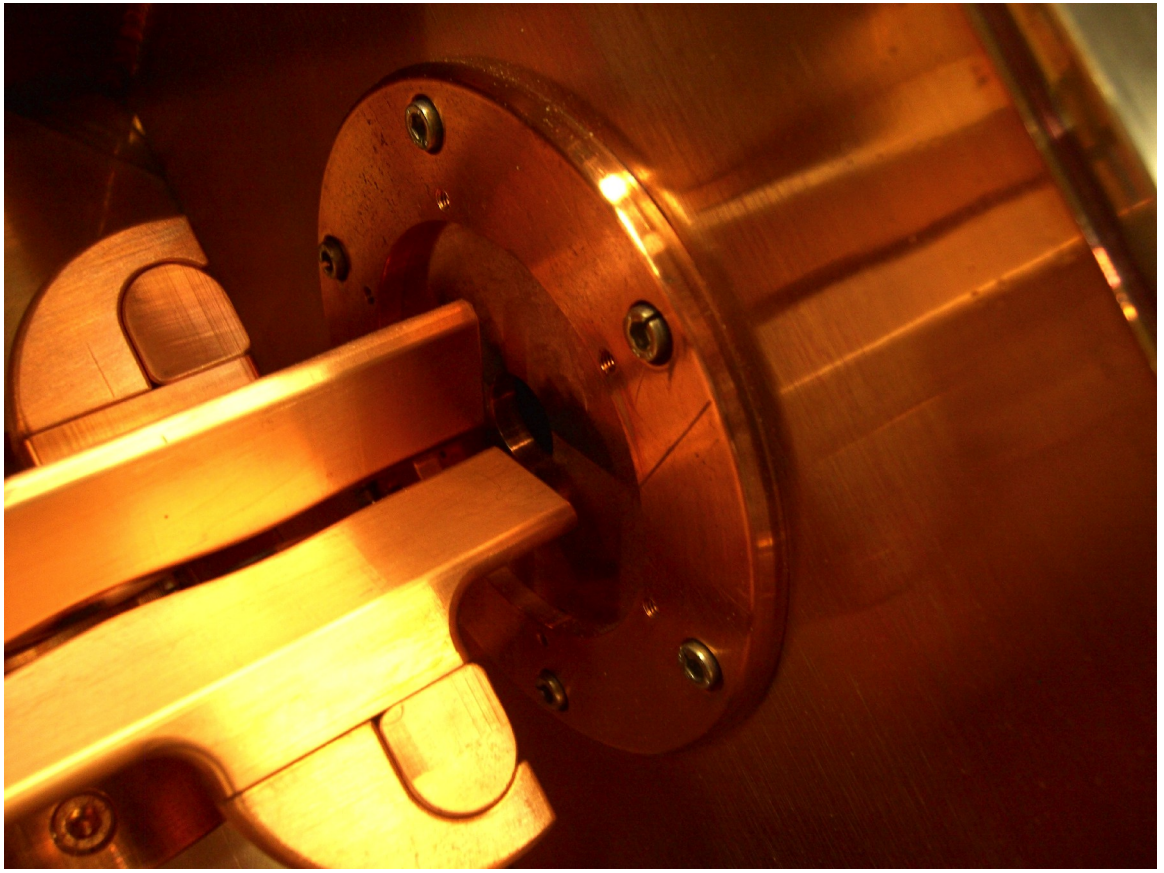
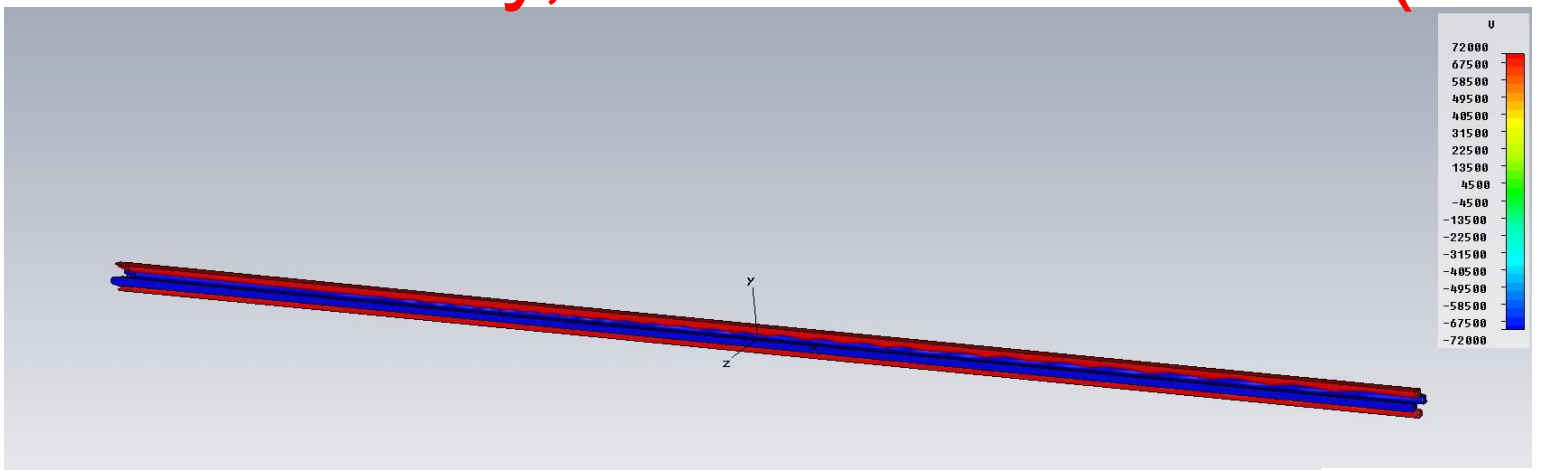
Summary of RFQ Simulations

S. Kurennoy, G. Romanov, J. Schmidt
(Summarized by C.Y. Tan)
25 June 2012

Picture of end plate before removal

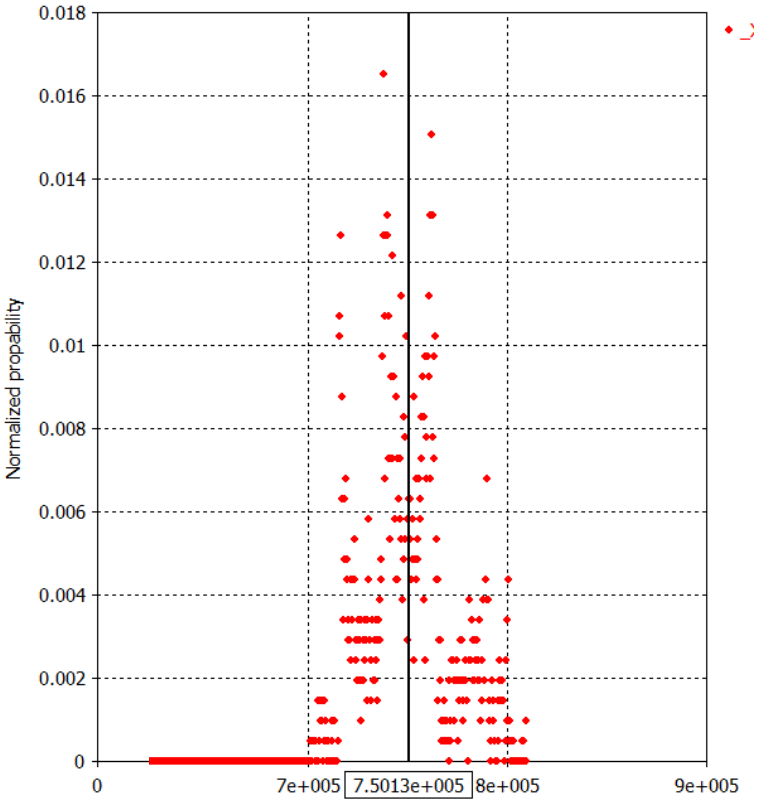


Rods only, beam accelerated (G. Romanov)

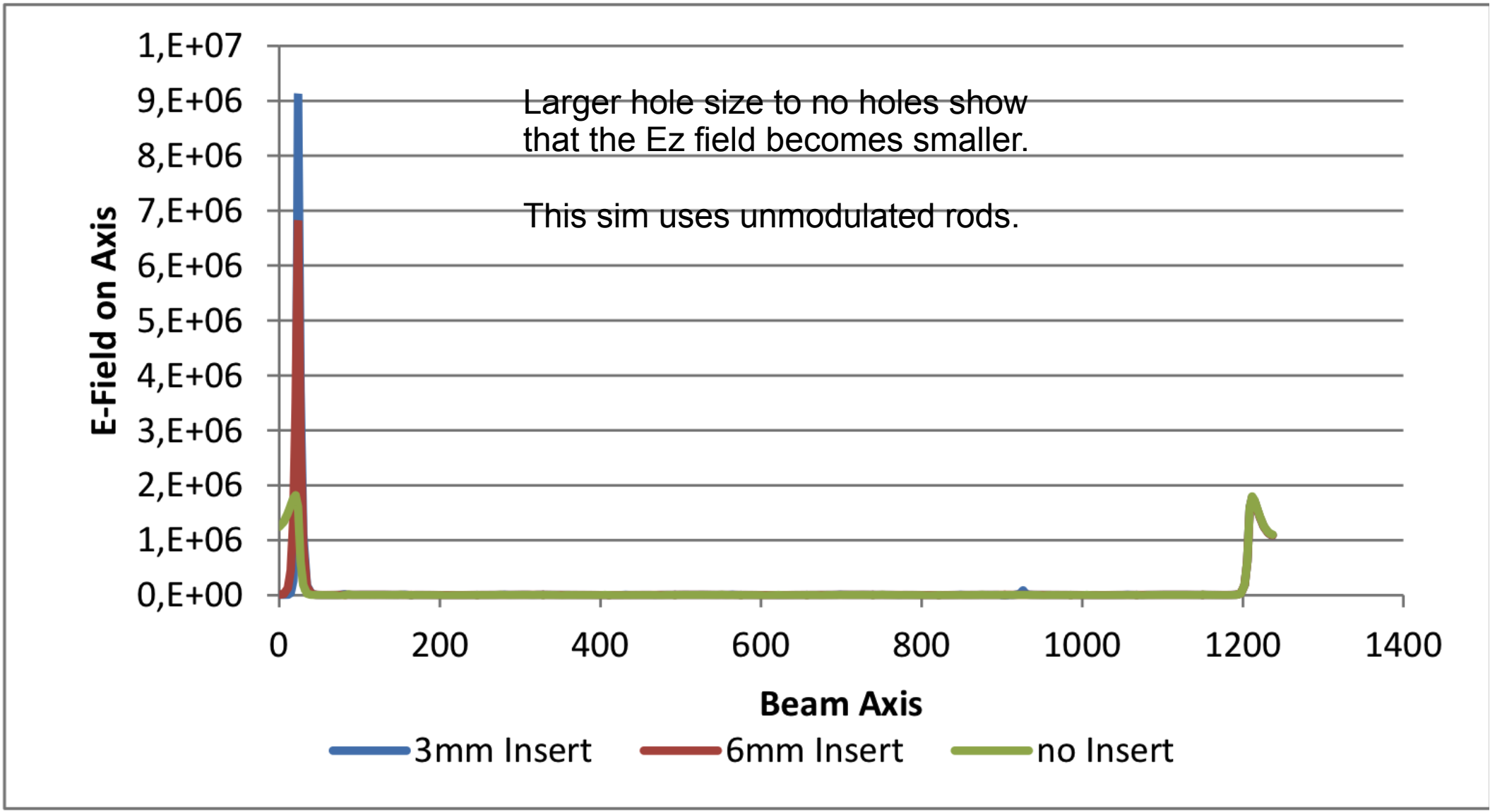


Energy of beam is 750 keV using engineering data for the vane modulations.

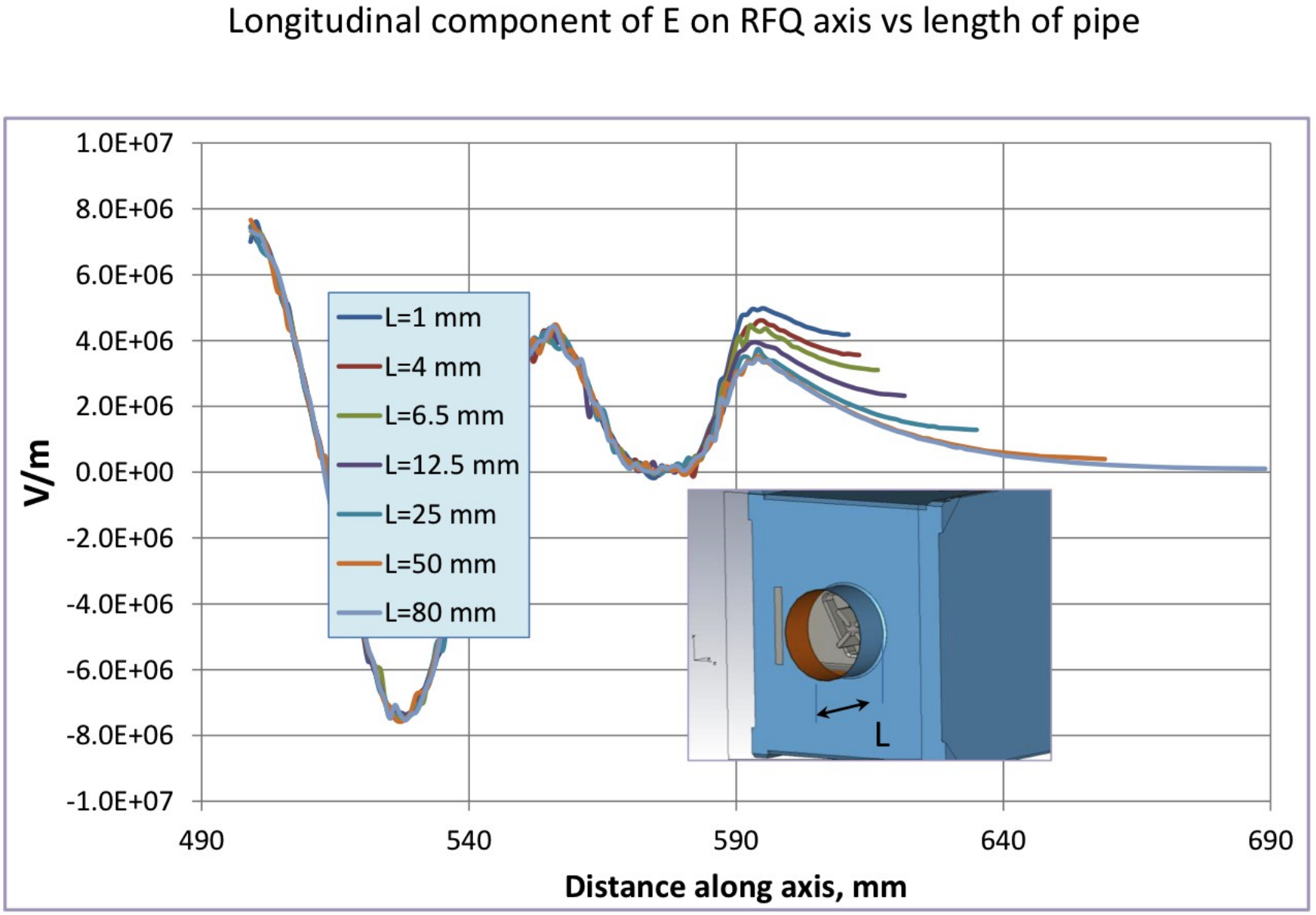
This simulation confirms that the PARMTEQM vane modulations are correct.



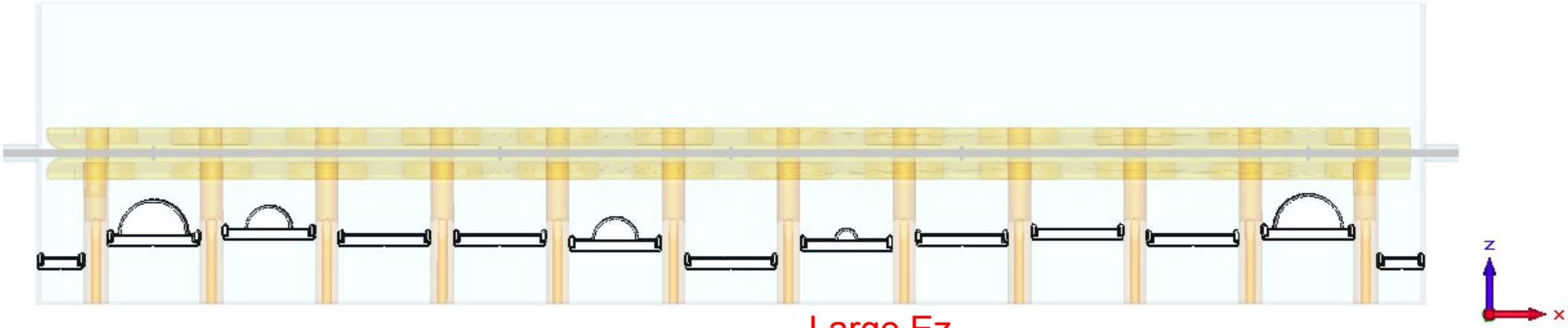
Effect of end plate hole size (J. Schmidt)



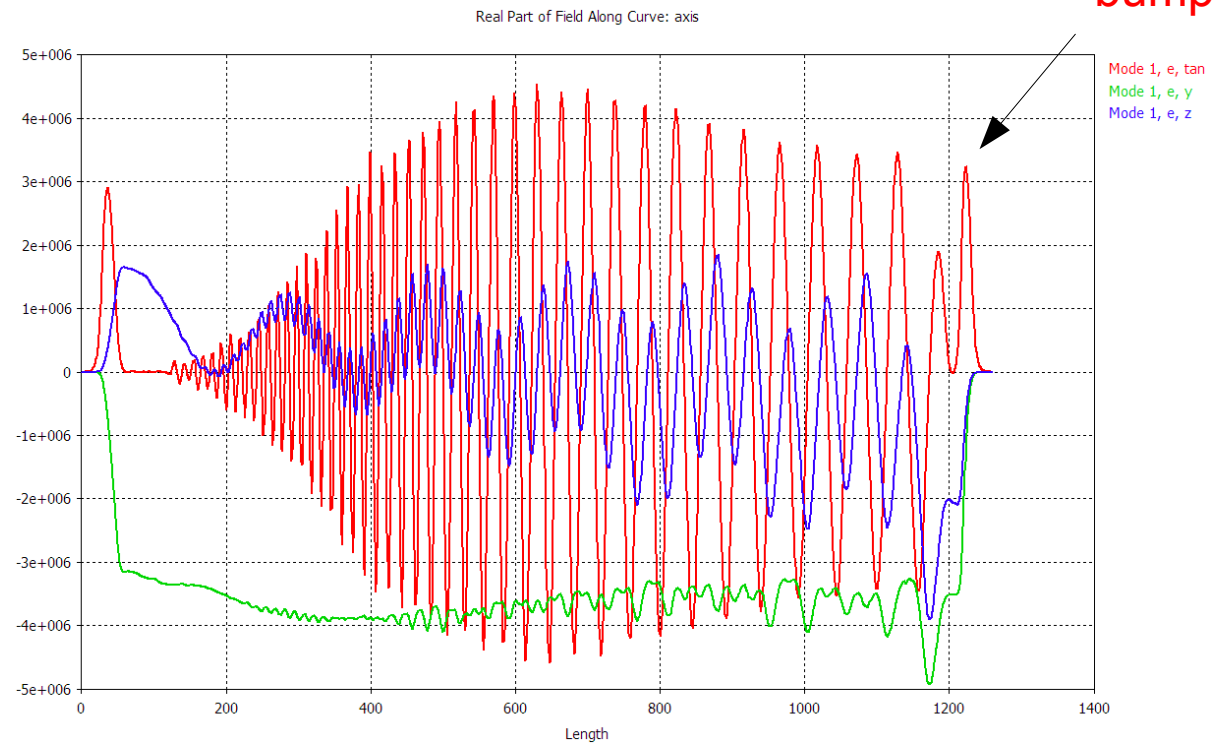
For a large hole (110 mm) and length of the end plate varied (G. Romanov)



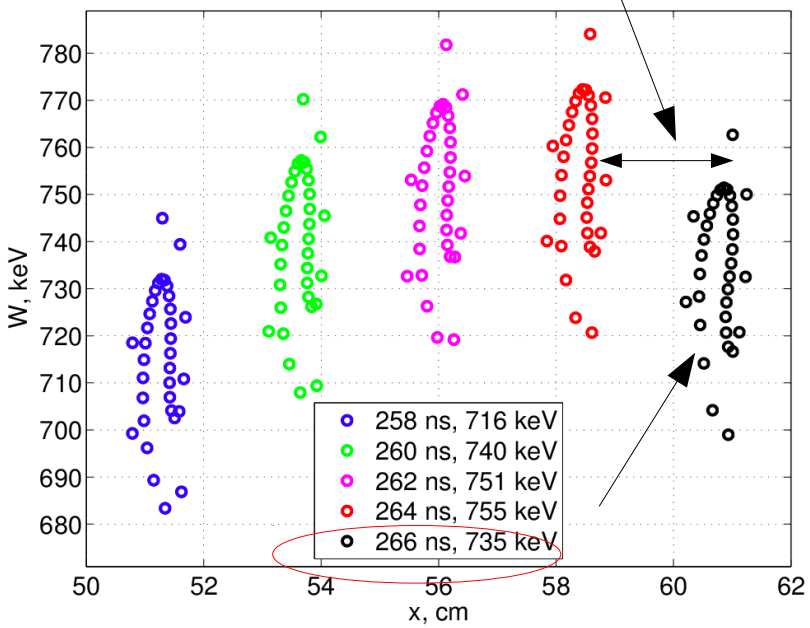
15 mm beampipe (S. Kurennoy)



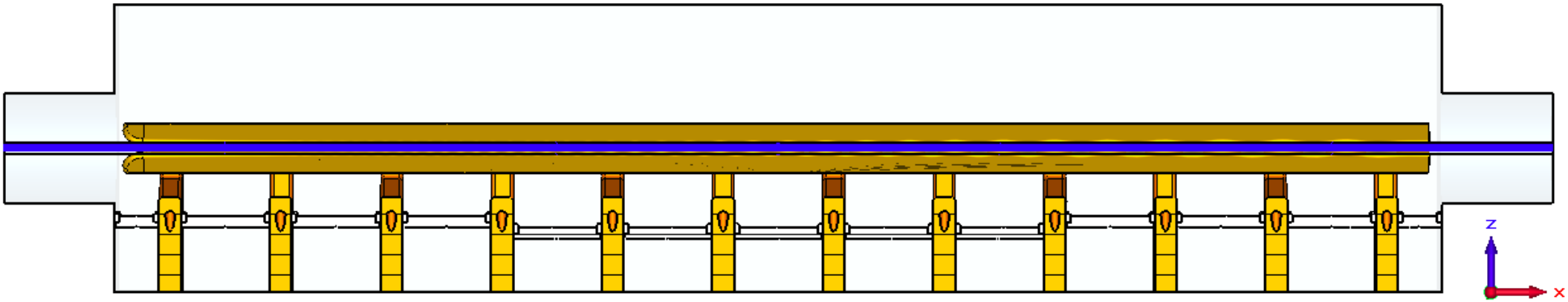
Large Ez
bump in gap



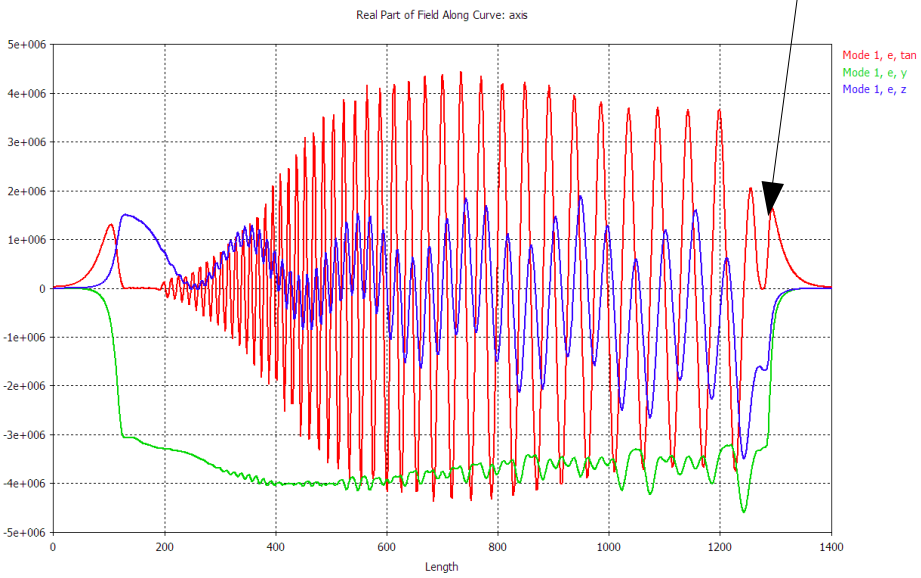
Energy
drop!



100 mm beampipe (S. Kurennoy)

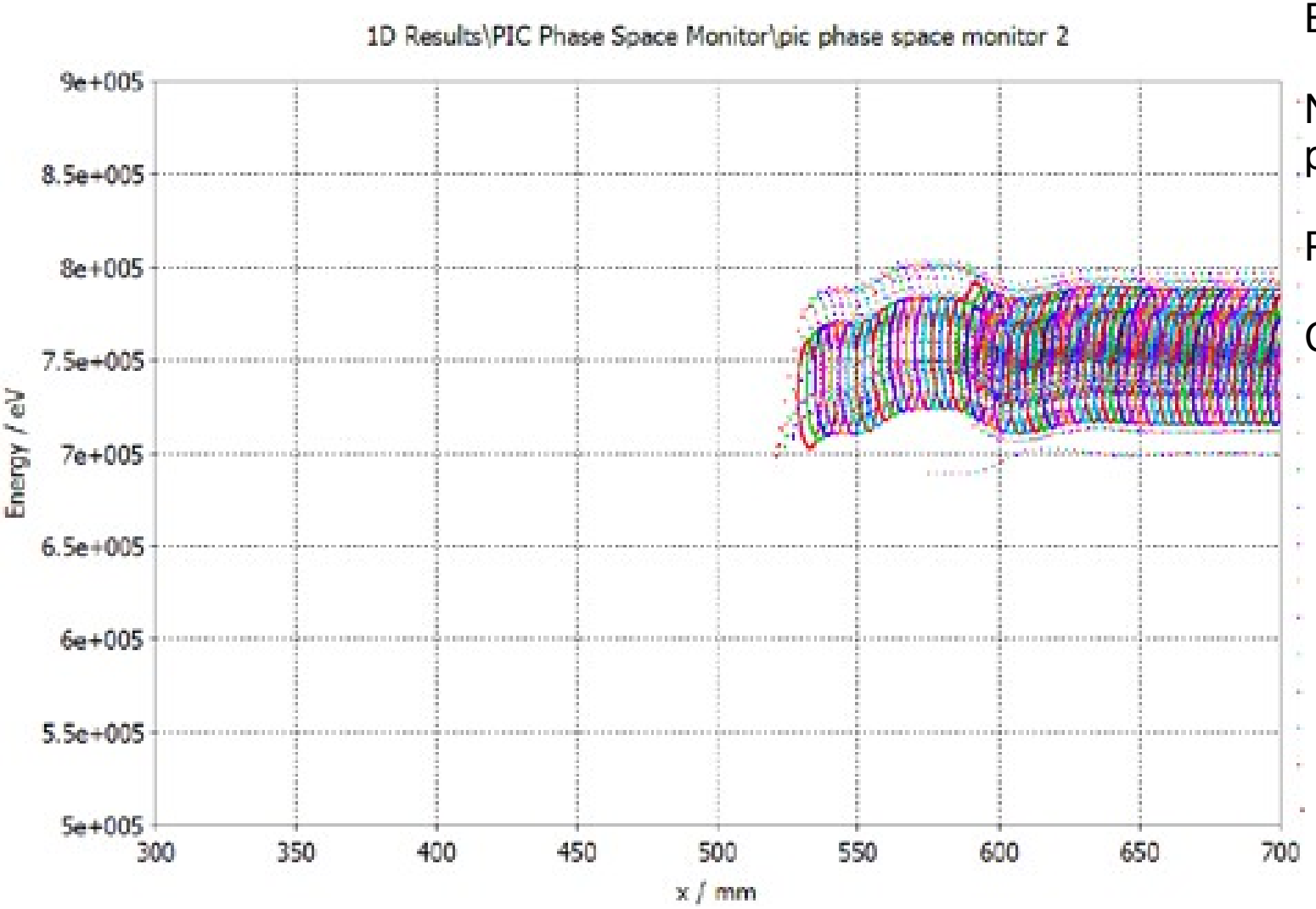


Smaller Ez bump



Energy is 753 keV.

Model A – Longitudinal Phase Space Evolution near exit of RFQ (S. Kurennoy)



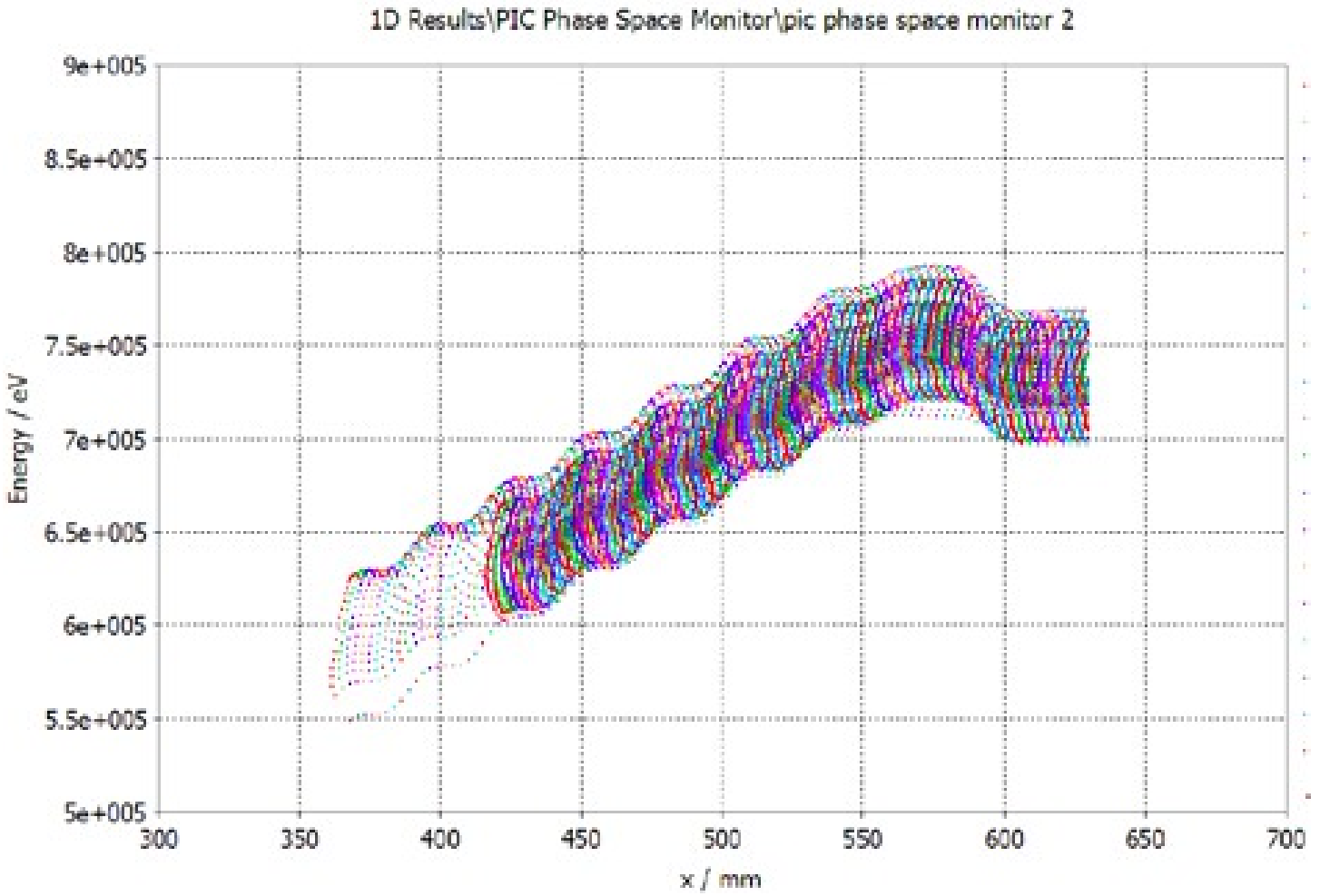
Exit energy is 753 keV

No half moons, wide pipes (100 mm)

Pencil beam simulation

Called Model A.

Model B – Longitudinal Phase Space Evolution near exit of RFQ (S. Kurennoy)



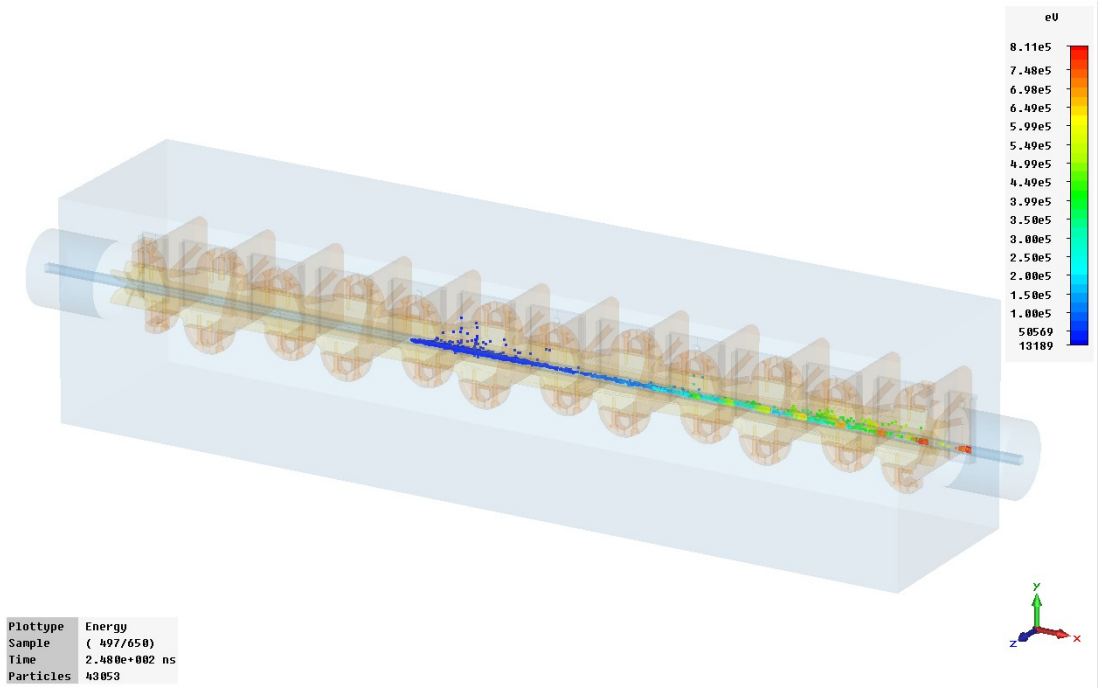
Exit energy is ~730 keV

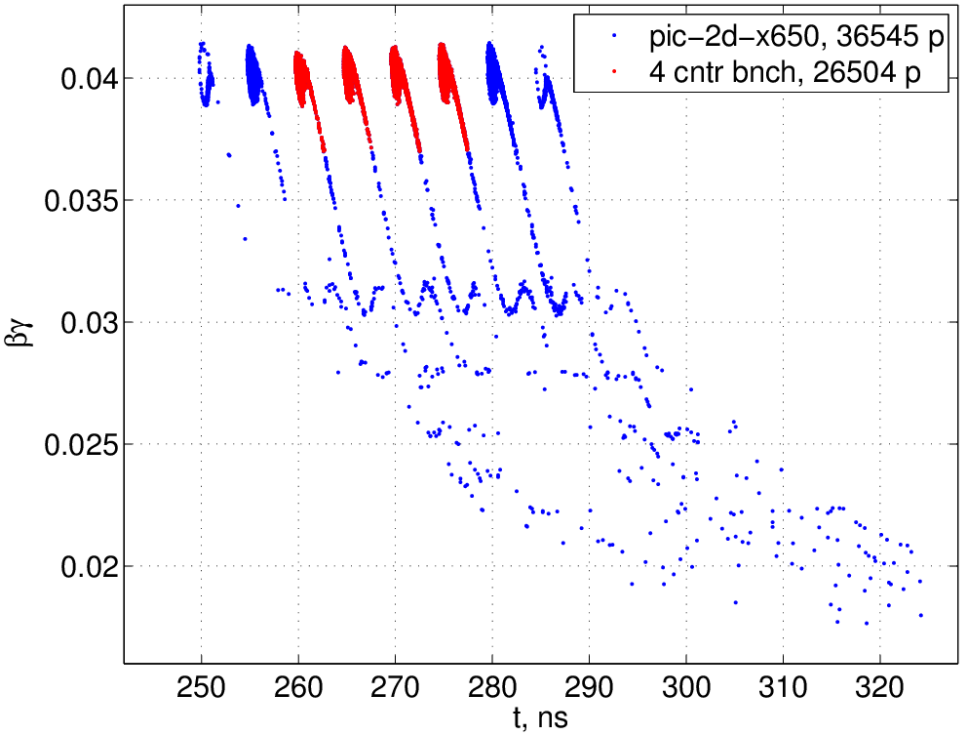
With half moons, narrow pipes (15 mm)

Pencil beam simulation

Called Model B.

Model A – 50k particle sim (S. Kurennoy)





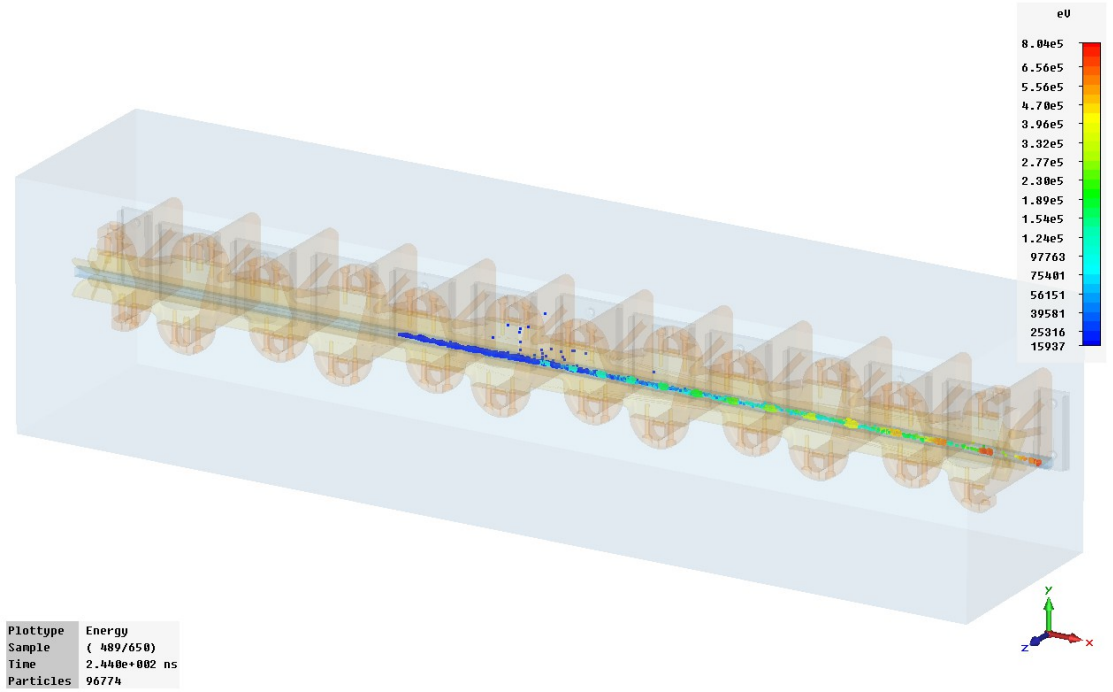
Realistic particle into distribution. Using Model A.

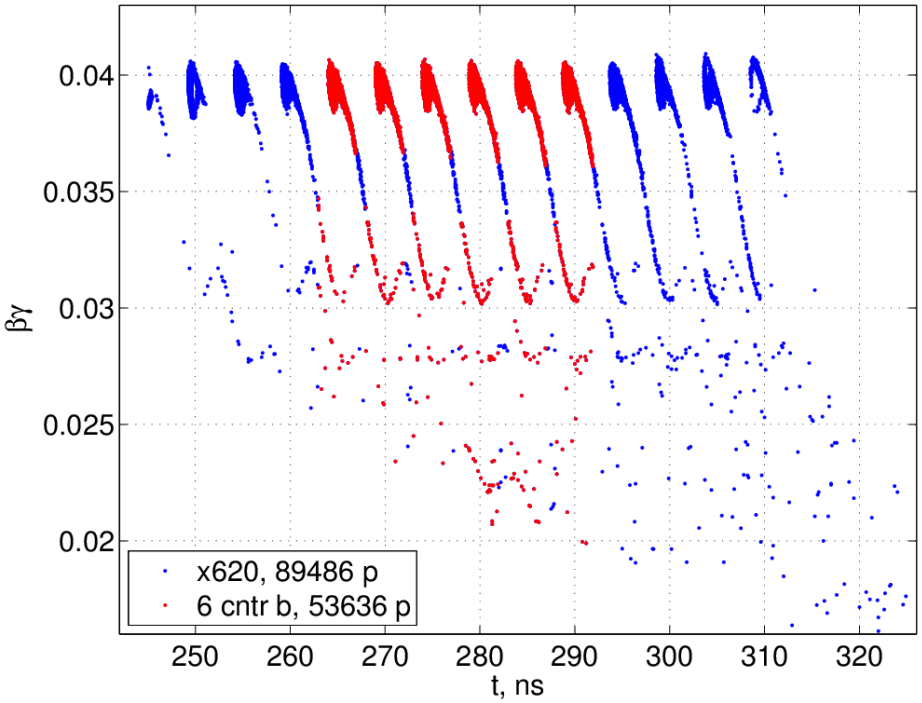
Average energy is 748 keV.

Transmission efficiency ~65%.

Note: there may be a problem with the way particles are injected. See 22 Jun mail

Model B – 100k particle sim (S. Kurennoy)





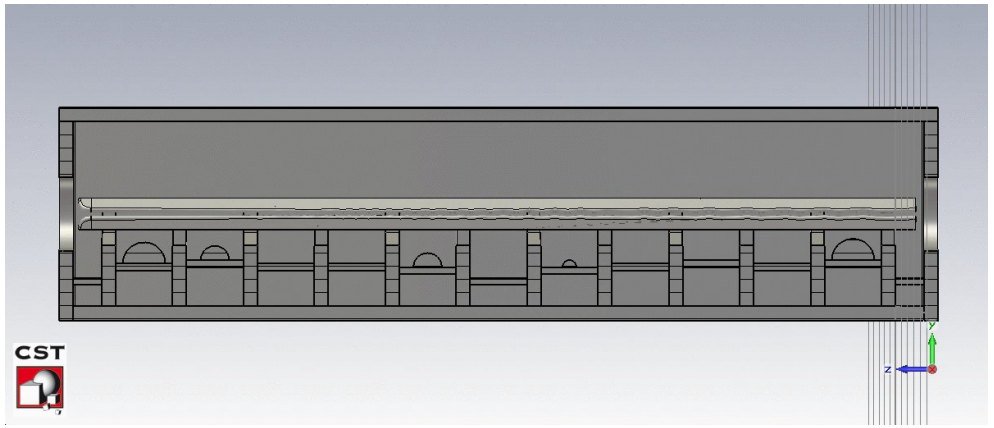
Realistic particle into distribution. Using Model B.

Average energy is 730 keV.

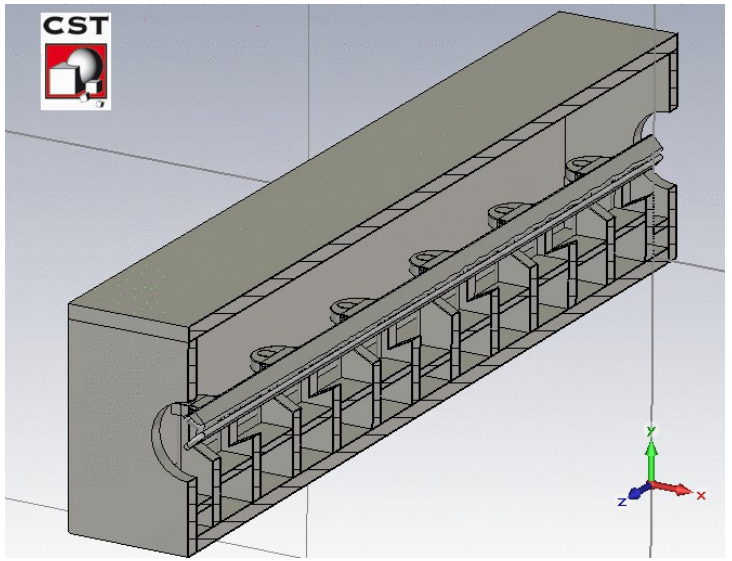
Transmission efficiency ~90%.

Injection problem fixed. (See 22 Jun mail message)

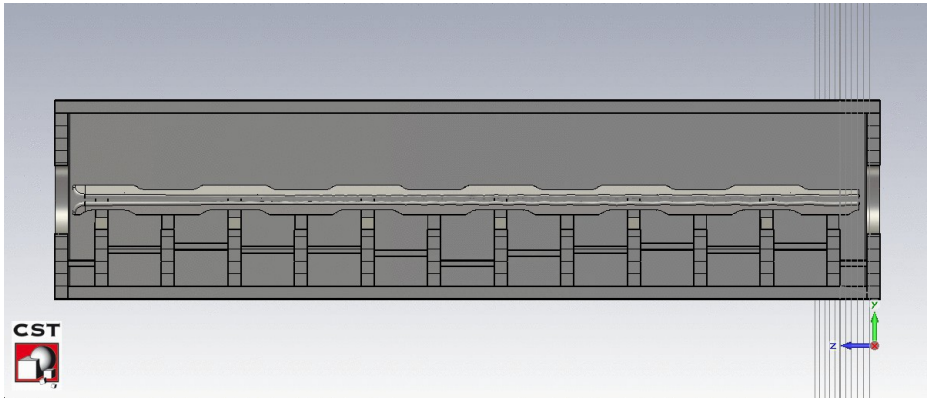
Resonant Frequency for different rod and half moon configs (J. Schmidt)



202.9 MHz with thick rods and half moons

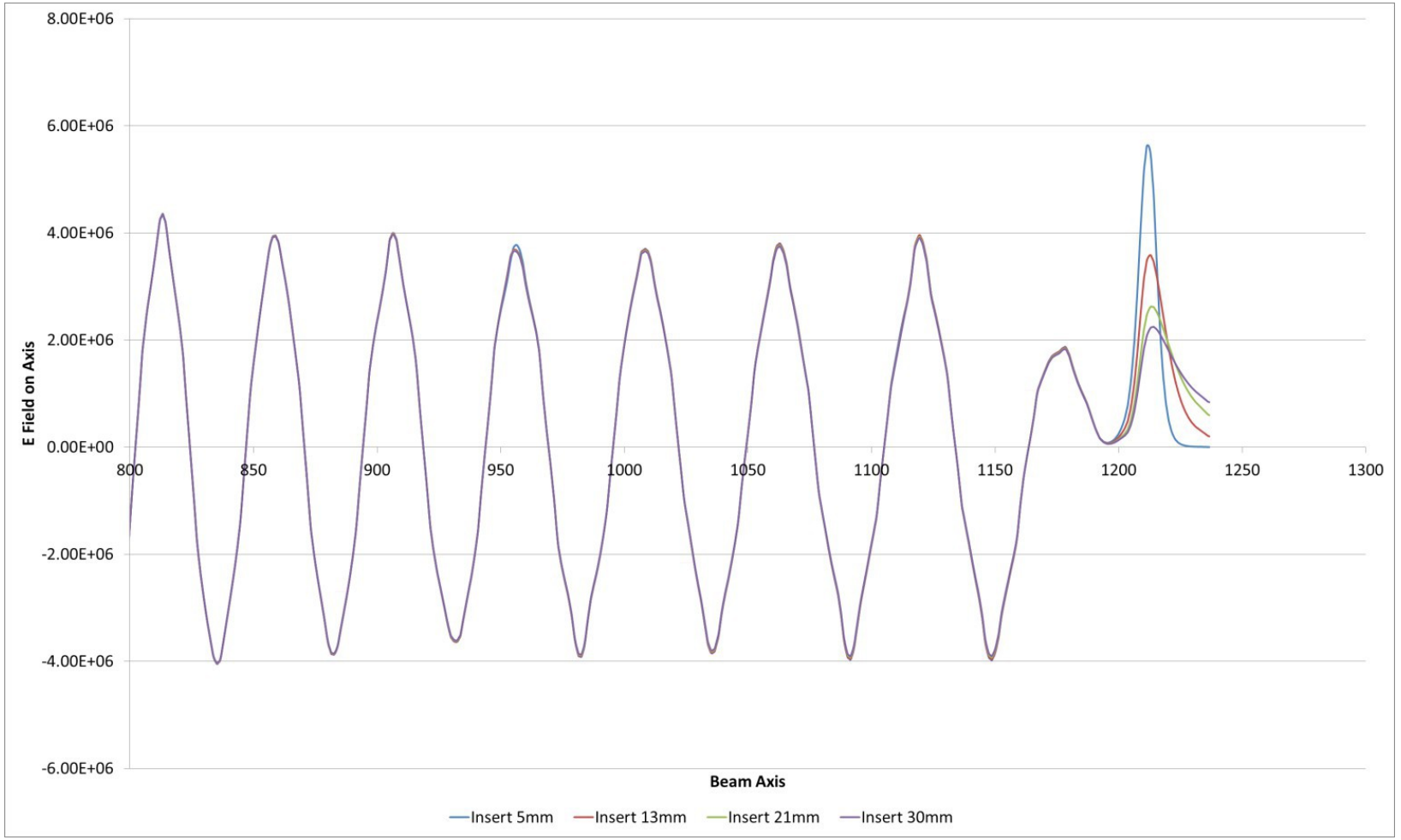


195.84 MHz with thick rods and no half moons



206 MHz, thin rods no half moons

Gap Ez bump is reduced as the end plate aperture is increased (J. Schmidt)



Resonant frequency increases from 200.39 MHz to 200.619 Mz from 5 mm radius to 30 mm radius hole.