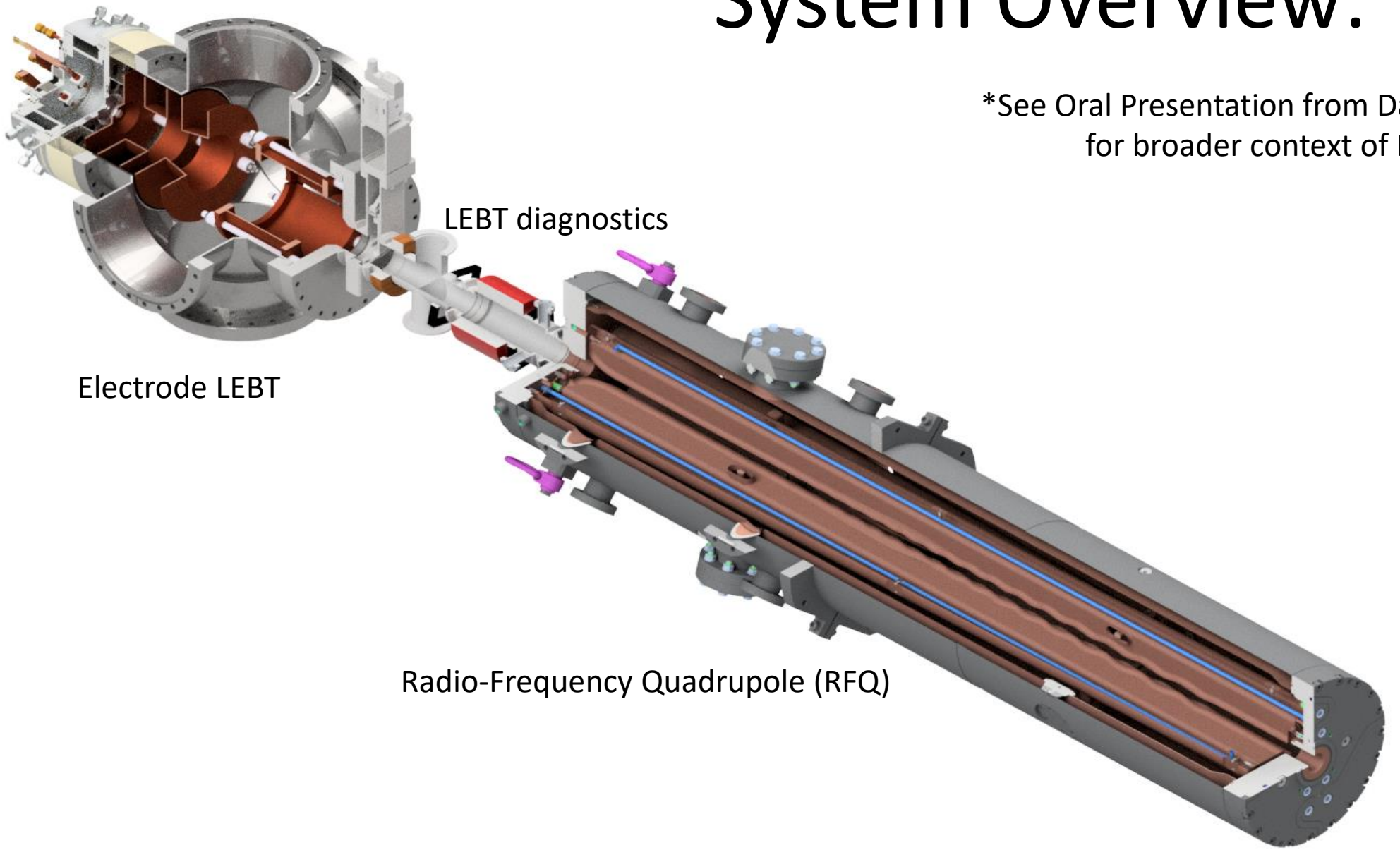
Matching of an RFQ and Multicusp Ion Source with Compact LEBT

Loyd Waites on Behalf of RFQ-DIP

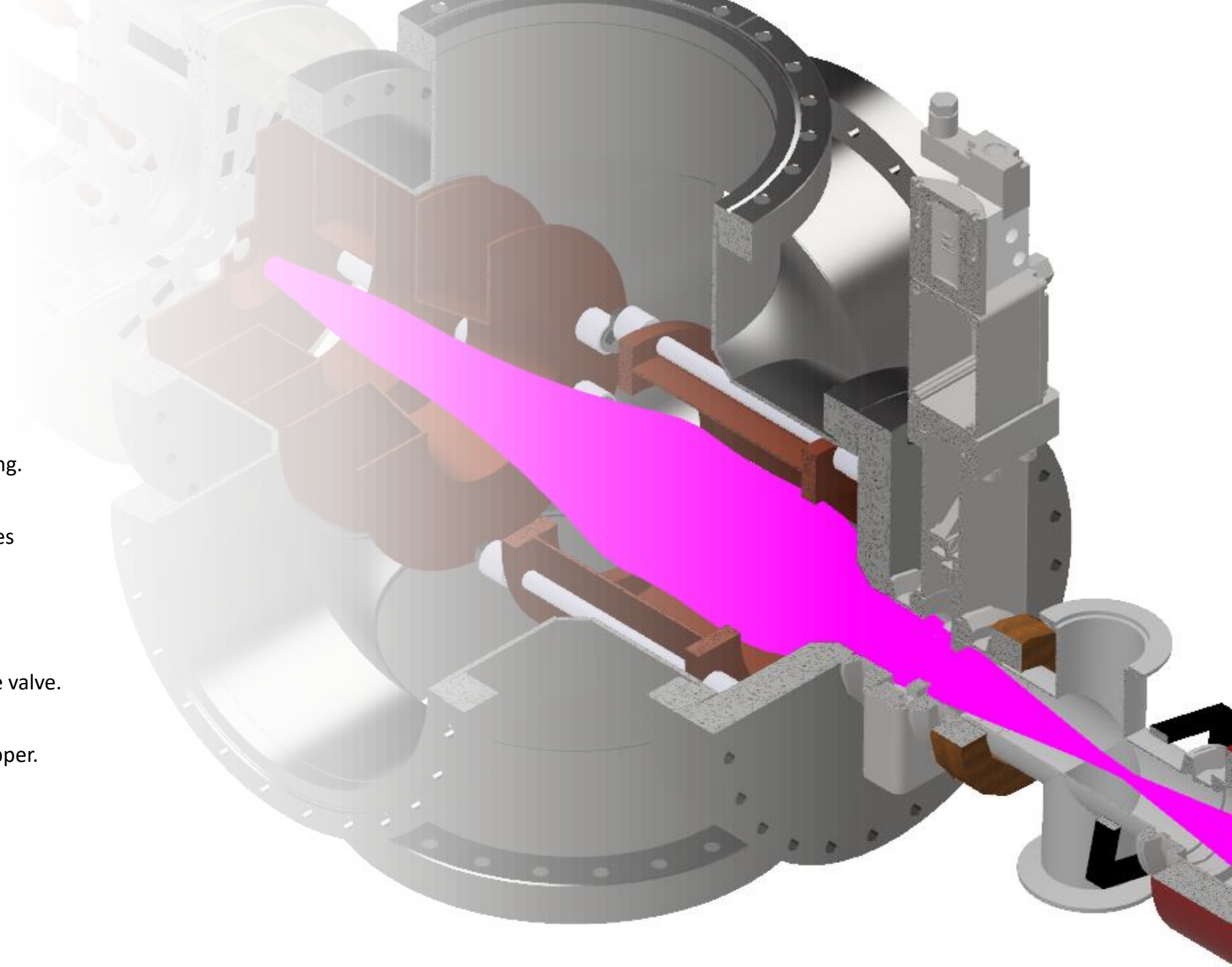
System Overview:

*See Oral Presentation from Daniel Winklener for broader context of RFQ-DIP

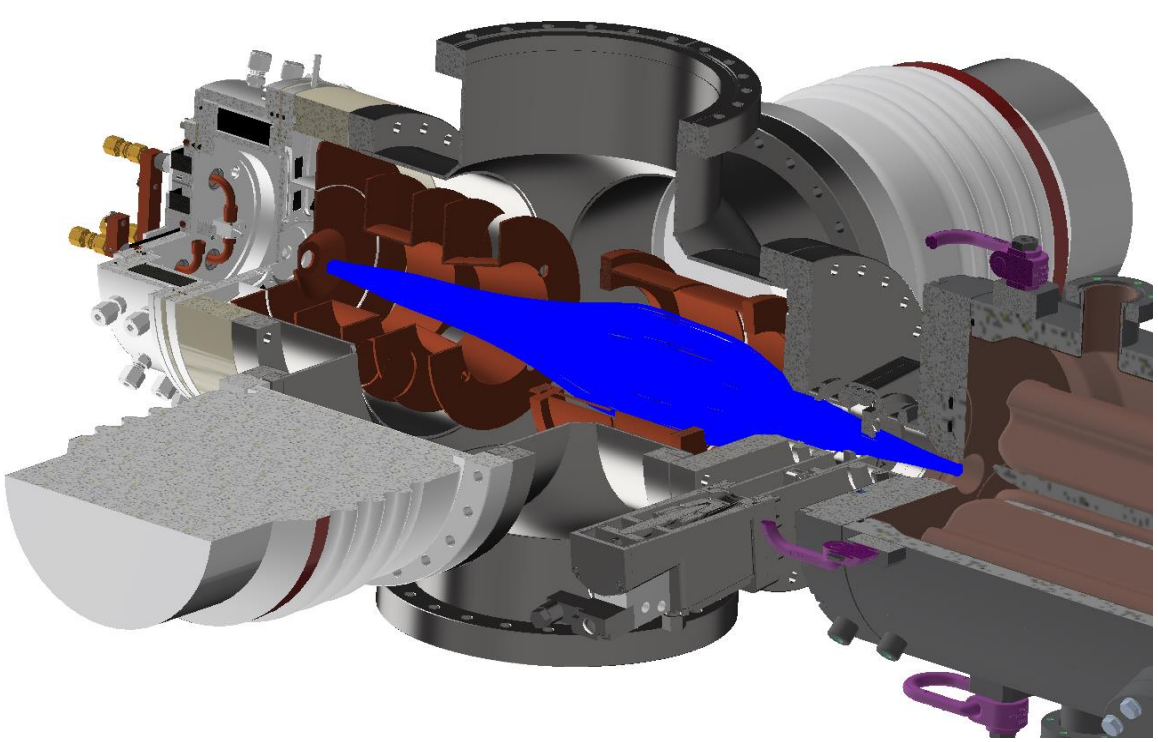


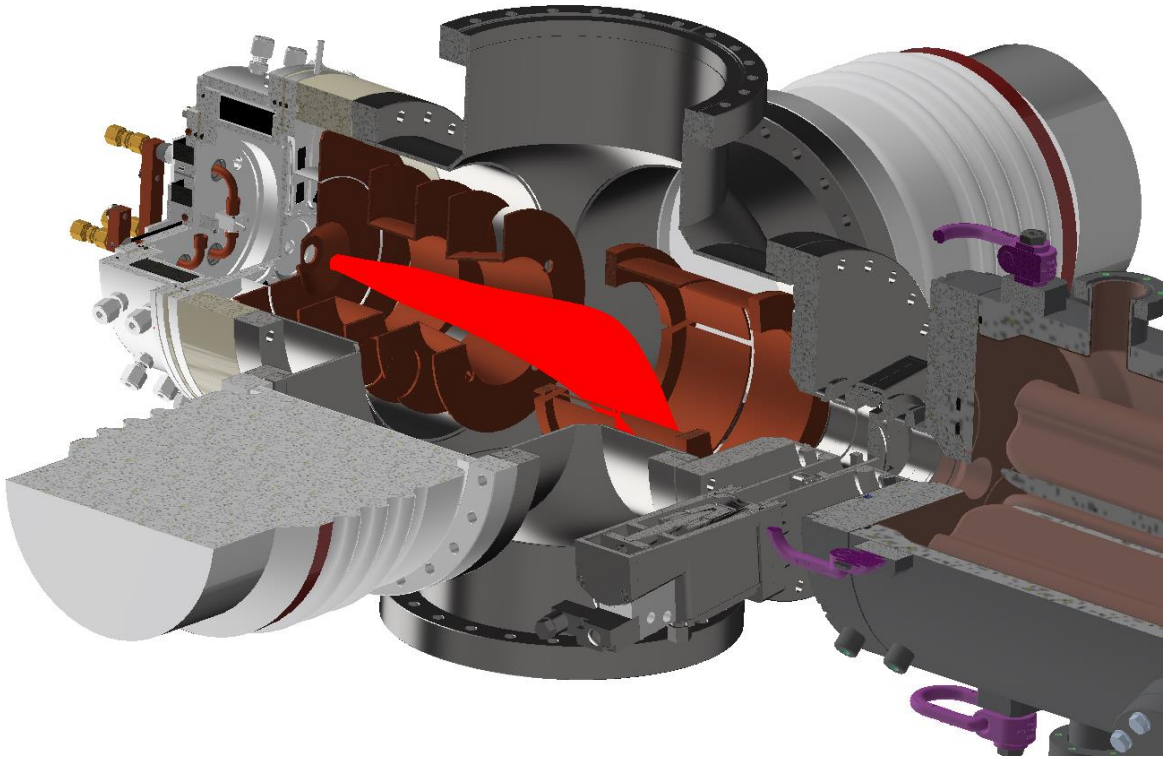
Design Constraints

- Output energy of the LEBT must be 15 KeV.
- The electrodes be sufficiently far apart to prevent sparking.
- The electrodes should be within the 6-way cross
- The LEBT should have a diagnostics section which includes
  - 4 button pickups
  - ACCT, Faraday cup
  - Additional port for pumping.
- LEBT is separated from the rest of the beamline by a gate valve.
- Small degree steering to ensure alignment with the RFQ.
- LEBT must be able to be run in pulsed mode using a chopper.

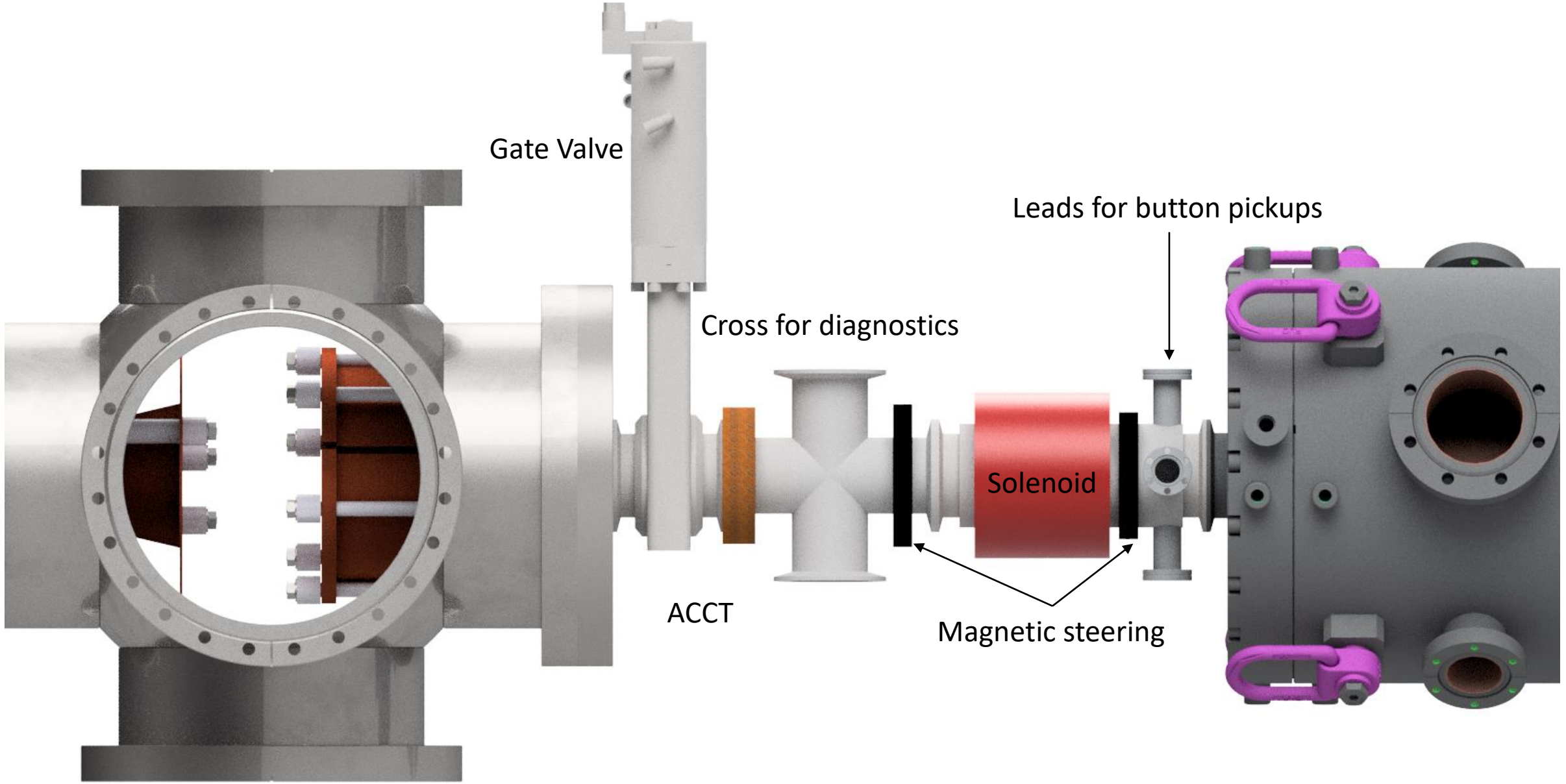


Beam Chopping



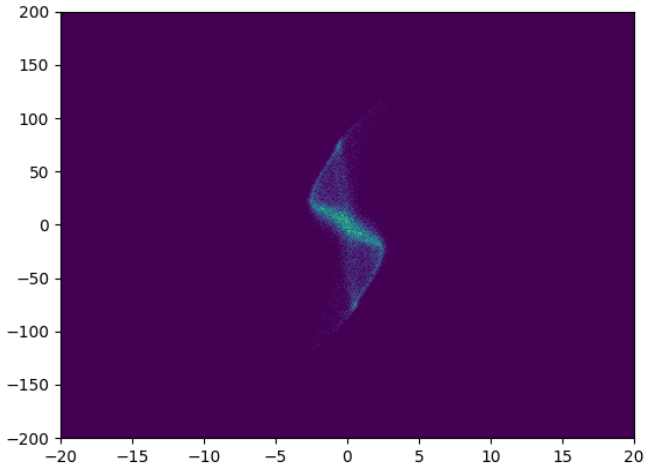


Diagnostics for Beam Entering RFQ

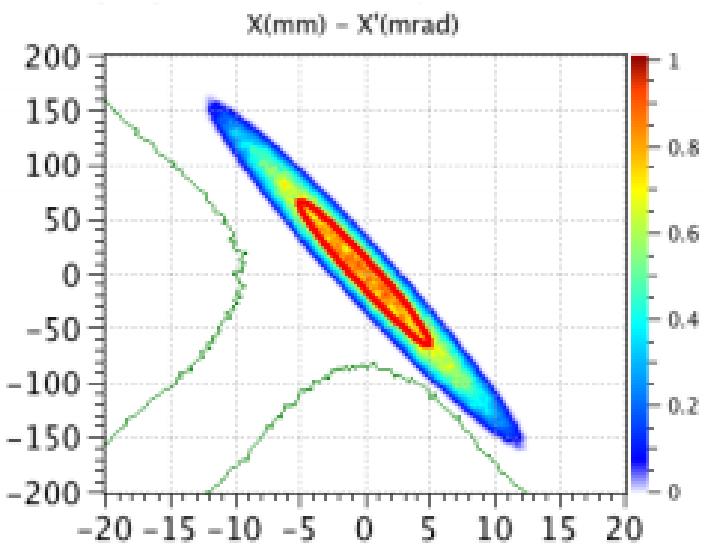


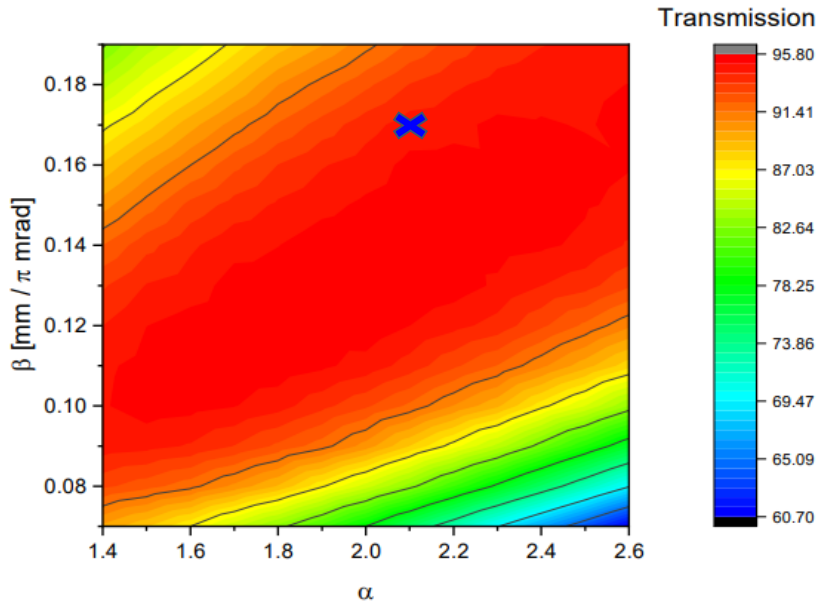
Ideal vs. Provided Twiss Parameters

LEBT output:



RFQ optimum:





Beam Parameter	LEBT Simulation Output	PARMTEQ Optimum
Norm. 1 RMS Emit. (mm mrad)	0.157	0.3
Alpha	2.1	2.1
Beta (mm mrad)	.17	.13

Conclusions

The LEBT is well matched to the RFQ, while also fitting the design constraints of the system. It provides steering and diagnostics for the beam going into the RFQ.