Science & Technology Facilities Council

ASTeC

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Imperial College London

WARWICK

Universidad del País Vasco

Euskal Herriko Unibertsitatea

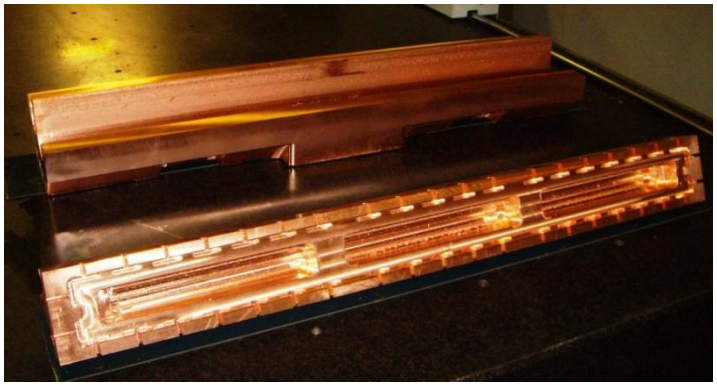
P.S.A.G. meeting

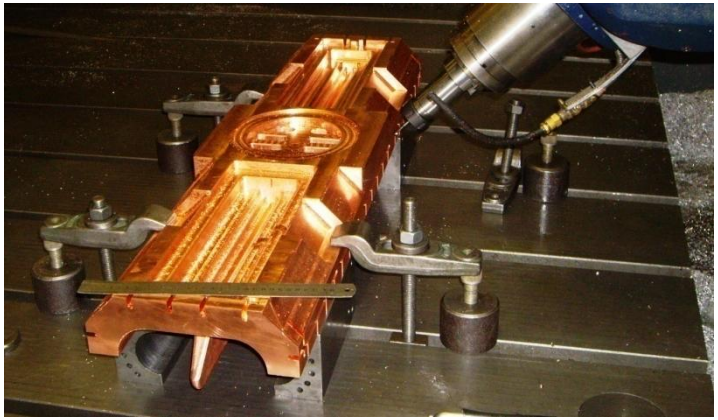
by **Juergen Pozimski**

10th May 2012

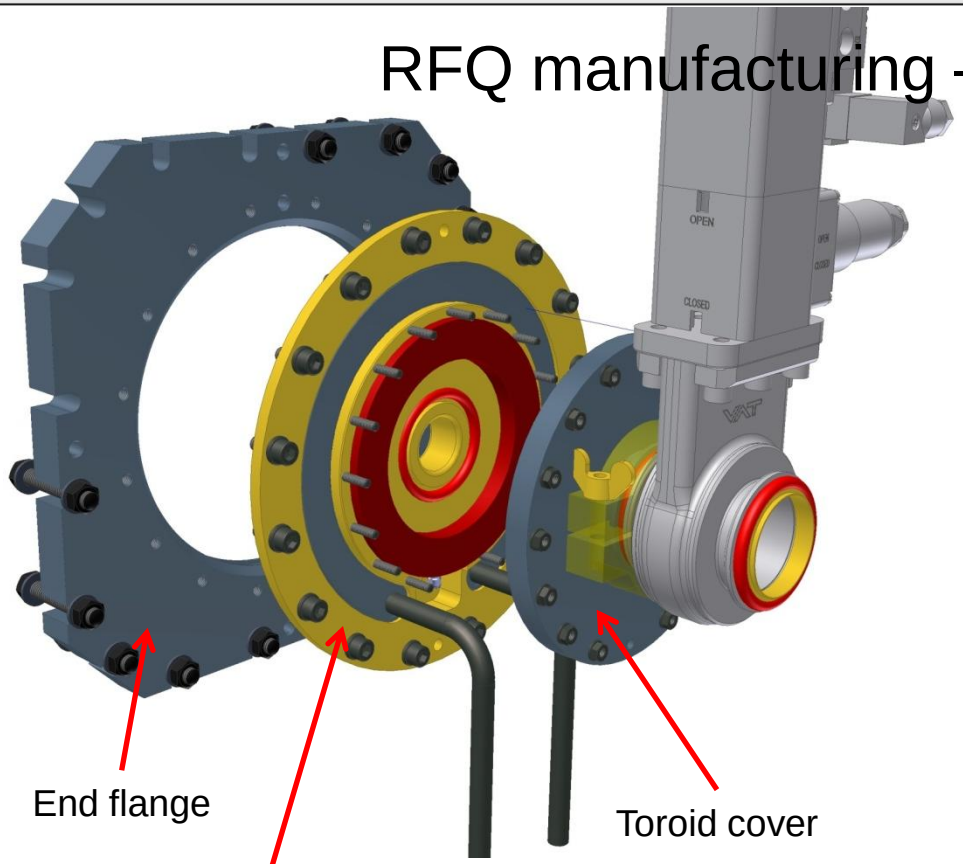
RFQ manufacturing – machining status

- Status at the last meeting in mid February: the four pieces of RFQ section 1(two major vanes and two minor vanes) were rough machined to +2mm.
- On 6th March the remaining bulk copper was delivered to the manufacturer.
- Today all 16 pieces of the complete 4m RFQ are machined to +2mm.



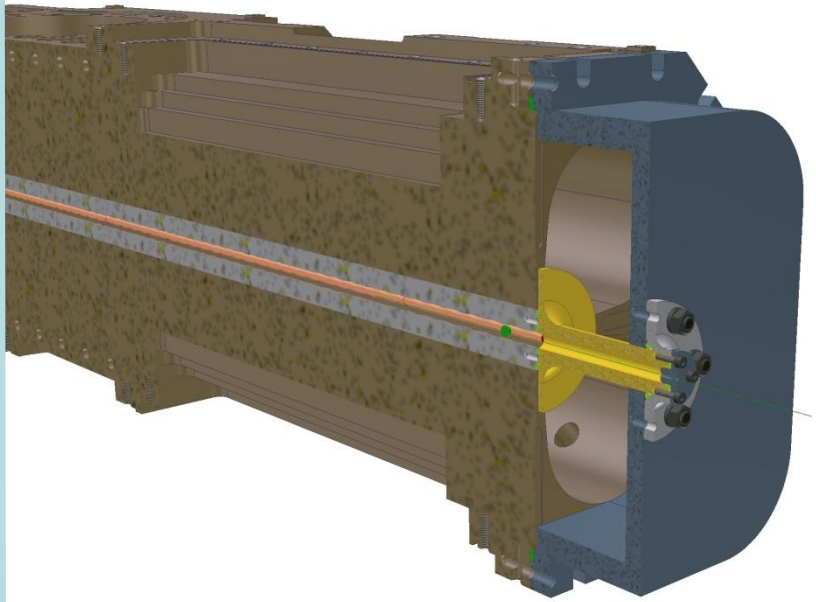


RFQ manufacturing – machining status



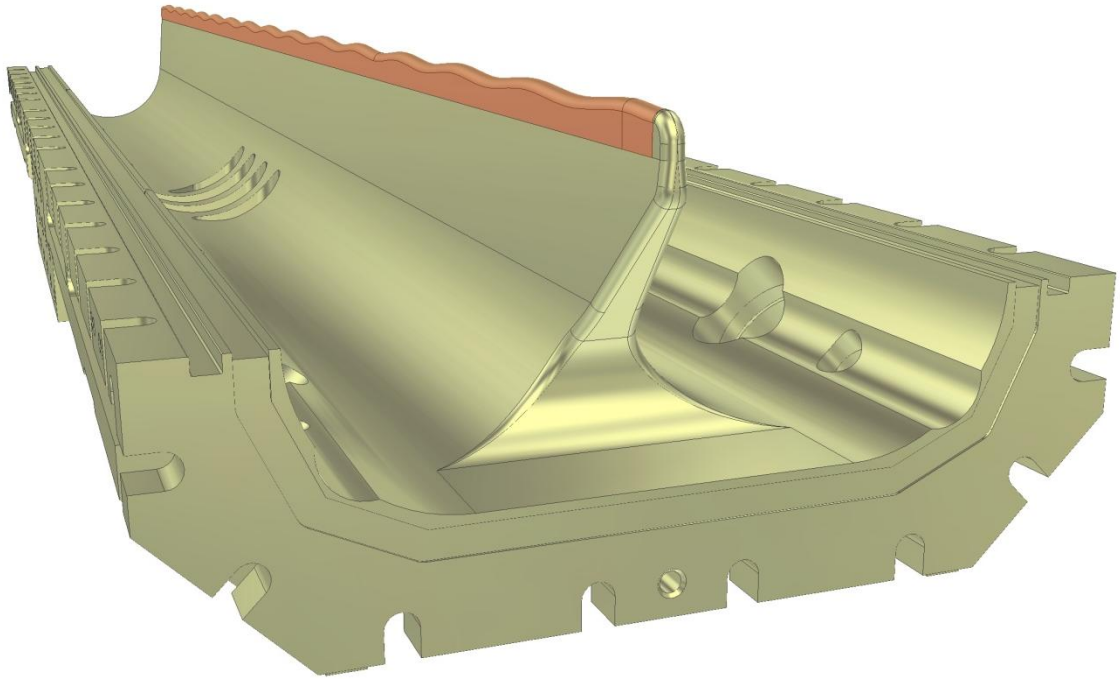
- The end flange design is complete.
- The engineering drawings are complete.
- Being manufactured now at Imperial College.

- Simulations for the RF test end flange have been made.
- RF test flange has been designed to be adaptable.
- Engineering drawings are being created now.

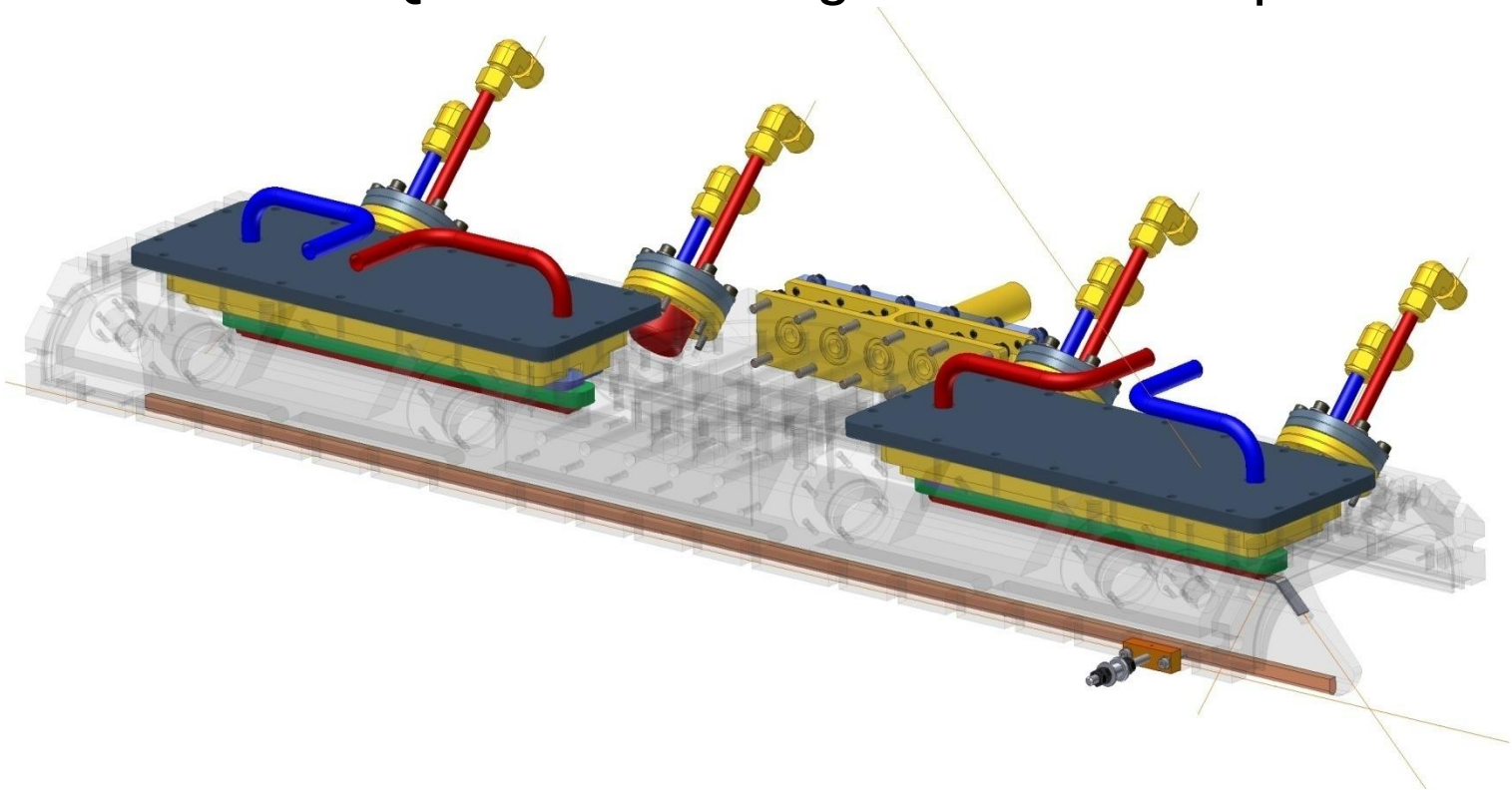


RFQ manufacturing – the next steps

- Machining the inner vane profile to the finished size is the next step and is the most critical operation.
- Trials have been completed to find the best cutter and machining speeds and feeds.
- One cutter must last an entire 15 hour machining operation to prevent surface imperfections caused by a tool change.

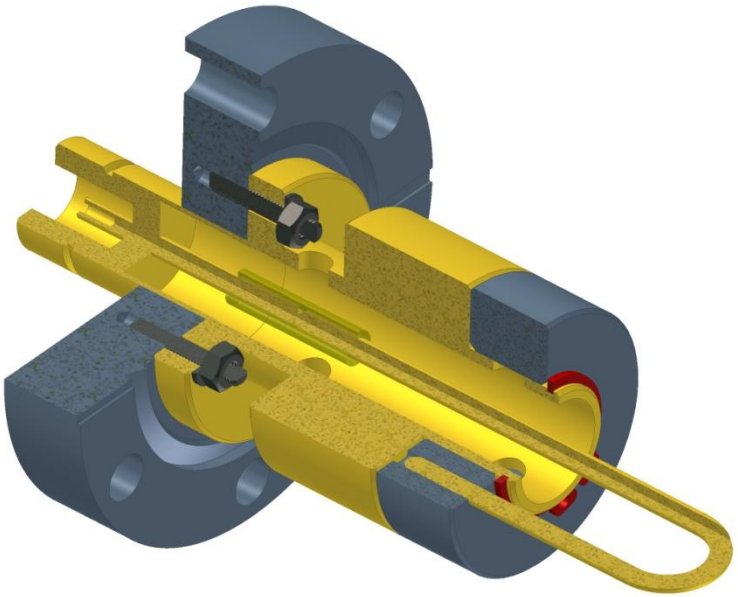


RFQ manufacturing – the next steps



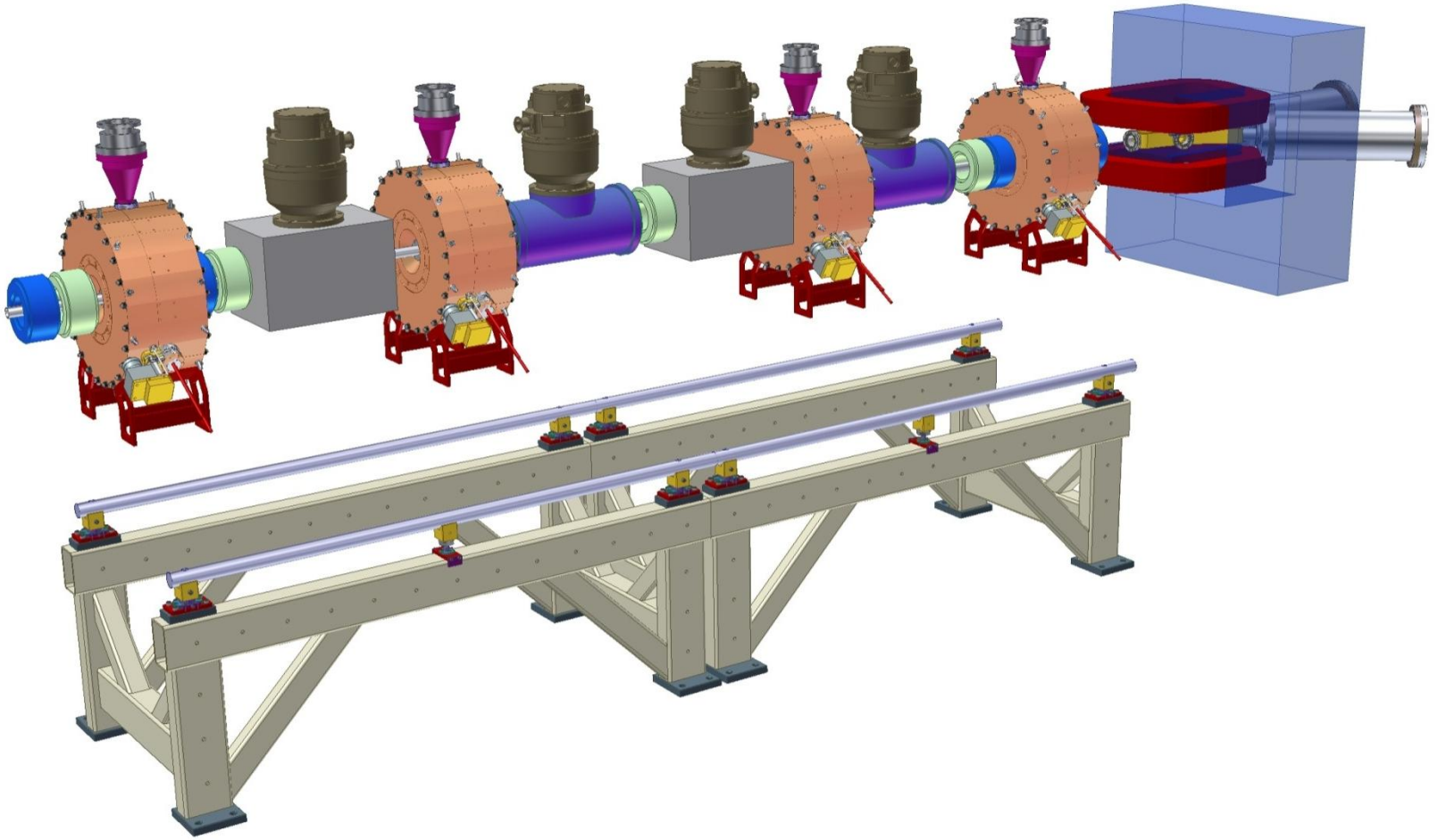
- The cooling manifolds have been designed and will be constructed at RAL.
- The next step is to finalise the cooling baffle design.
- Manufacture of the cooling baffles will be at Imperial College.
- The material has been bought and delivered.

RFQ diagnostics



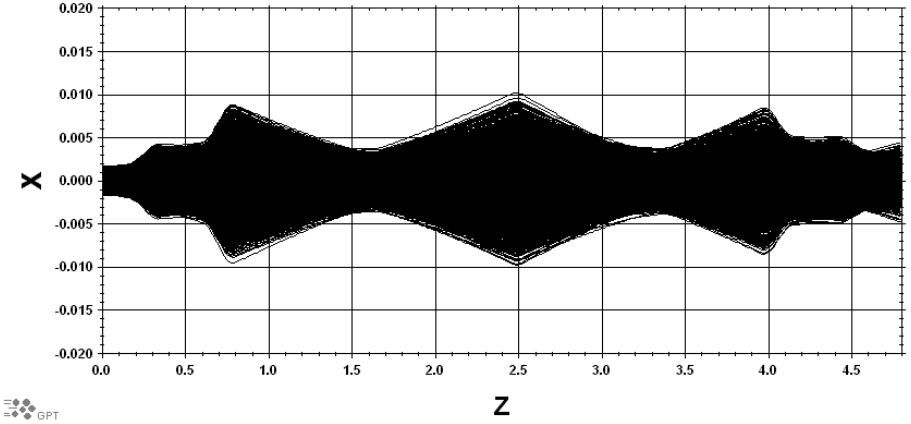
- The existing RFQ cold model bead pull rig will be modified to span the longer real RFQ sections.
- The design is complete and the new slides, belts and pulleys are on order.
- Couplers for low power RF tests are being designed now.
- The waveguide has arrived at RAL ready for installation.

MEBT – image may be of use to you.....

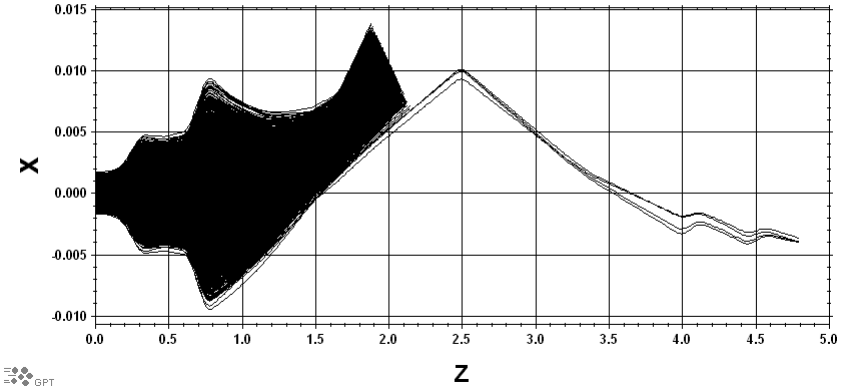


Slides from Morteza.....

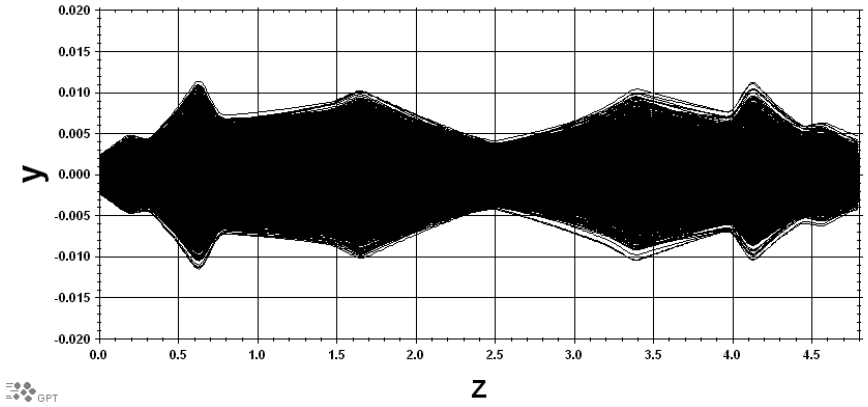
Trajectory in x-z plane with space charge
Mike original file with built in function Quads



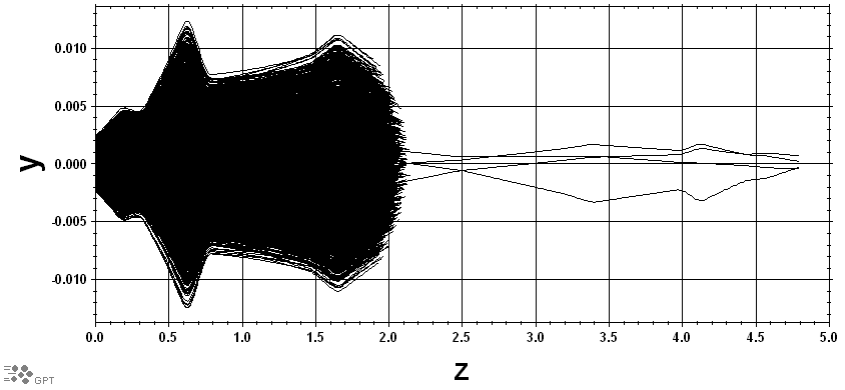
Mike Original file
Chopper



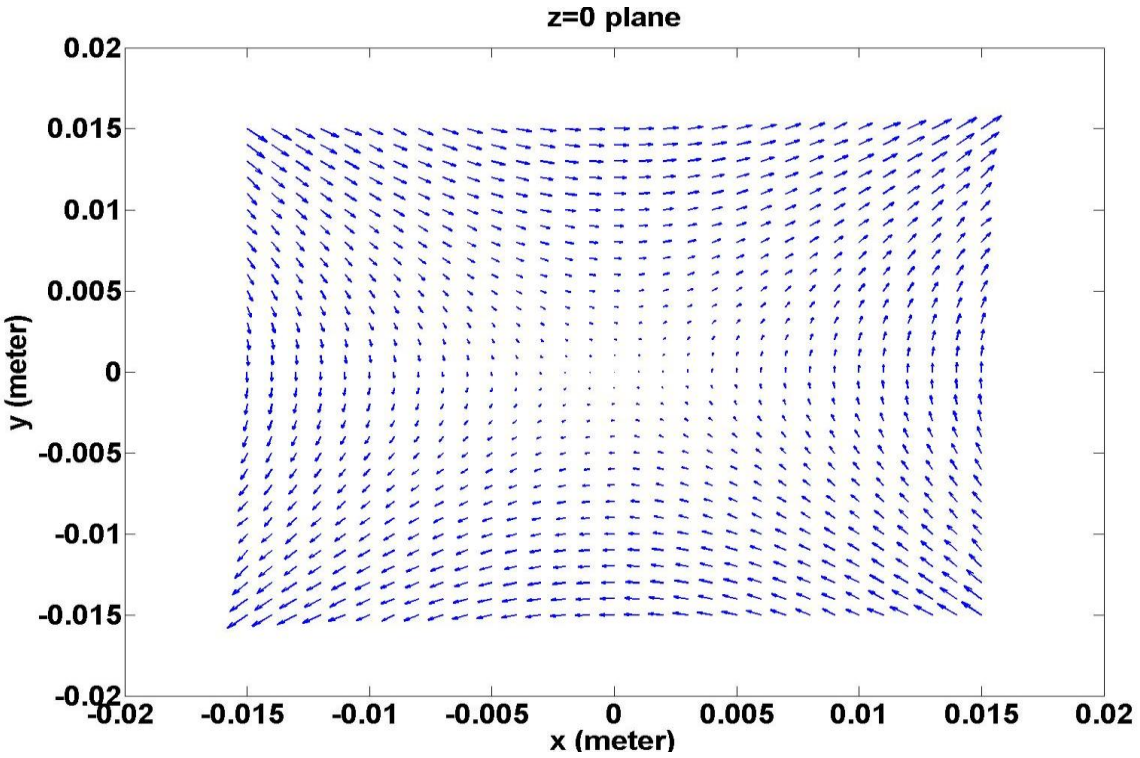
Trajectory in y-z plane with space charge
Mike original file with built in function Quads



Mike Original file
Chopper



Gradient(velocity flow for the first field map) in x-y plane

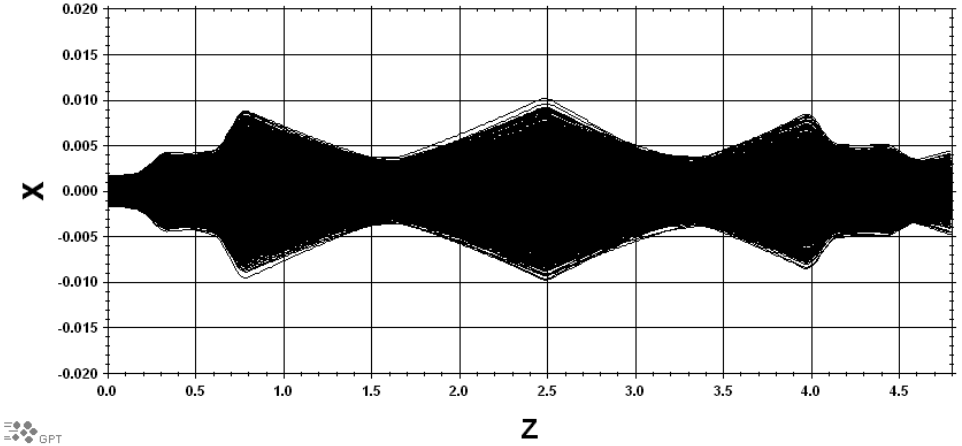


Quadrupole field map by Alan:

z= -150 mm to z=150 mm, x=-15 mm to x=15 mm,
Y=-15 mm to y=15 mm, Focusing in x for H^-
Gradient=10.0173 T/m, Fringe fields included down to 10^{-3}
The second field map: The same as the first on, but Focusing in y for H^-

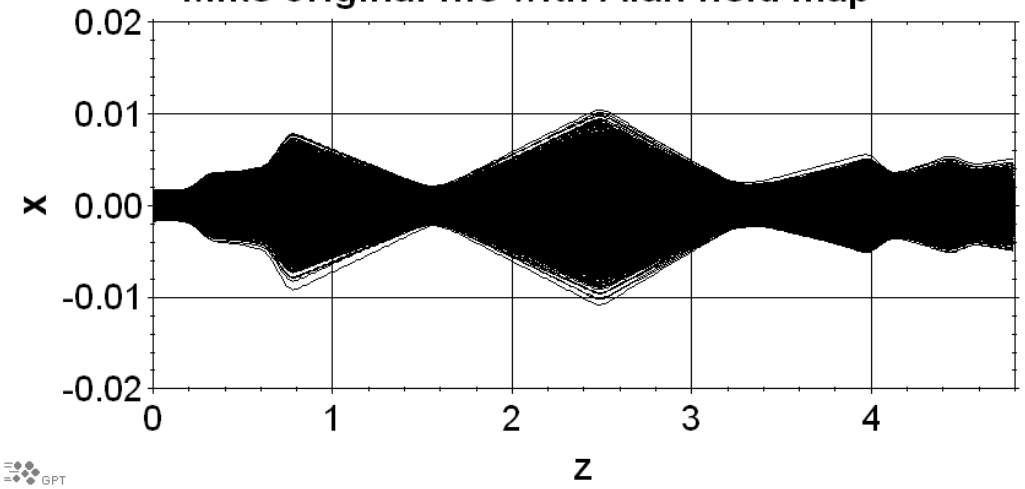
Trajectory in x-z plane with space charge

Mike original file with built in function Quads



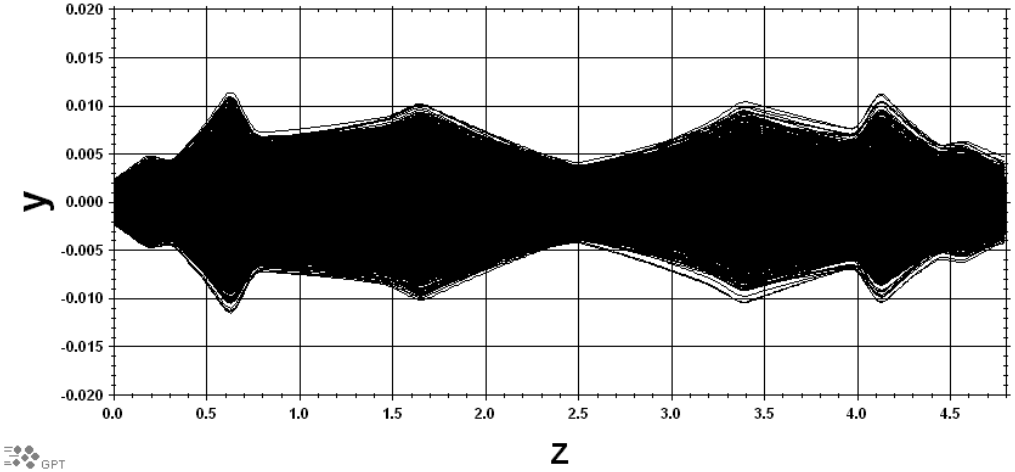
Trajectory in x-z plane with no space charge.

Mike original file with Alan field map



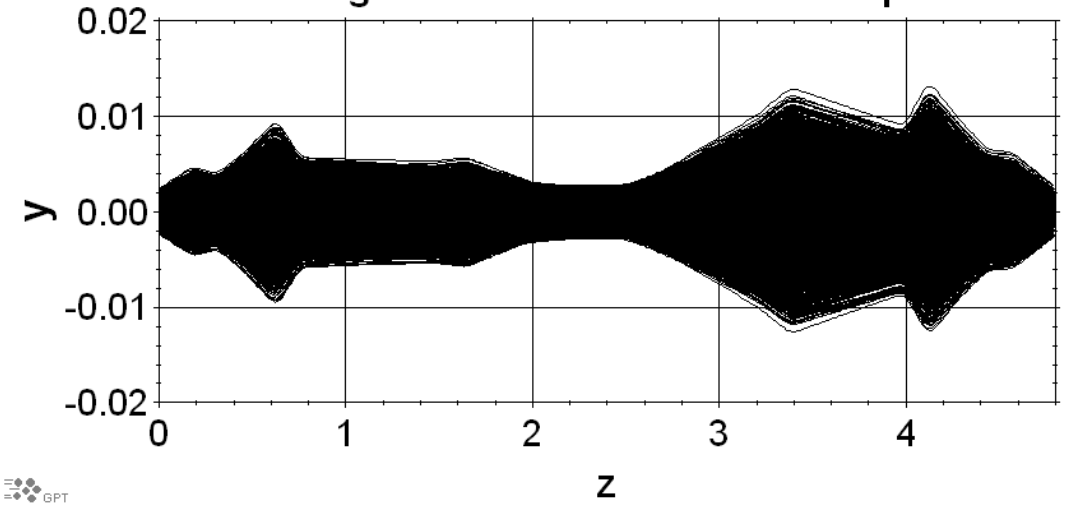
Trajectory in y-z plane with space charge

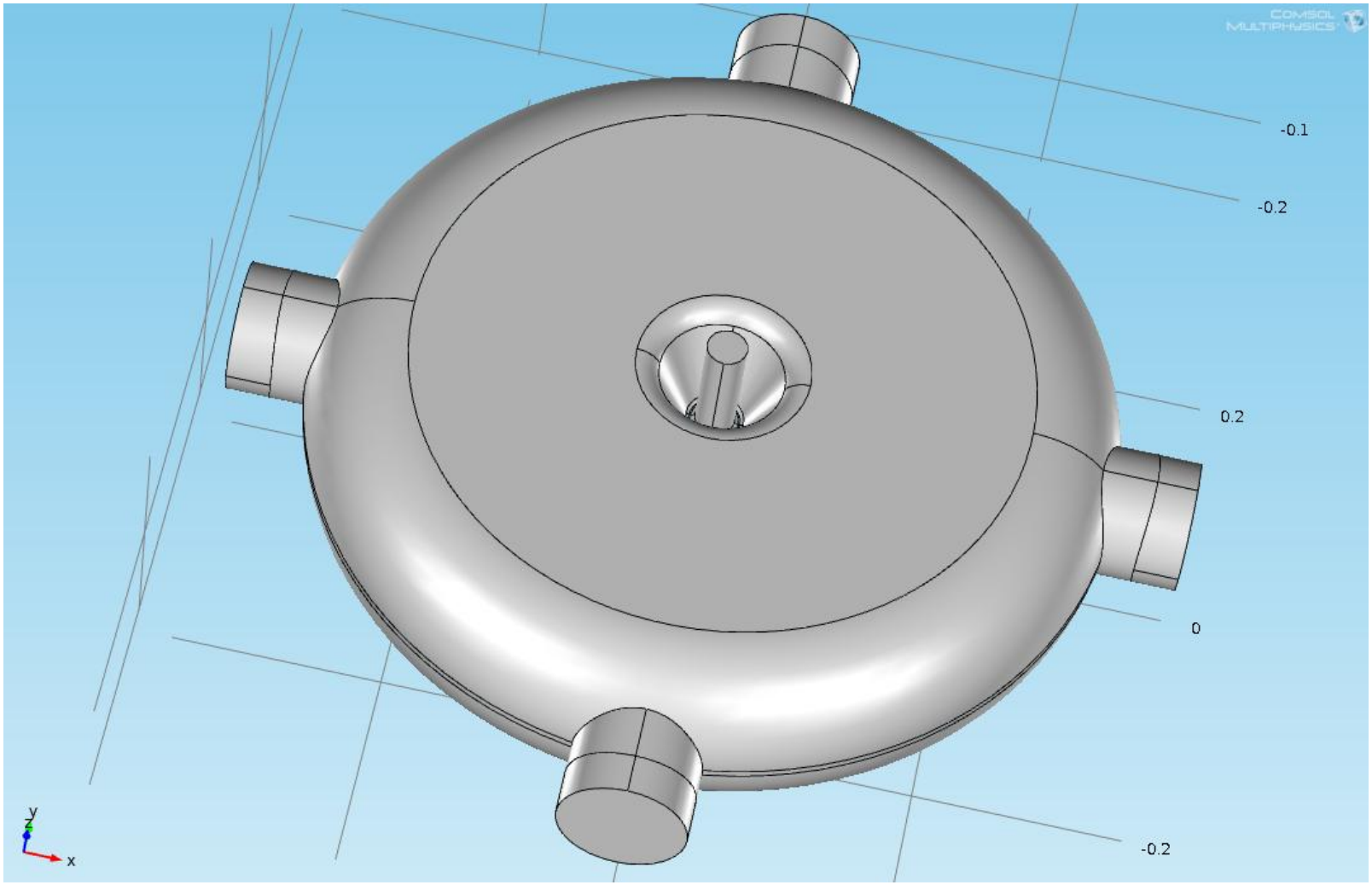
Mike original file with built in function Quads



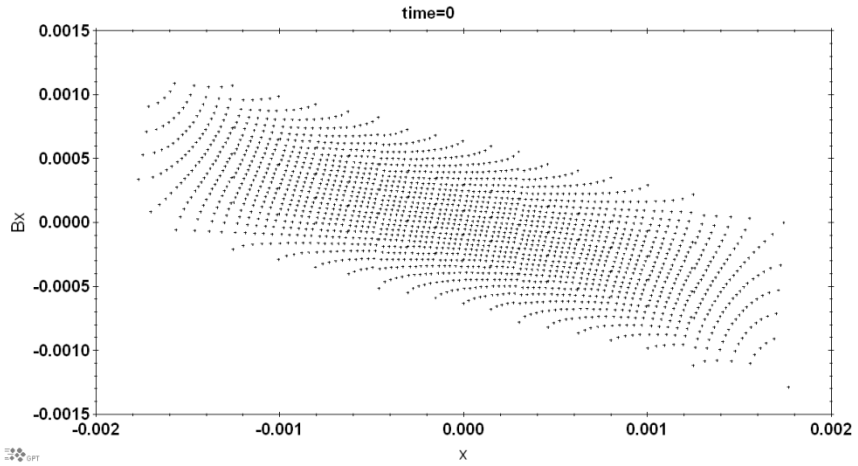
Trajectory in y-z plane with no space charge.

Mike original file with Alan field map

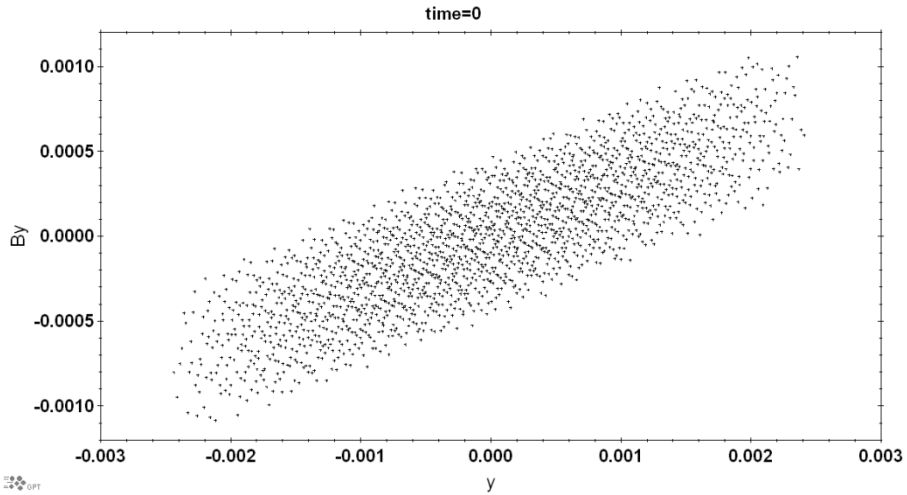



COMSOL MULTIPHYSICS
-0.1
-0.2
0.2
0
-0.2
y
z
x

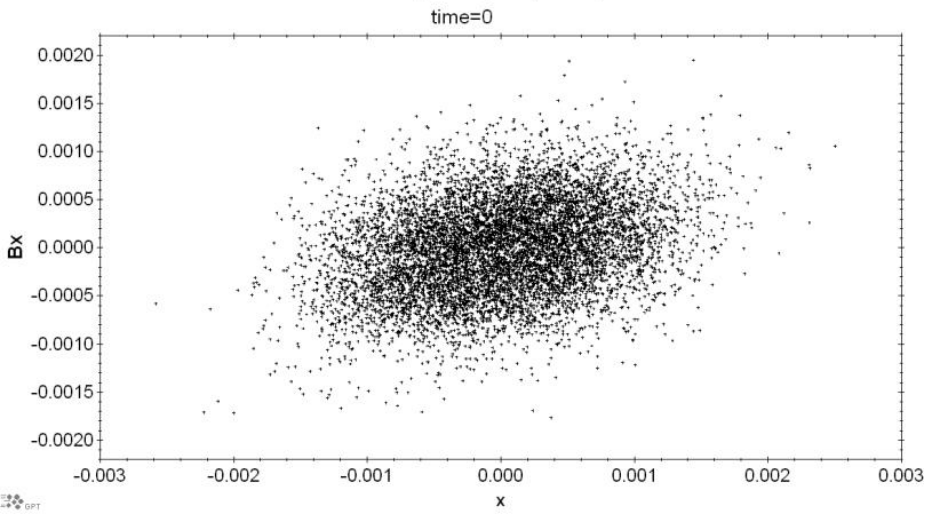
Horizontal phase space(Mike, 2000 particles)



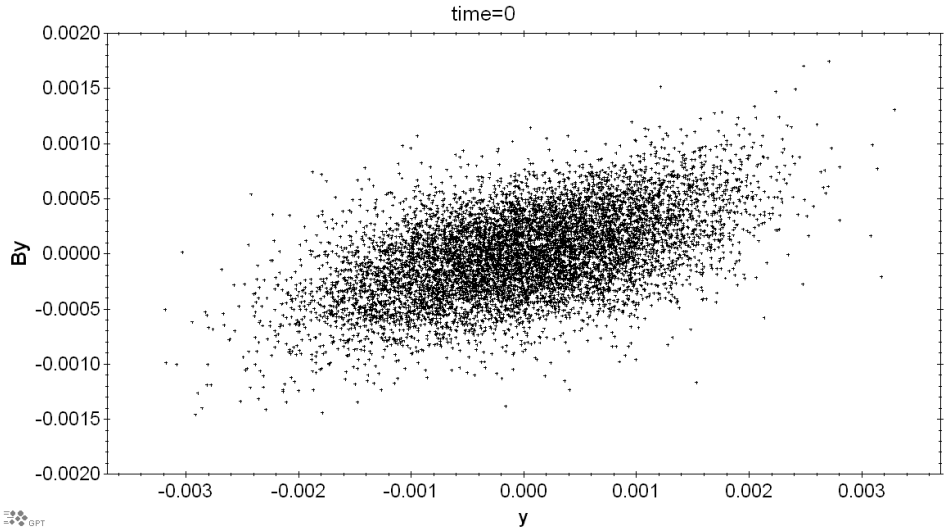
Vertical phase space(Mike, 2000 particles)

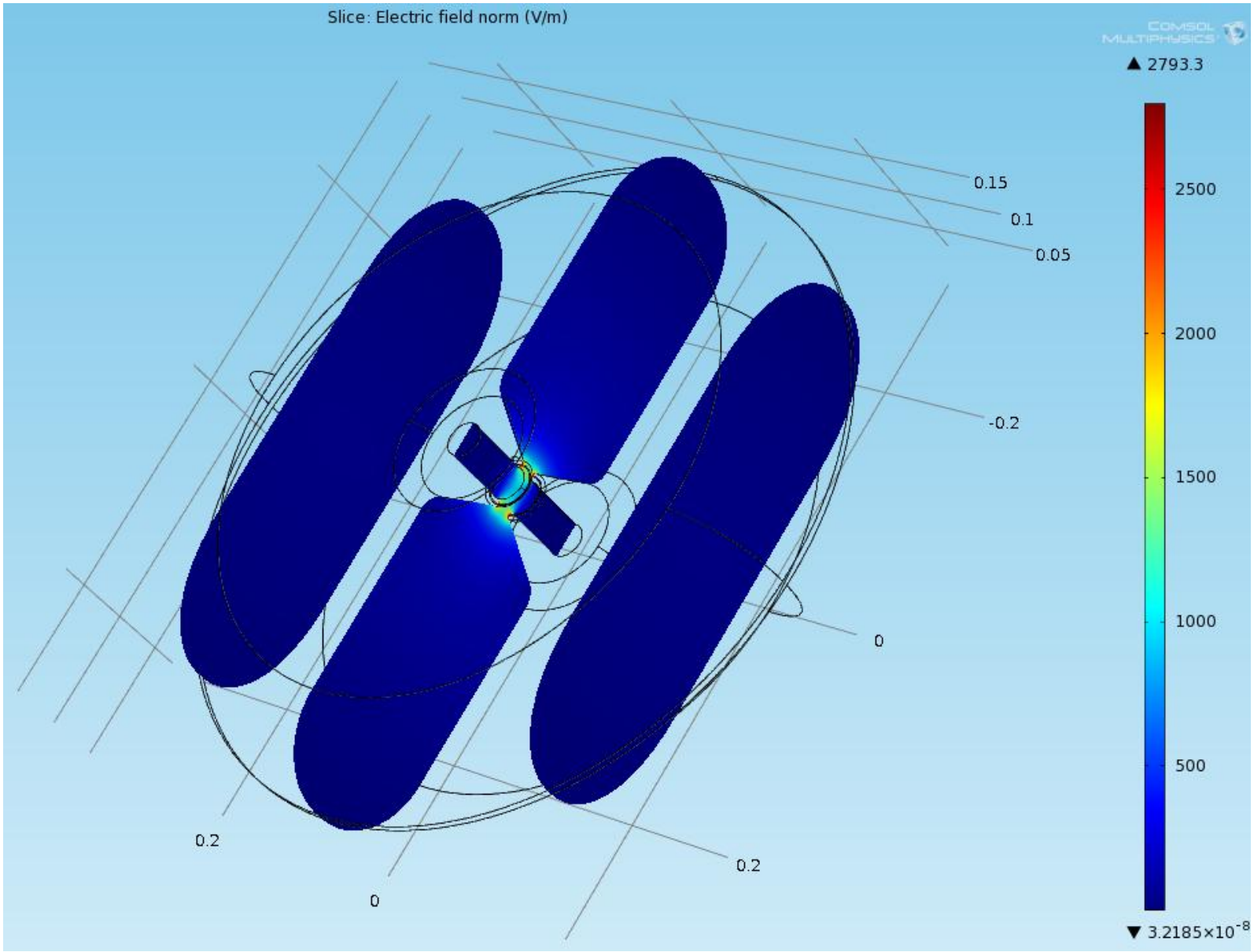


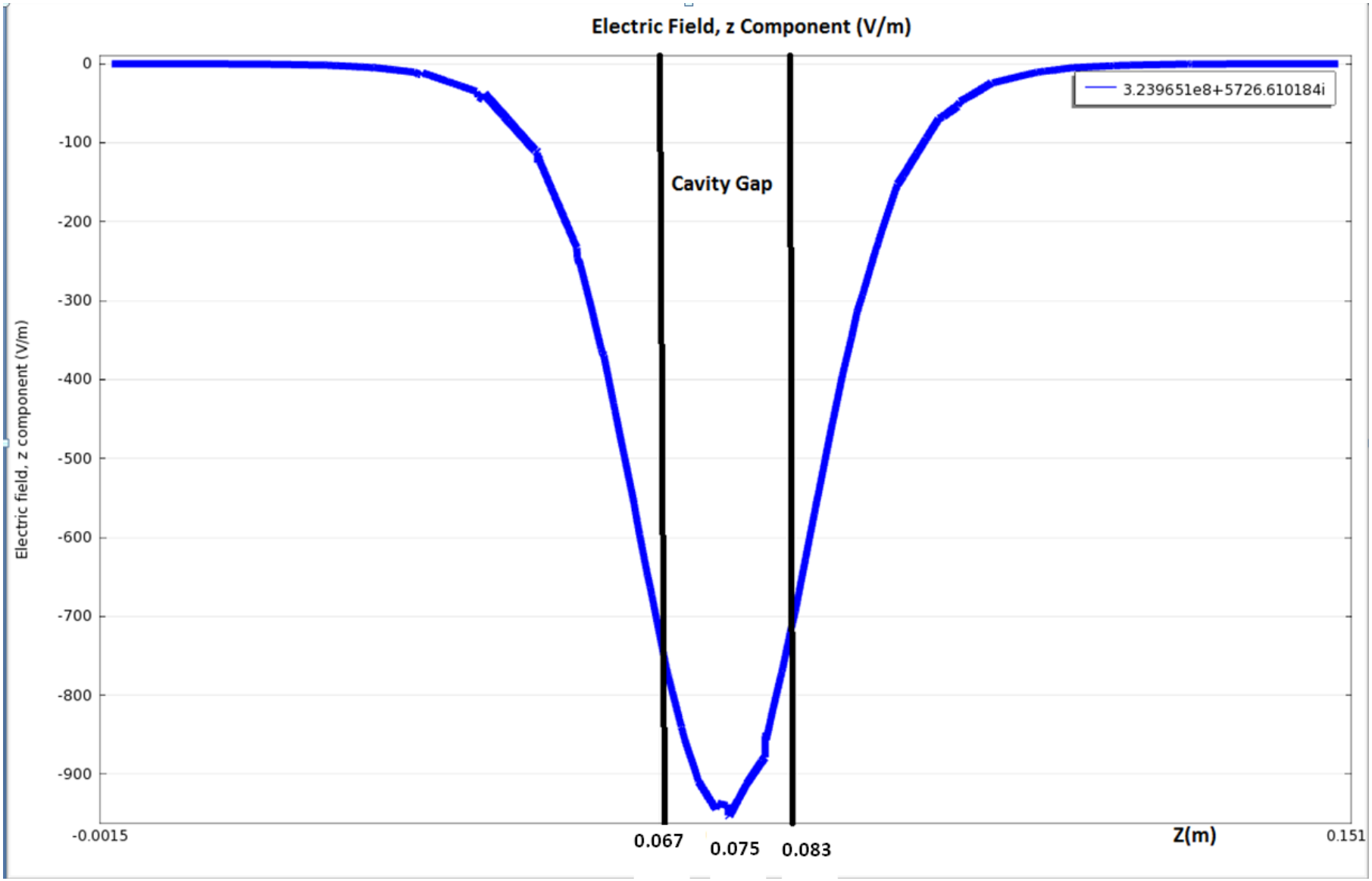
Horizontal phase space (Simon)



Vertical phase space (Simon)




Slice: Electric field norm (V/m)
COMSOL MULTIPHYSICS
▲ 2793.3
2500
2000
1500
1000
500
▼ 3.2185×10^-8
0.15
0.1
0.05
-0.2
0
0.2
0.2
0


Electric Field, z Component (V/m)
3.239651e8+5726.610184i
Cavity Gap
Electric field, z component (V/m)
0
-100
-200
-300
-400
-500
-600
-700
-800
-900
-0.0015
0.067
0.075
0.083
Z(m)
0.151