

# Study of High $T_c$ Superconducting $MgB_2$ Thin-Film Coated RF Cavities

Goal: To optimize a resonator to test the quality of a coupon of  $MgB_2$

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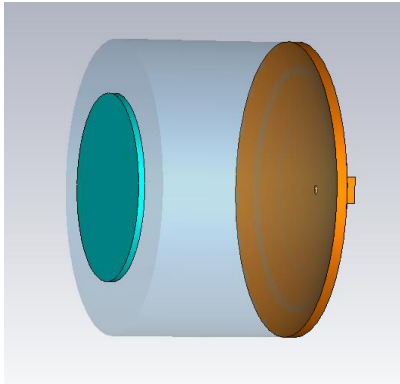
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Argonne National Laboratory

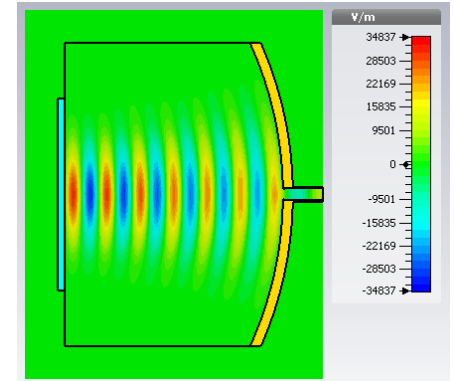
Advance Photon Source

Accelerator Systems Division, RF Group

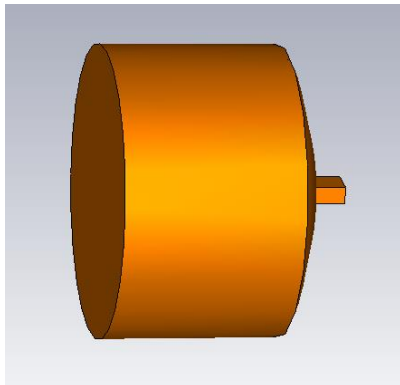
# Simulations



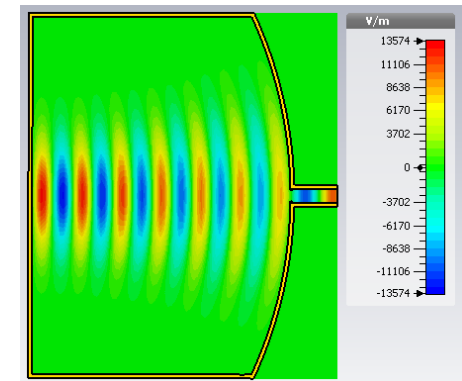
- Varied dimensions of the Fabry-Perot open resonator (left) to find optimal design
  - Radius of mirror
  - Height of curvature
  - Radius of sample
  - Separation
- Power dissipation in the sample was not large enough
- Too much power is radiating out



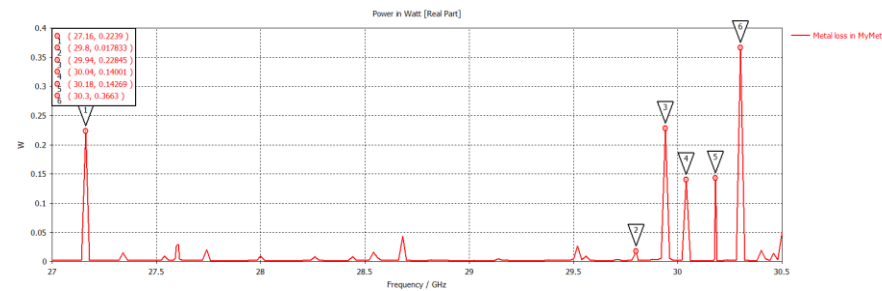
Open Resonator at 29.80 GHz



- Closed resonator (left) and the electric field pattern of one of the modes (right)
- Mode is present
- Power dissipation is small

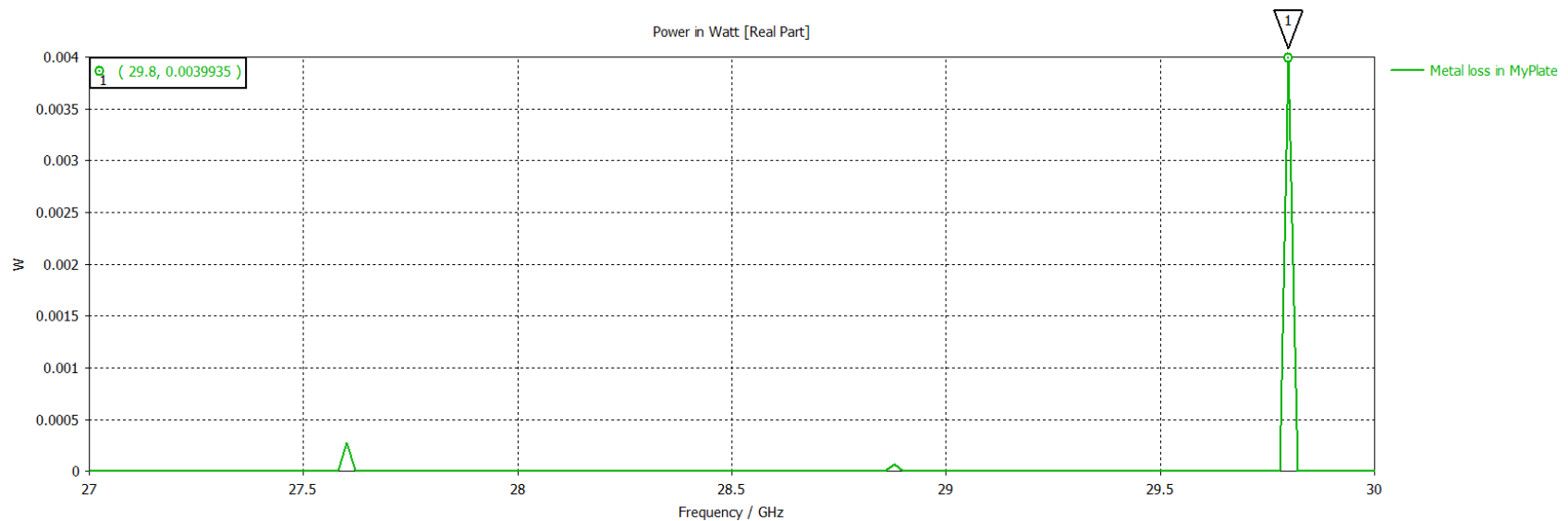


Closed Resonator at 29.80 GHz



# By the end of the summer...

- Find an optimal resonator design where an adequate amount of power is dissipated onto the sample.
- Potentially run a test of the resonator design to measure the quality factor of the coupon
- Ultimately, this project is helping to determine the feasibility of using  $\text{MgB}_2$  for cryogen-free RF systems



Power lost in sample for an open resonator. Total power is 0.50W.

