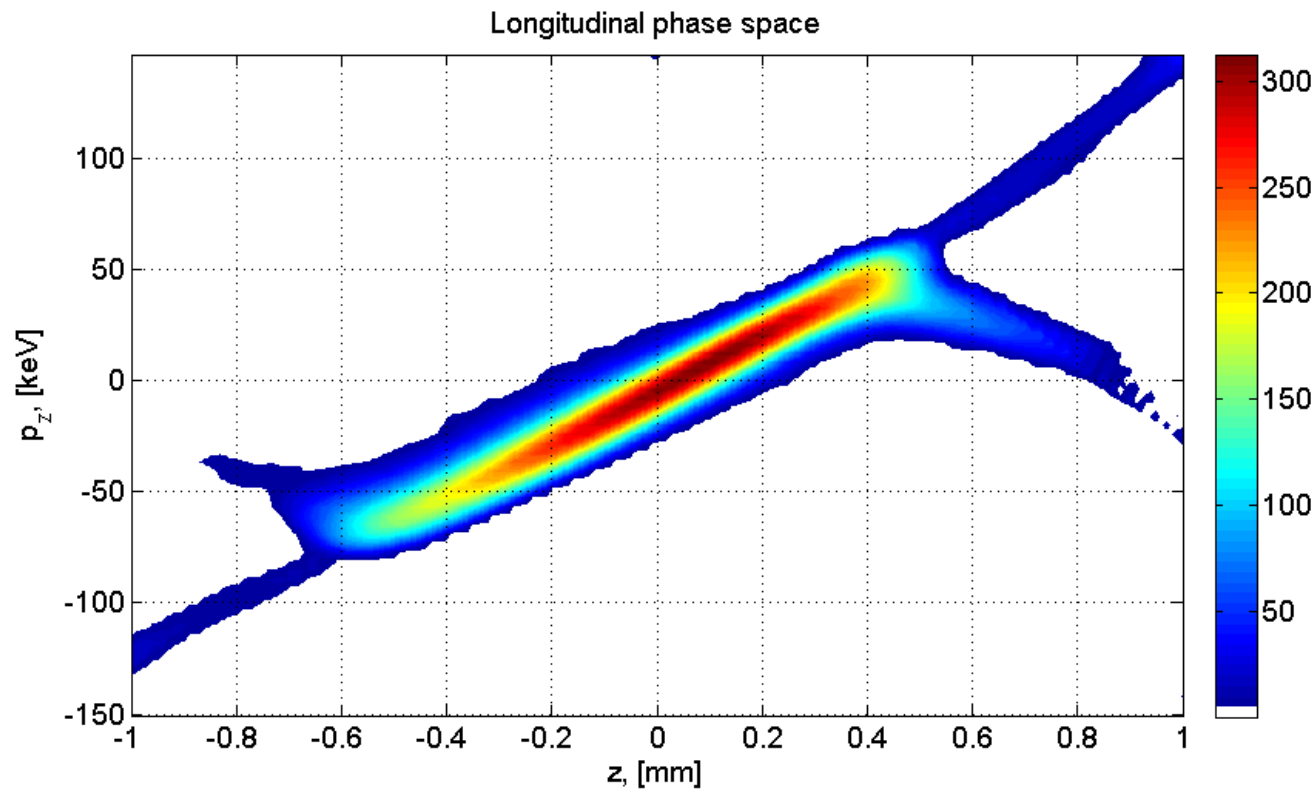
Dmitriy Malyutin
PPS July 2013

Momentum phase scan

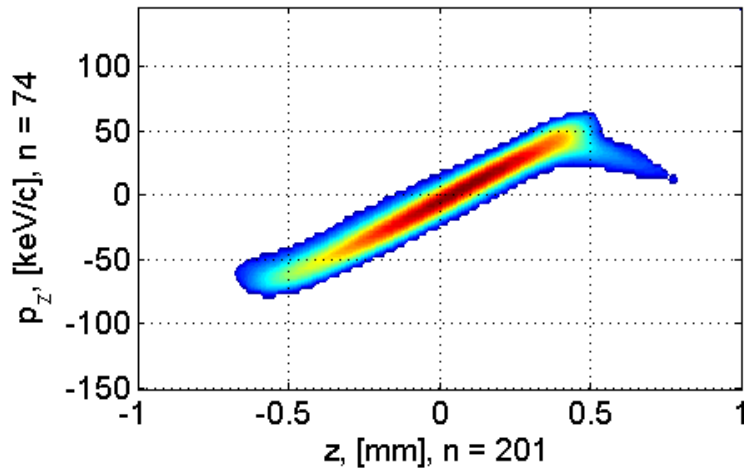


Momentum distributions

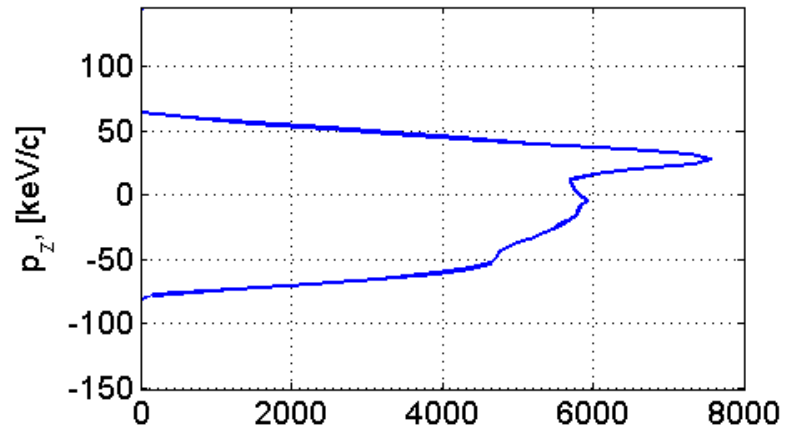




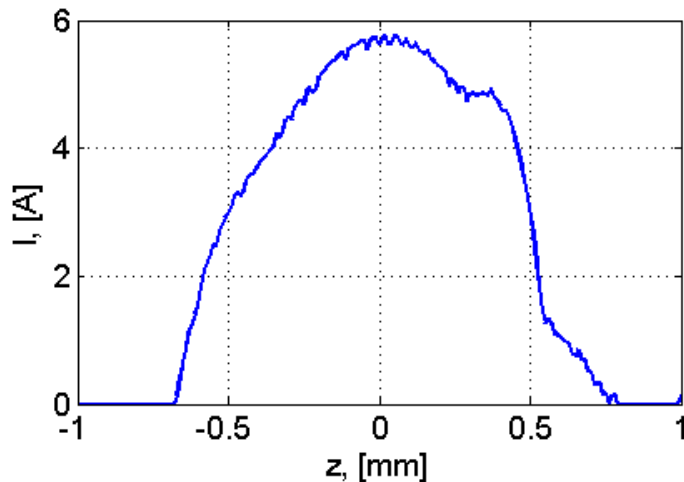
Longitudinal phase space, 90% of total charge



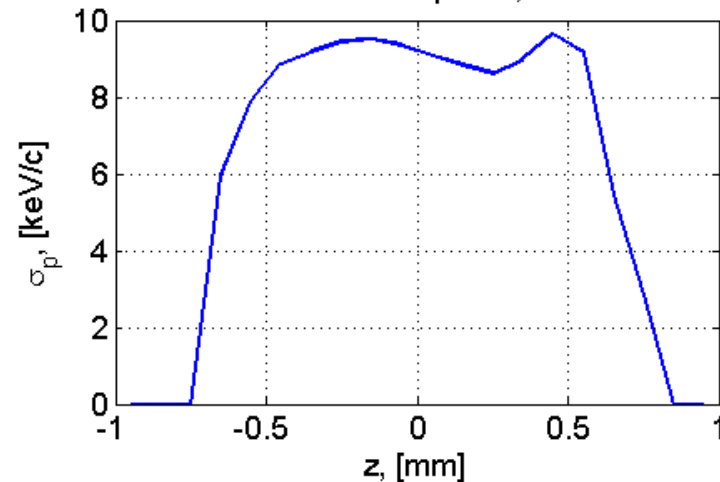
Momentum distribution, keV/c



Current distribution



Slice momentum spread, 20 slices

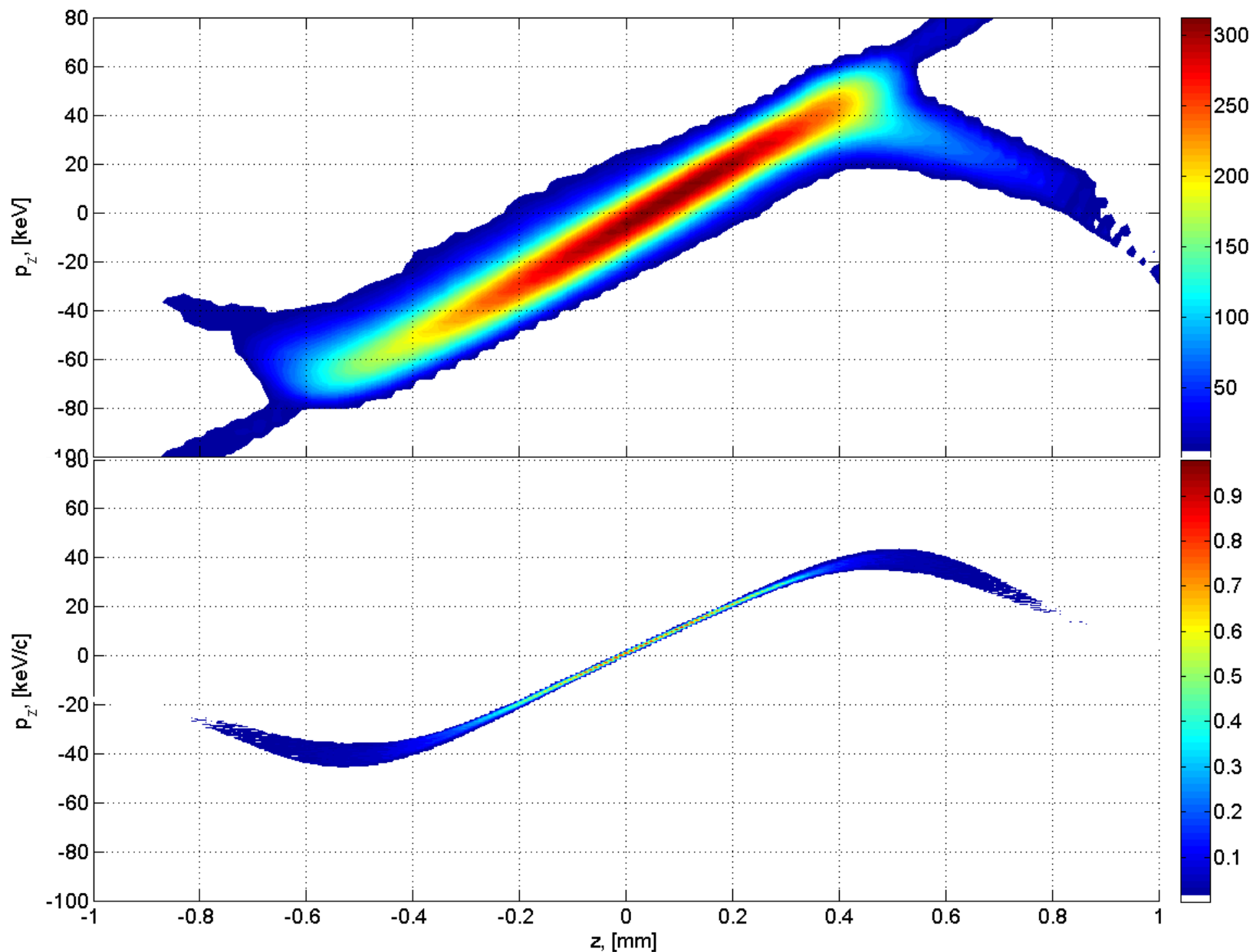


Longitudinal Emittance = 7.39 [mm*keV/c]
RMS momentum spread = 39.67 [keV/c]
RMS bunch length = 0.36 [mm]

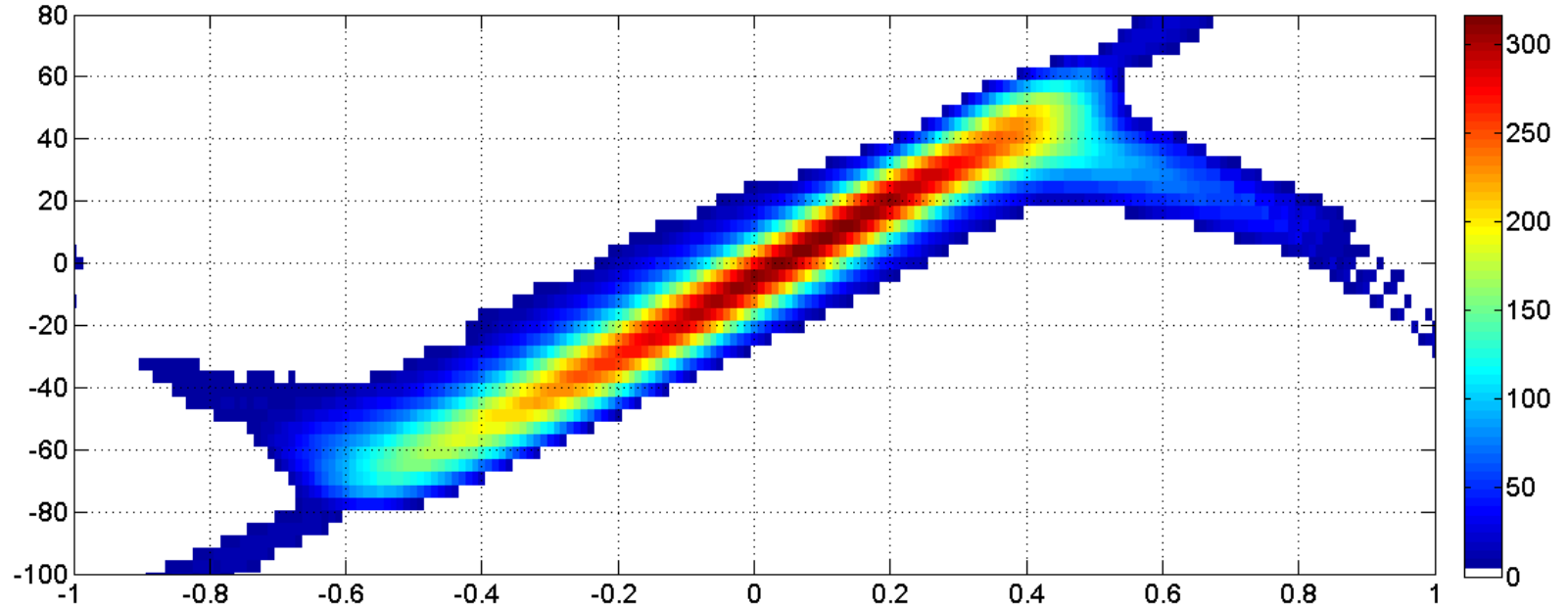
$dp_z = 4.073$ [keV/c]
 $dz = 0.010$ [mm]



Measured and simulated phase spaces



Measured phase space, in pixels

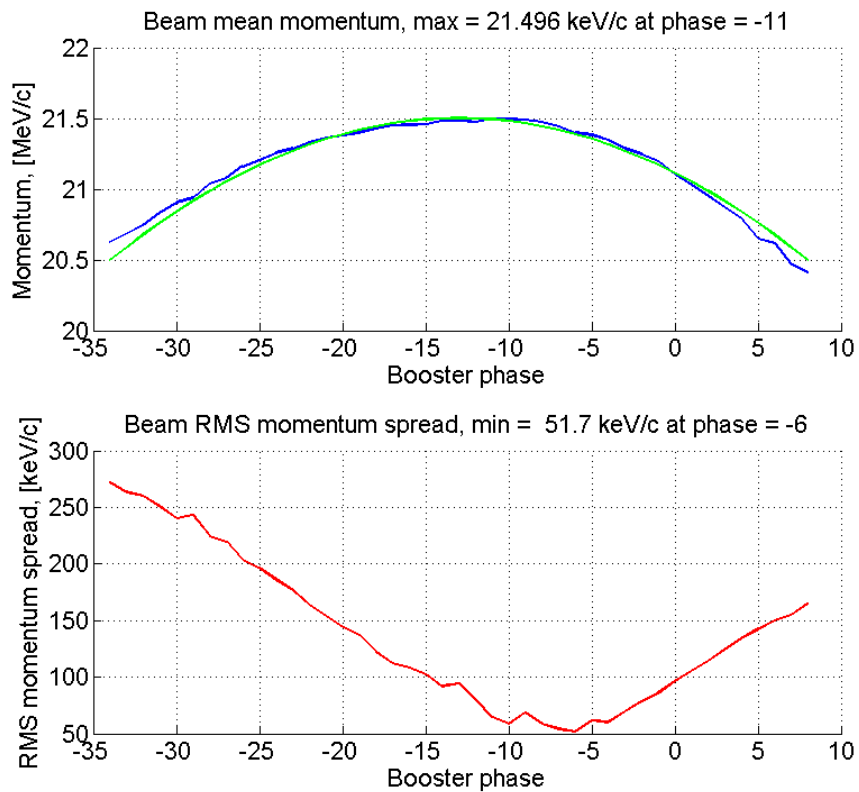


Conclusion for the case of 20 pC bunch charge

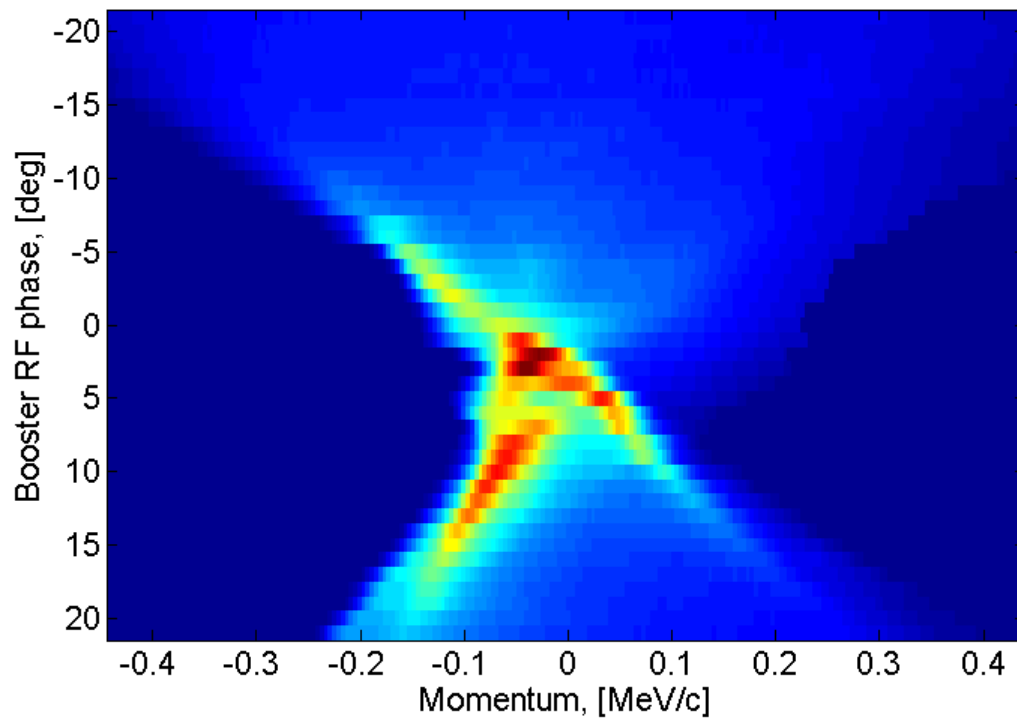
- The shapes of the measured and the simulated phase spaces look very similar.
- The measured phase space shows much higher slice momentum spread than the simulated one.
- Physical limit for momentum resolution of 4 keV/c per pixel is not sufficient to resolve the fine structure of the bunch.

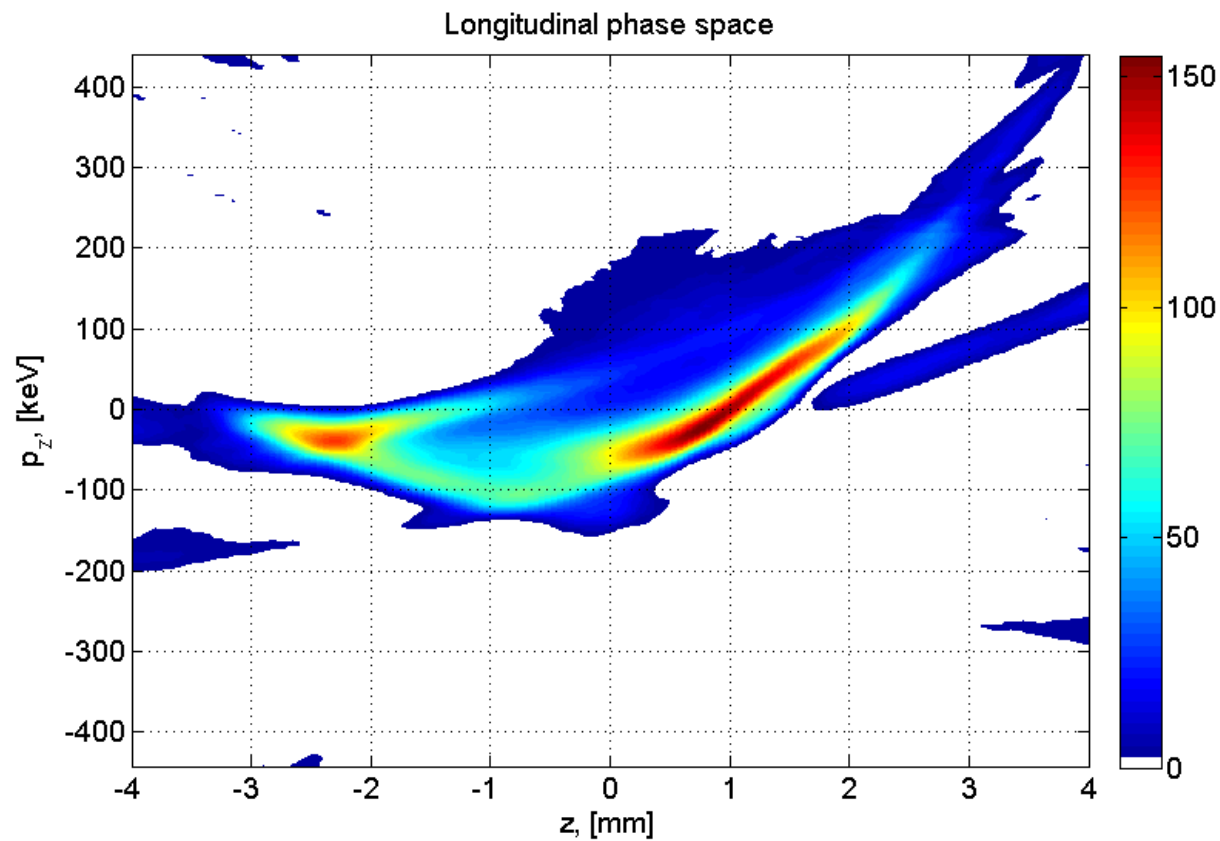


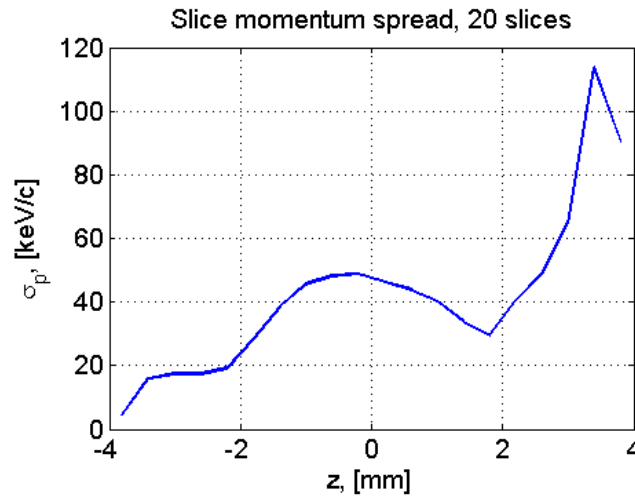
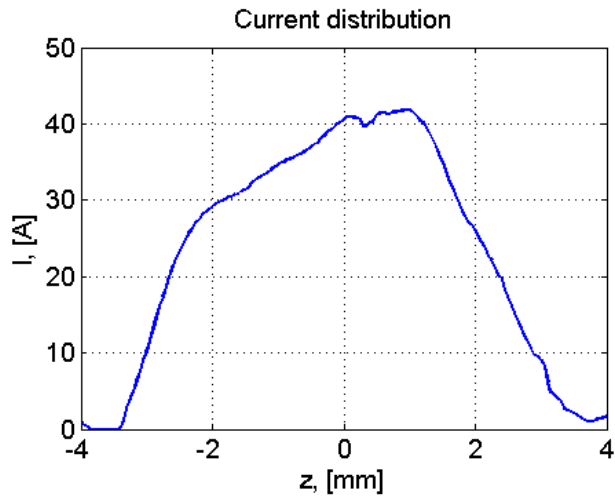
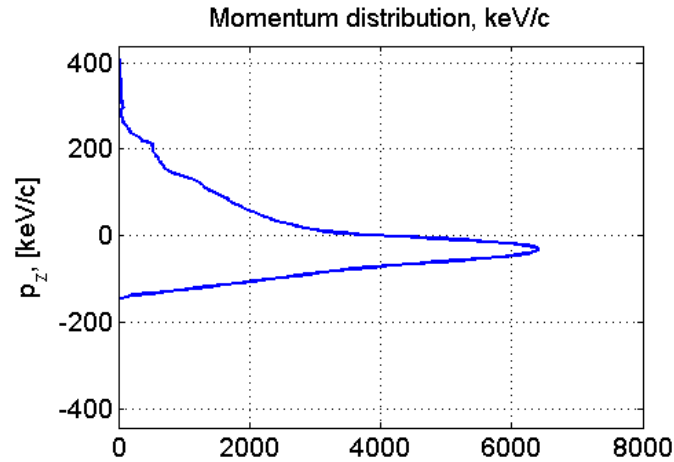
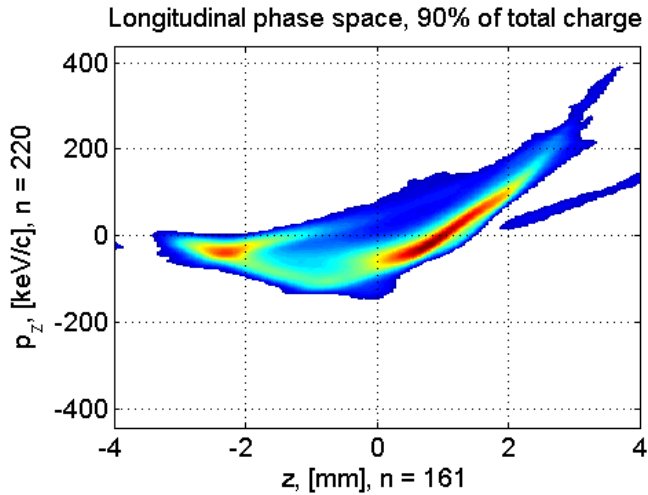
Momentum phase scan



Momentum distributions





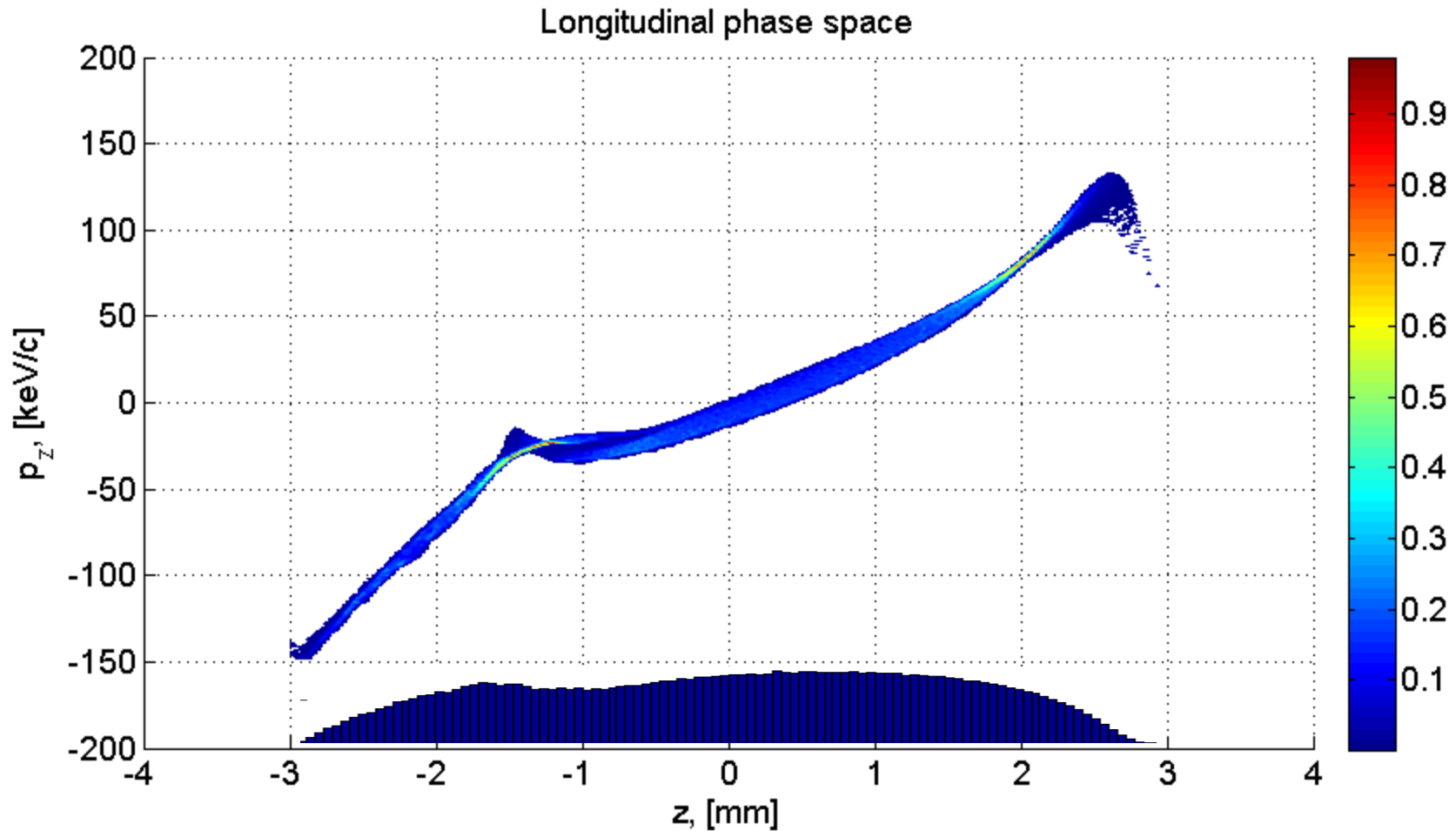


Longitudinal Emittance = 89.98 [mm*keV/c]
RMS momentum spread = 81.93 [keV/c]
RMS bunch length = 1.56 [mm]

$dp_z = 4.021$ [keV/c]
 $dz = 0.010$ [mm]



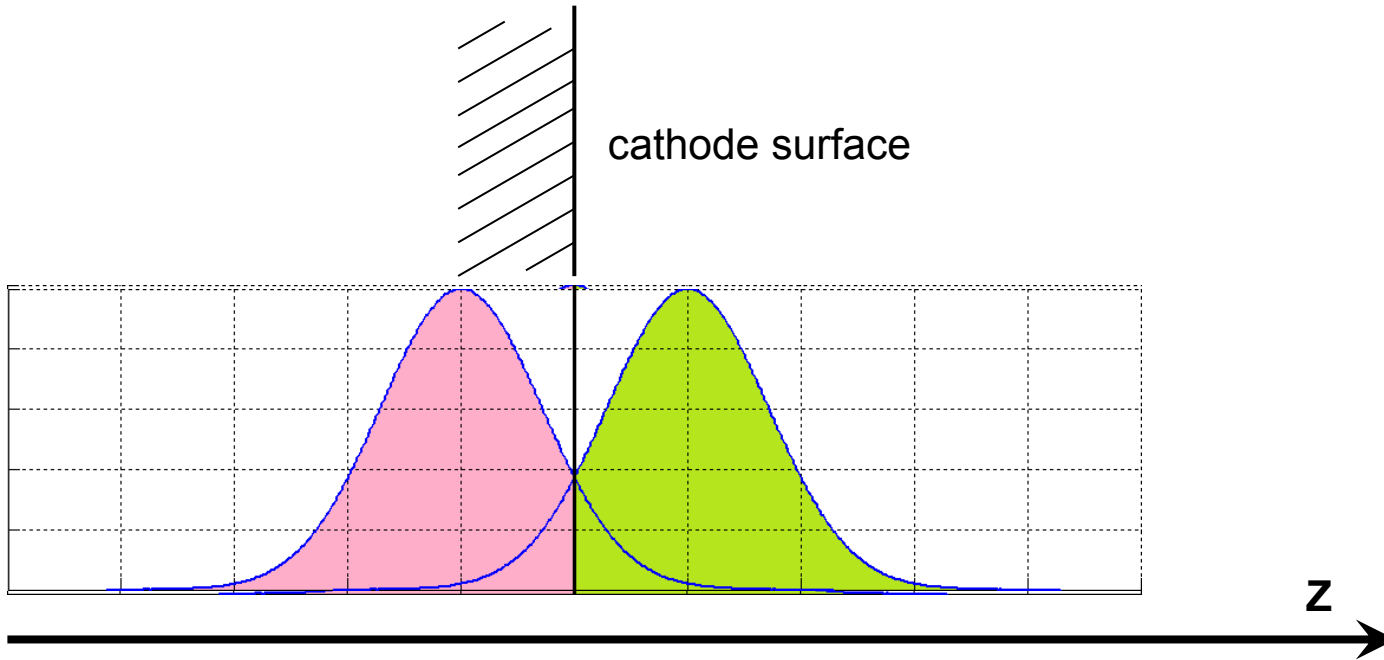
Simulation, 2.5 m, 1.4 nC charge from laser intensity



0.83 nC – charge extracted!



Charge extraction



Conclusion for the case of 700 pC bunch charge

- Looks like that phase space consists of two separated parts
- The structure can be explained by the virtual cathode formation, what also can be seen in ASTRA simulations

