Using pickup coupler for 1.75 GHz HOM

Binping Xiao

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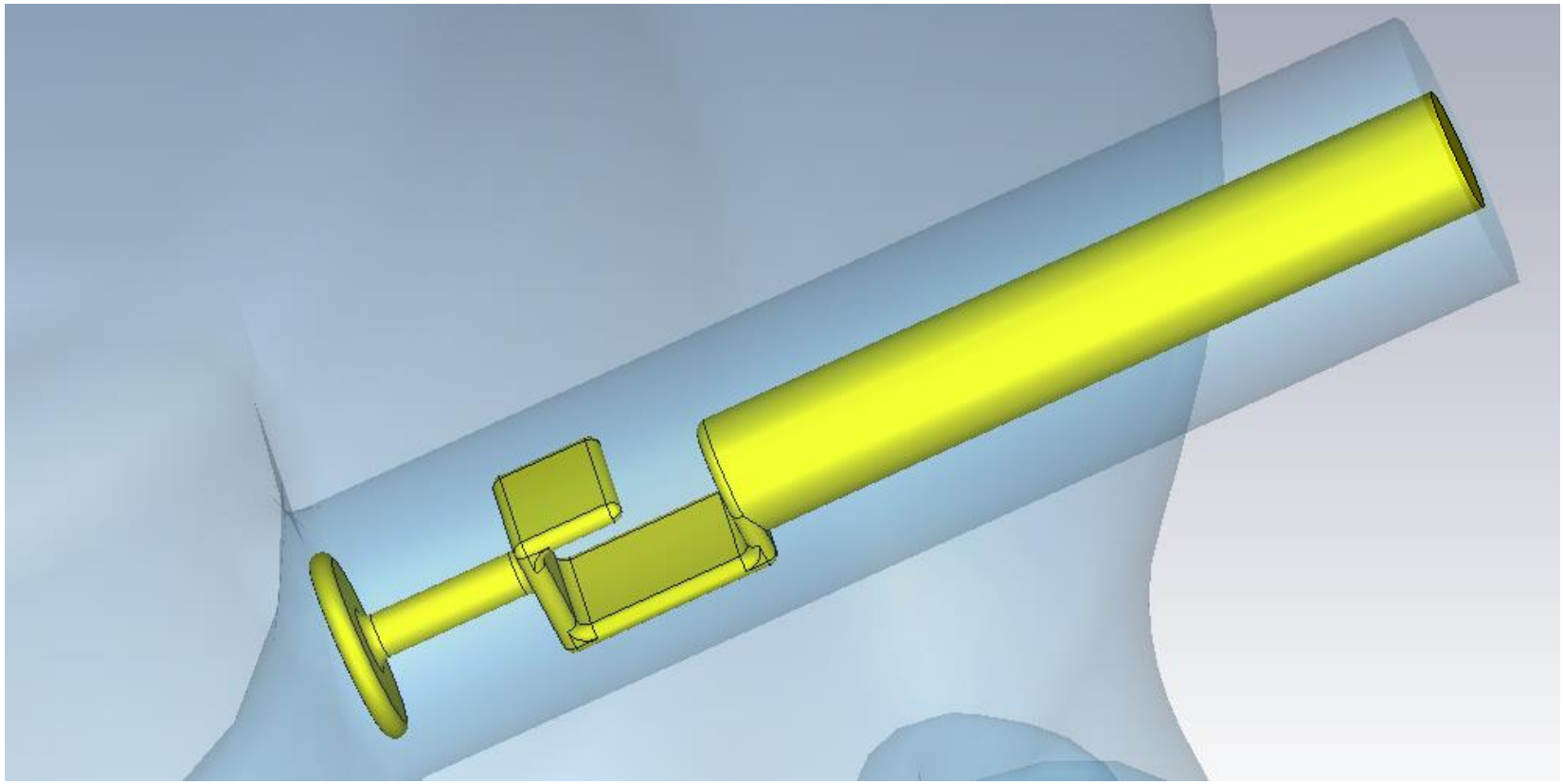
Current PU design

- Add a “T” on top of the original PU coupler



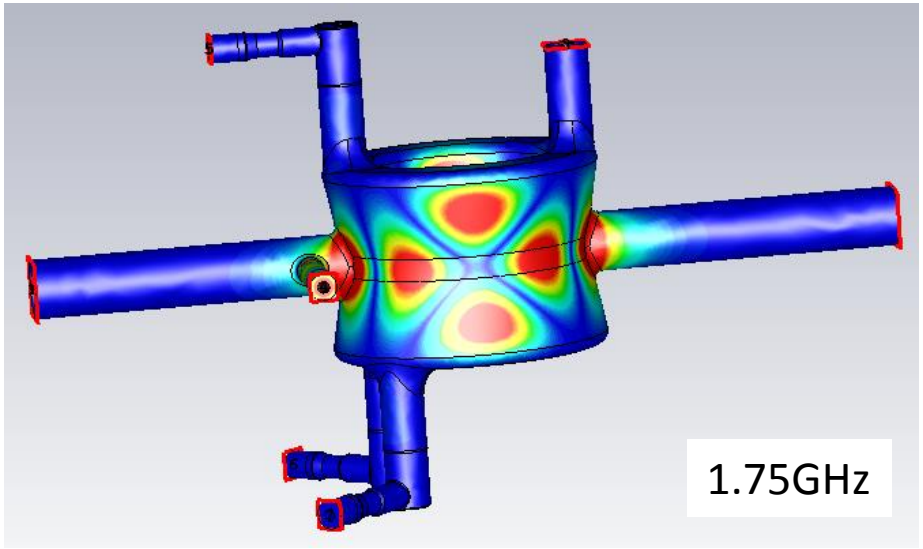
RF properties

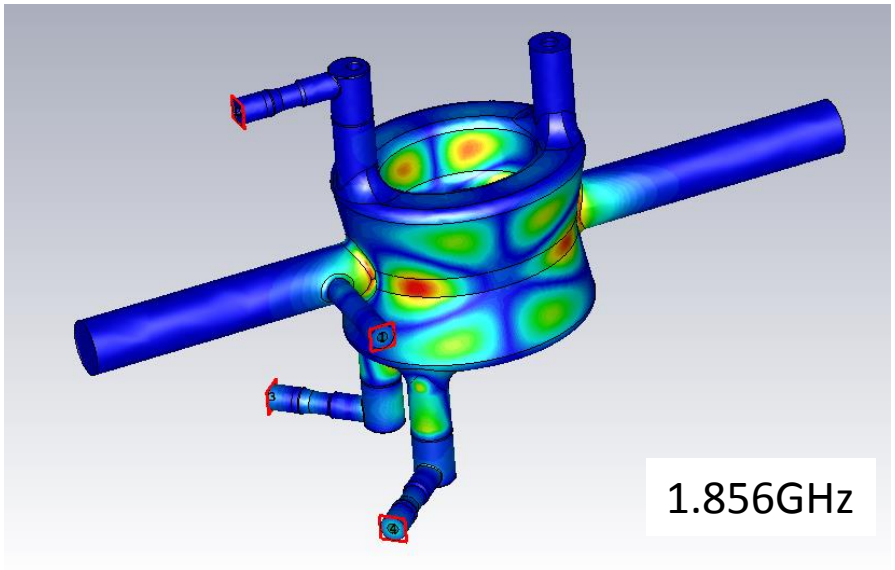
	Modified PU	Original PU
Q_{ext} @ 1.75 GHz (from PU and HOM couplers)	9616	7.27e6
Horizontal shunt impedance (Ω/m/cavity, in circuit definition)	8.39e5	6.34e8
Q_{ext} @ 400 MHz (from PU coupler)	1.6e10	1.6e10
Pickup power at 3.34MV (W)	1.57	1.57
Power dissipation at PU at 400MHz (for 20nΩ Nb PU)	26.5μW	

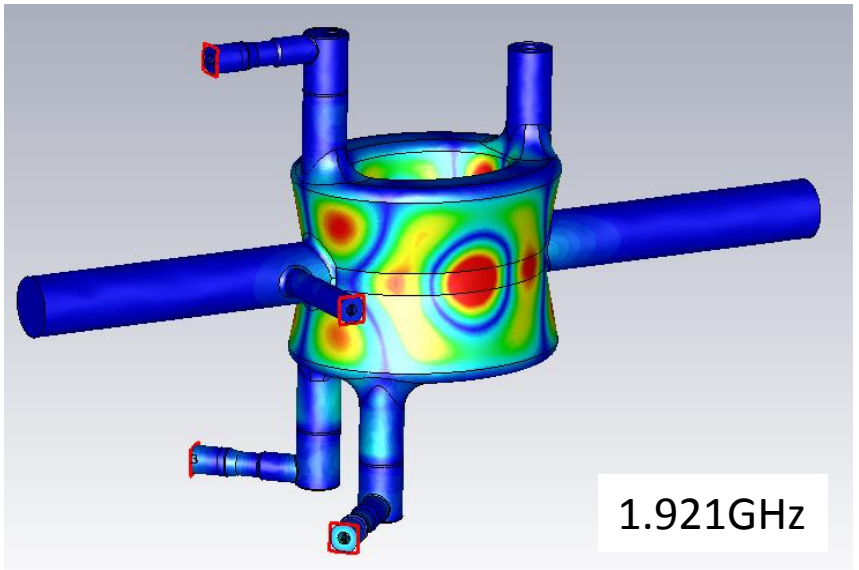
RF properties (other HOMs)

- It will not couple to the longitudinal modes below 1GHz, the HOM power going out of the PU port will be small.
- Besides the 1.75GHz mode, it will also couple to 1.856GHz and 1.921GHz, with coupling comparable to the coupling to the HOM ports.

E field of these modes







Next Steps

- Design the RF feedthrough.
- Find a way to separate 400 MHz and 1.75 GHz.