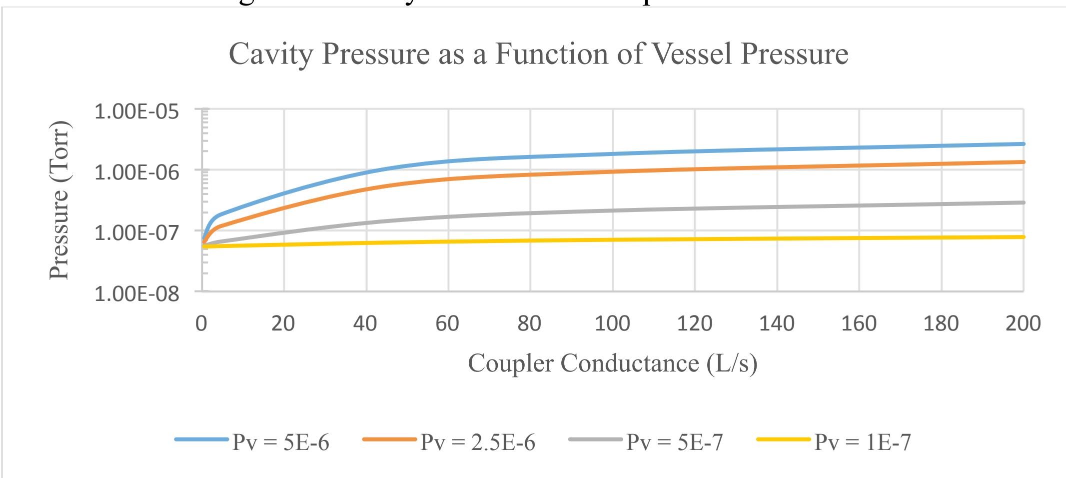
End Use at Rutherford Appleton Laboratory:

Ultimately the MICE RF module will be installed in the Muon Ionization Cooling Experiment (MICE) at Rutherford Appleton Laboratory. The vacuum performance when installed will largely depend on what the beamline vacuum conditions are there. The beamline is common with the vessel vacuum in our test, so the performance of the cavity is dependent on the pressure in the beamline. Figure 9 is a plot of the cavity pressure verses coupler conductance for various beamline pressures.

Figure 9. Cavity Pressure vs. Coupler Conductance



It can be seen that if beamline pressures are maintained in the 2E-6 to 5E-7 Torr range Cavity pressures should be maintained in the low E-7 to high E-8 Torr range if coupler conductance is limited to around 20 L/s.

Assuming that the beamline gas load is similar to that of the MICE RF module vessel being tested at Fermilab the gas load would be about 5.27E-5 Torr-L/s-m. This would require that Pumping speeds of 105 L/s-m to maintain a pressure of 5E-7 Torr in the beamline. That would be equivalent to one 145 L/s turbo connected directly to the outer shell via a 4" gate valve every meter. This would require the turbo to be magnetically shielded. As the diameter of the connection port is increased the pump could be moved farther away from the shell. As an example, going from a 4 inch port to a 6 inch port would allow the turbo to be moved thirty inches away from the shell. An eight inch port would allow for the turbo to be eighty inches away.

The advantage of this approach is in protecting the beryllium windows. With the connectivity of the coupler/beamline conductance there would be little danger of developing a harmful pressure deferential between the beamline and the cavity. Further modeling of the gas flow between the two volumes would be needed to specify the actual size of the conductance needed.