FROM RESEARCH TO INDUSTRY

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CEA COUPLER ACTIVITY UPDATE

28 MAY 2020

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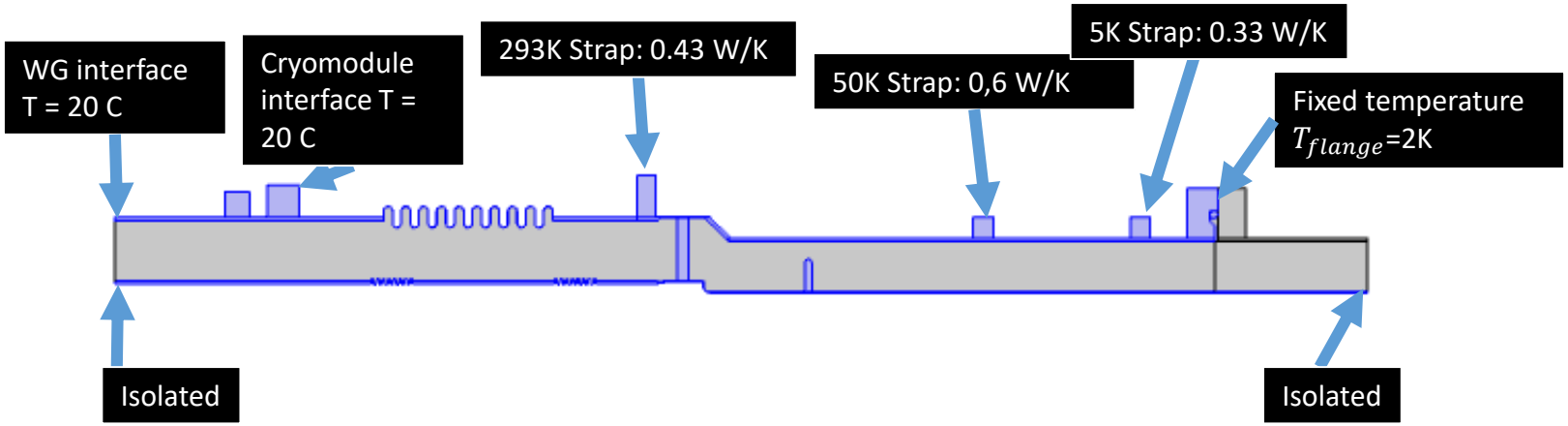
PIP-II Coupler collaboration meeting

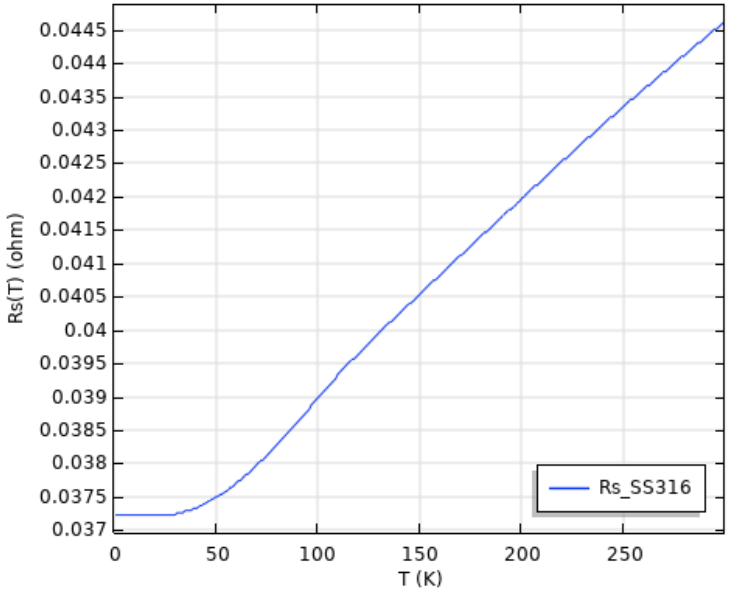
Comsol 2D thermal calculation model

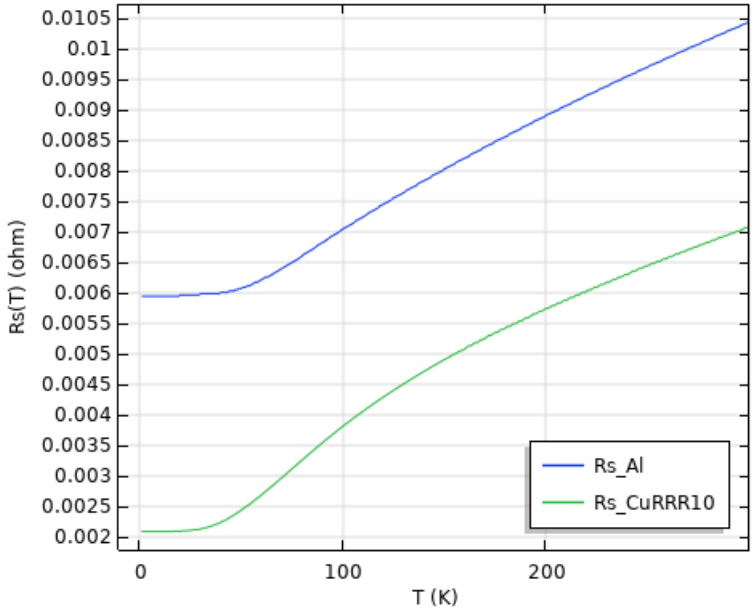
- We added the Al gasket in this model in order to perform the RF calculation not shown in this presentation

Old straps configuration



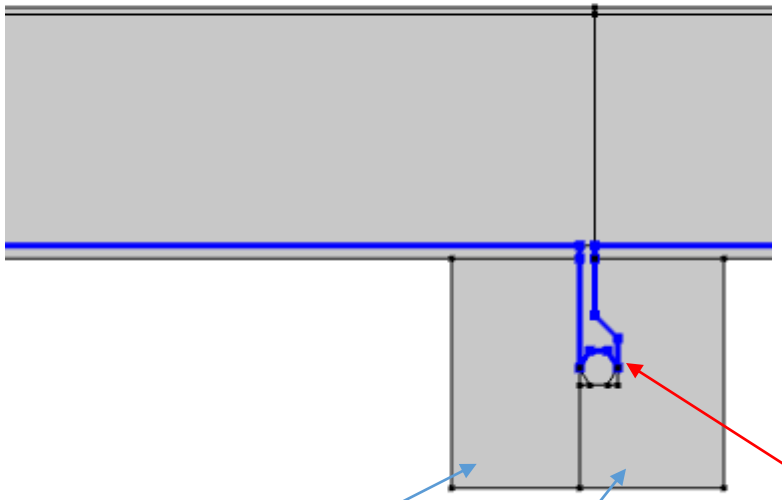
Surface resistance of material used on coupler to cavity interface





Magnetic field on coupler to cavity interface flanges

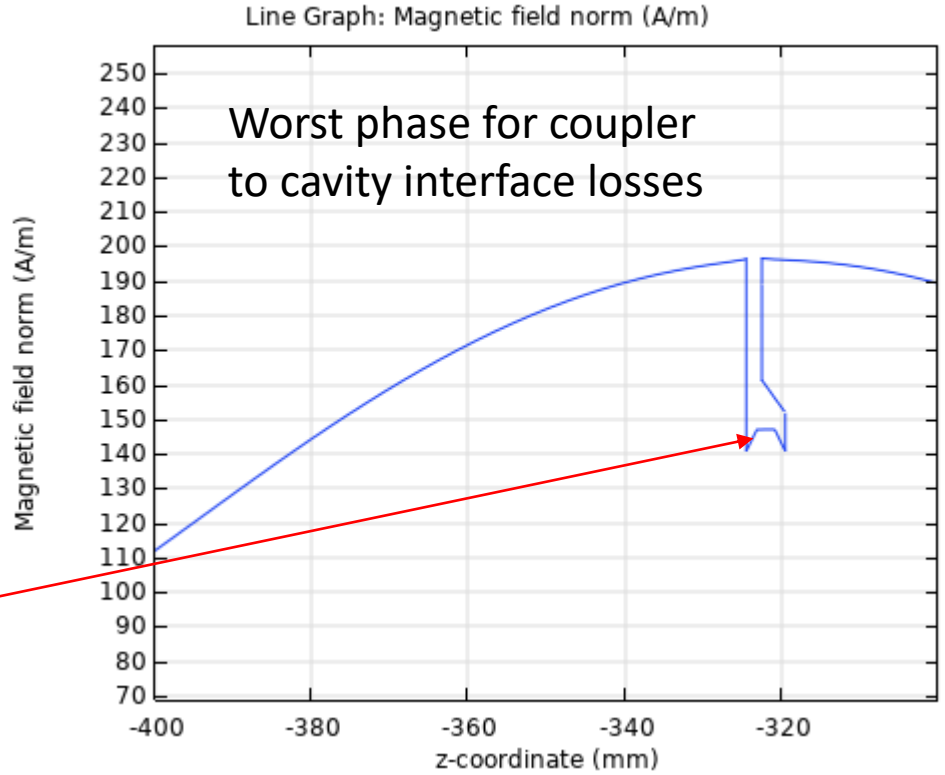
Fwd power= 50 kW CW
Ref. power = 10 kW CW(all phase)



Cavity flange

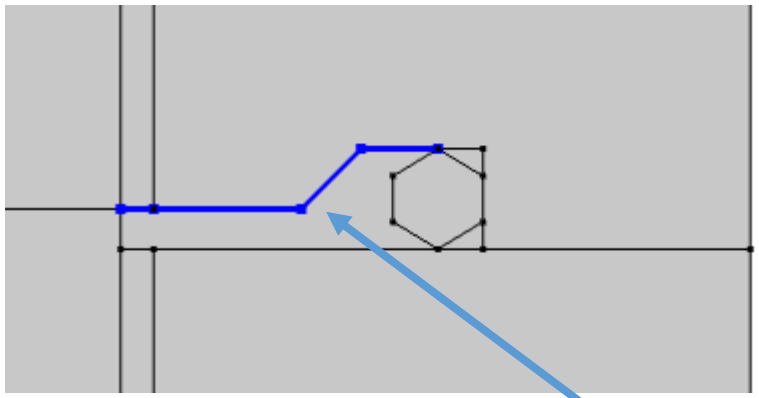
Coupler flange

Gasket surface

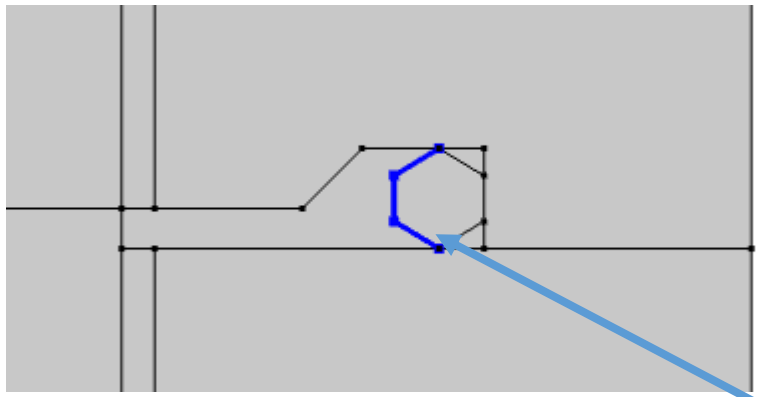


Worst phase for coupler to cavity interface losses

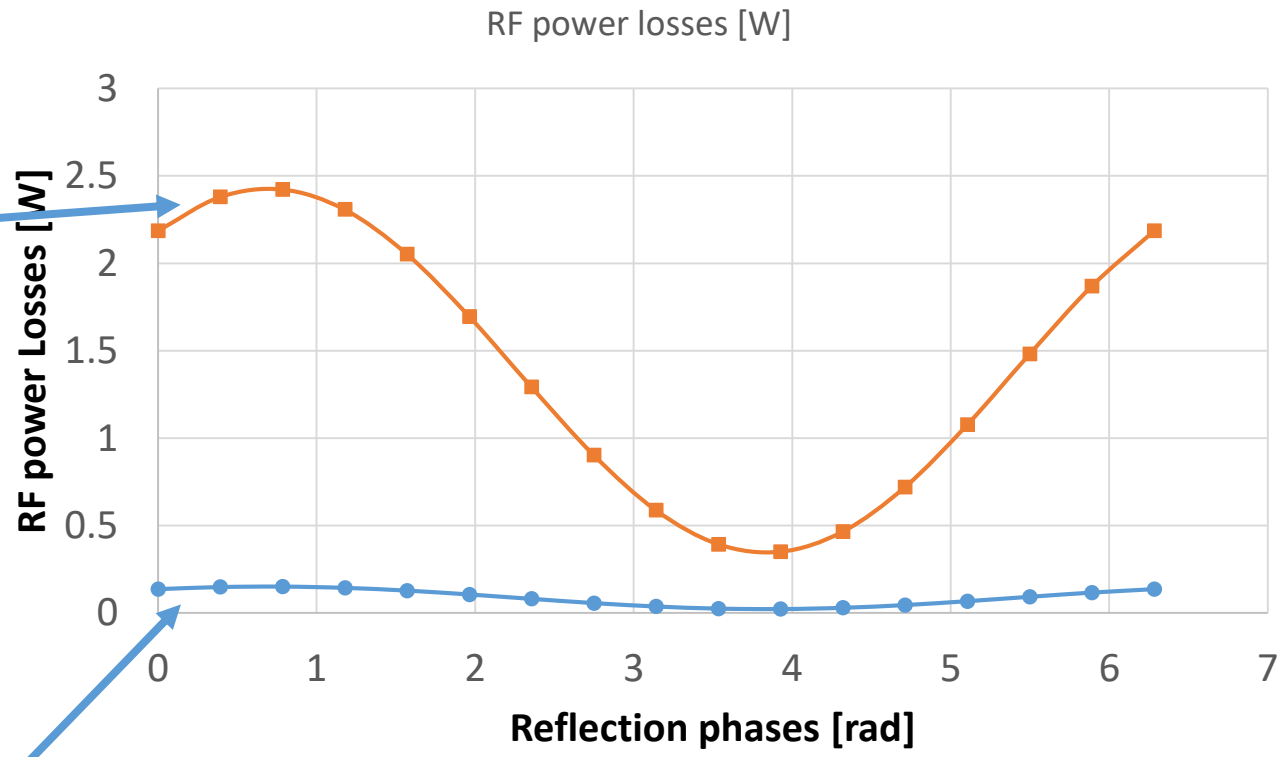
Flange interface RF losses



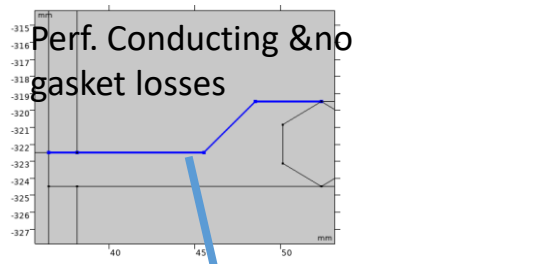
SS surface Flange RF losses

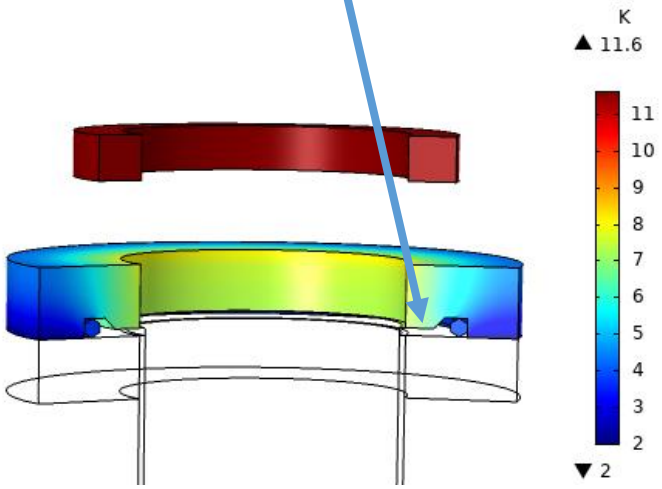


Al Gasket RF losses

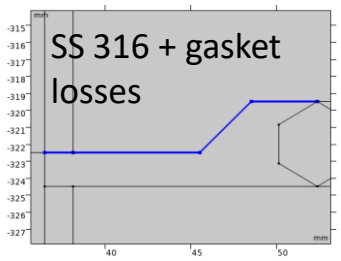


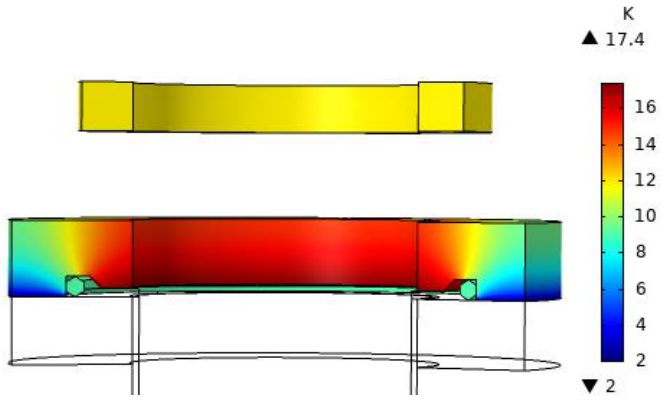
Effect of the flange surface and the gasket



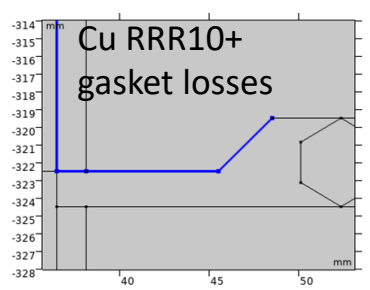


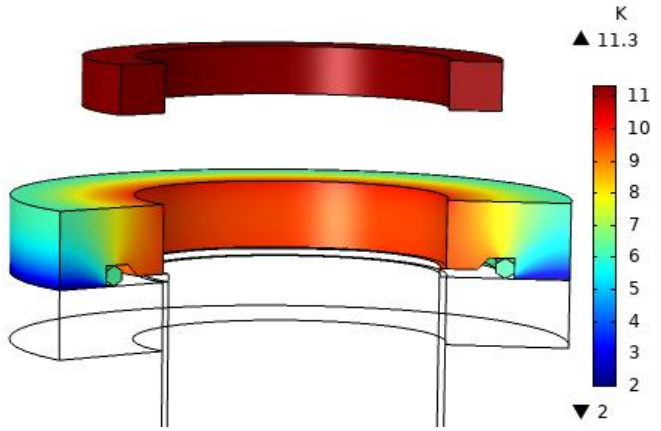
Heat flux to 2K (no rad.) = 0.36 W





Heat flux to 2K (no rad.) = 2.7 W





Heat flux to 2K (no rad.) = 1 W

- ❑ The copper plating of the coupler to cavity surface seems to be mandatory to reduce the conductive heat flux to cavity. It needs to be requested and controlled during manufacturing.

- ❑ The results will be updated using the new straps configuration

3D model

- We received the Fermilab 3D model for RF and thermal calculations. It will be used for the next studies