

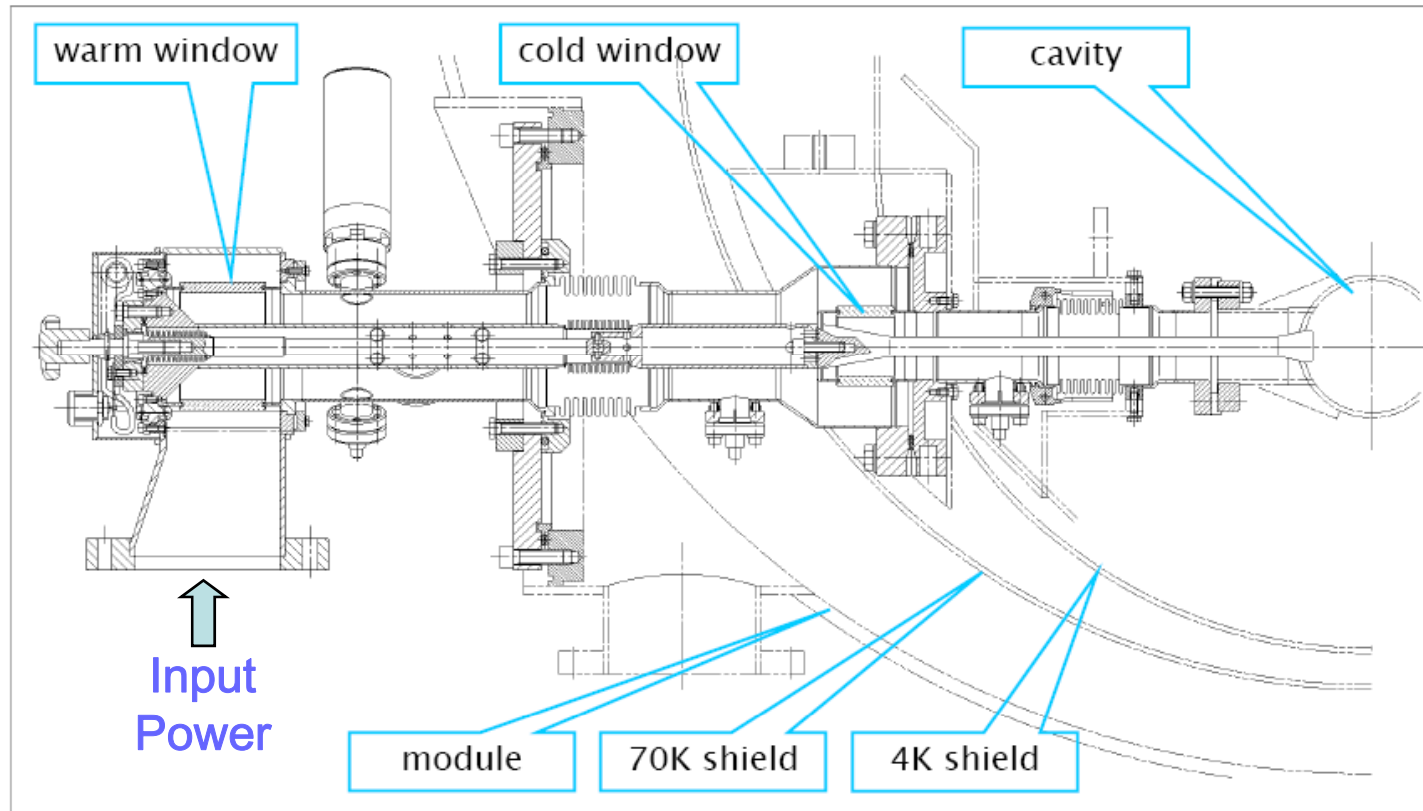
# Coupler Diameter, Multipacting and Tunability

## Issues

- Multipacting at 300 kW (TW + SW) operating point – may want to increase coax diameter from 40 mm to 60 mm
- Qext Adjustability (movable center conductor versus external E/H or stub tuner that produces SW pattern versus none) – big impact on operating with gradient spread and running efficiently at lower beam currents
- HV bias of center conductor (cost)
- Heat Loss in ACD designs (in baseline design, 17% of cryo AC for couplers)
- Beam line of sight to windows
- Need for diagnostics (cost) – minimum probably just a probe in cold region

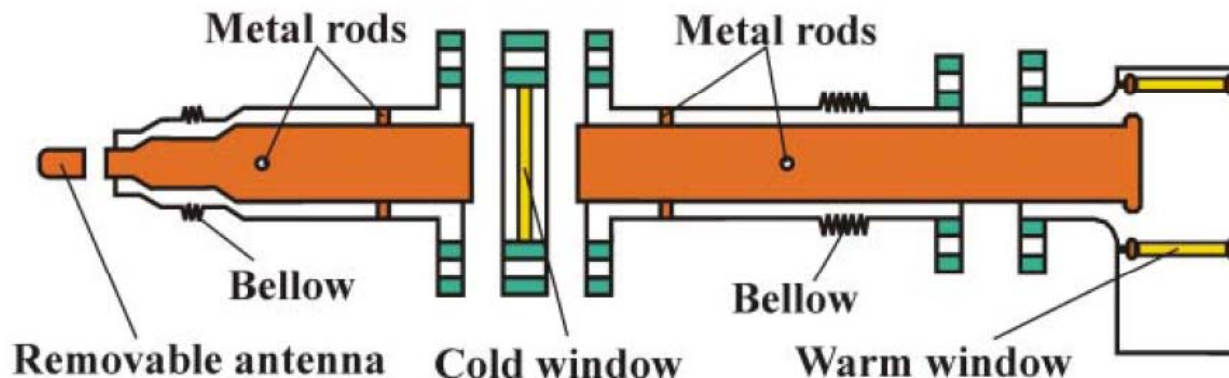
# Baseline TTF-3 Coupler Design

Design complicated by need for tunability ( $Q_{ext}$ ), HV hold-off, dual vacuum windows and bellows for thermal expansion.



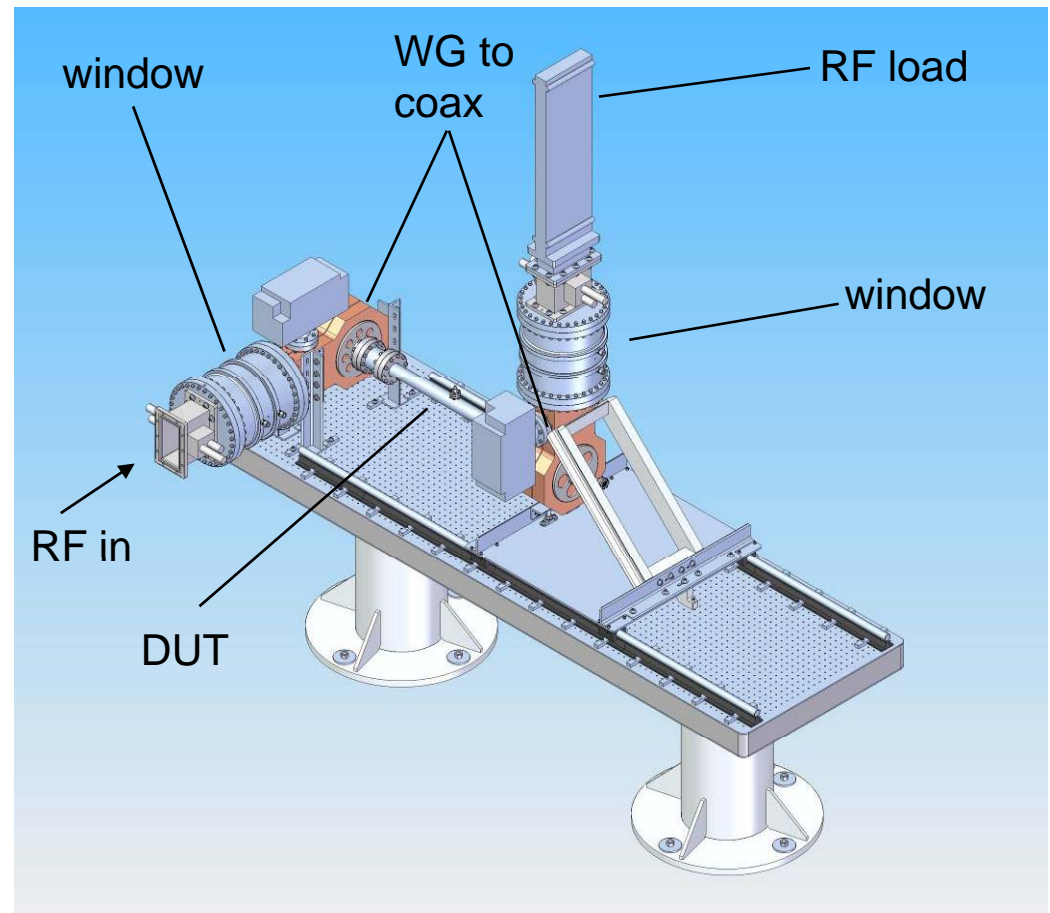
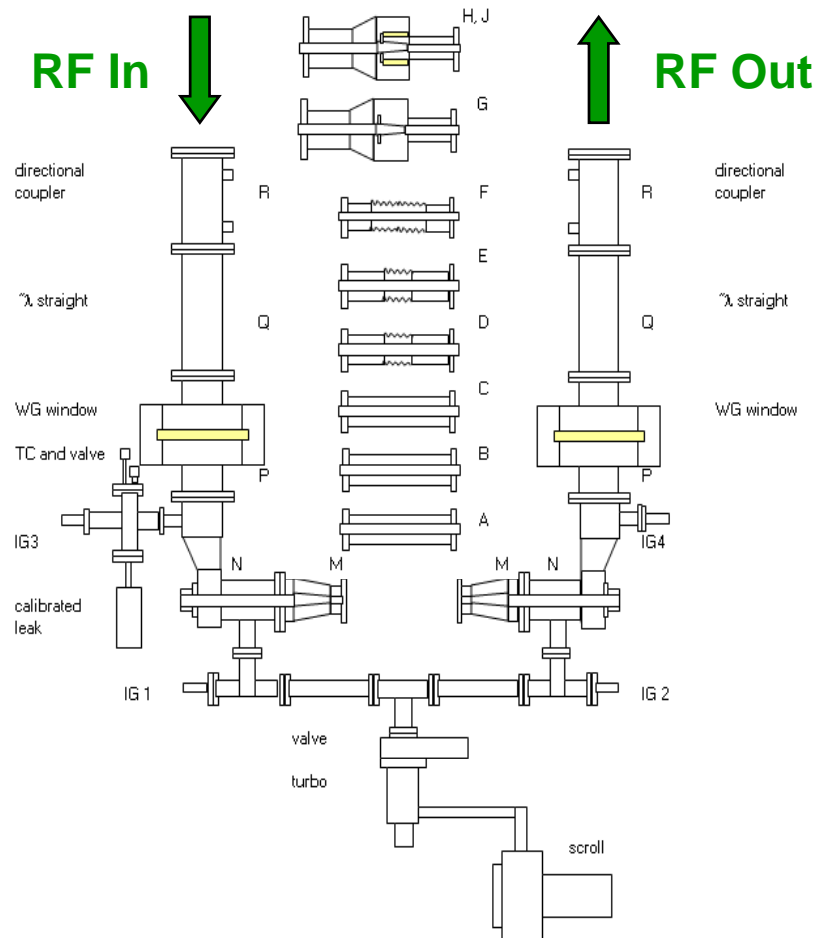
# Baseline and Alternative Designs

	Cold Window	Bias-able	Variable Qext	Cold Coax Dia.	# Fabricated
TTF-3	Cylindrical	yes	yes	40 mm	62
KEK2	Capacitive Disk	no	no	40 mm	3
KEK1	Tristan Disk	no	no	60 mm	4
LAL TW60	Disk	possible	possible	62 mm	2
LAL TTF5	Cylindrical	possible	possible	62 mm	2



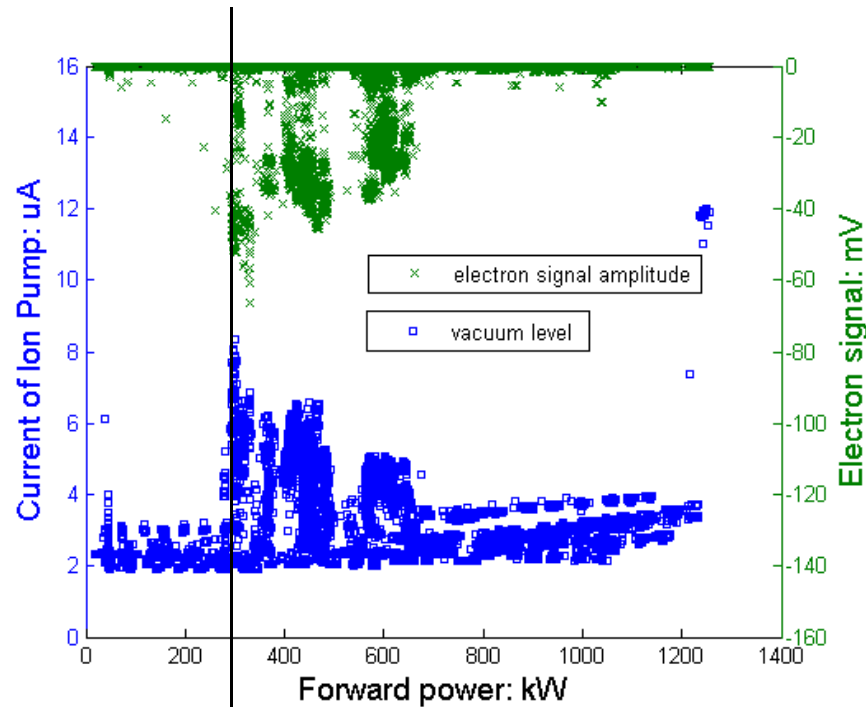
# Coupler Component Test Stand (SLAC / LLNL)

Facility assembled and operating – initially testing 600 mm long, 40 mm diameter stainless-steel and Cu coaxial sections



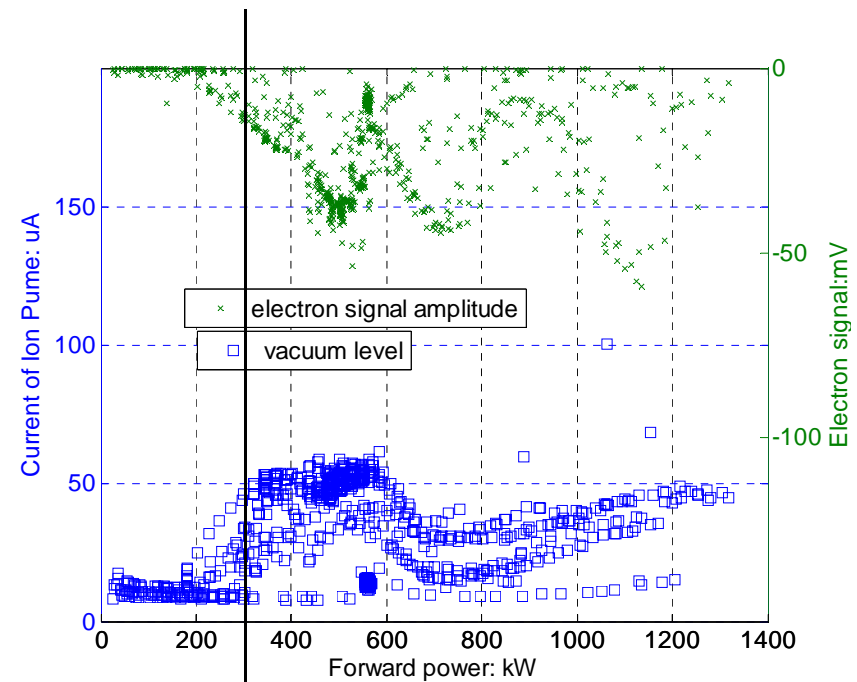
# Multipacting Data and Simulations

600mm long straight SS coax section test results

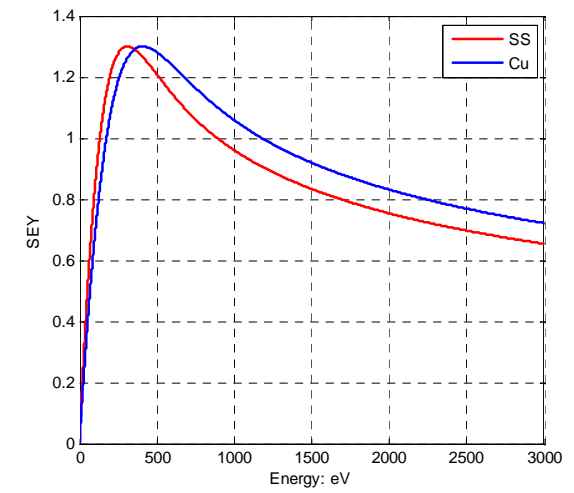
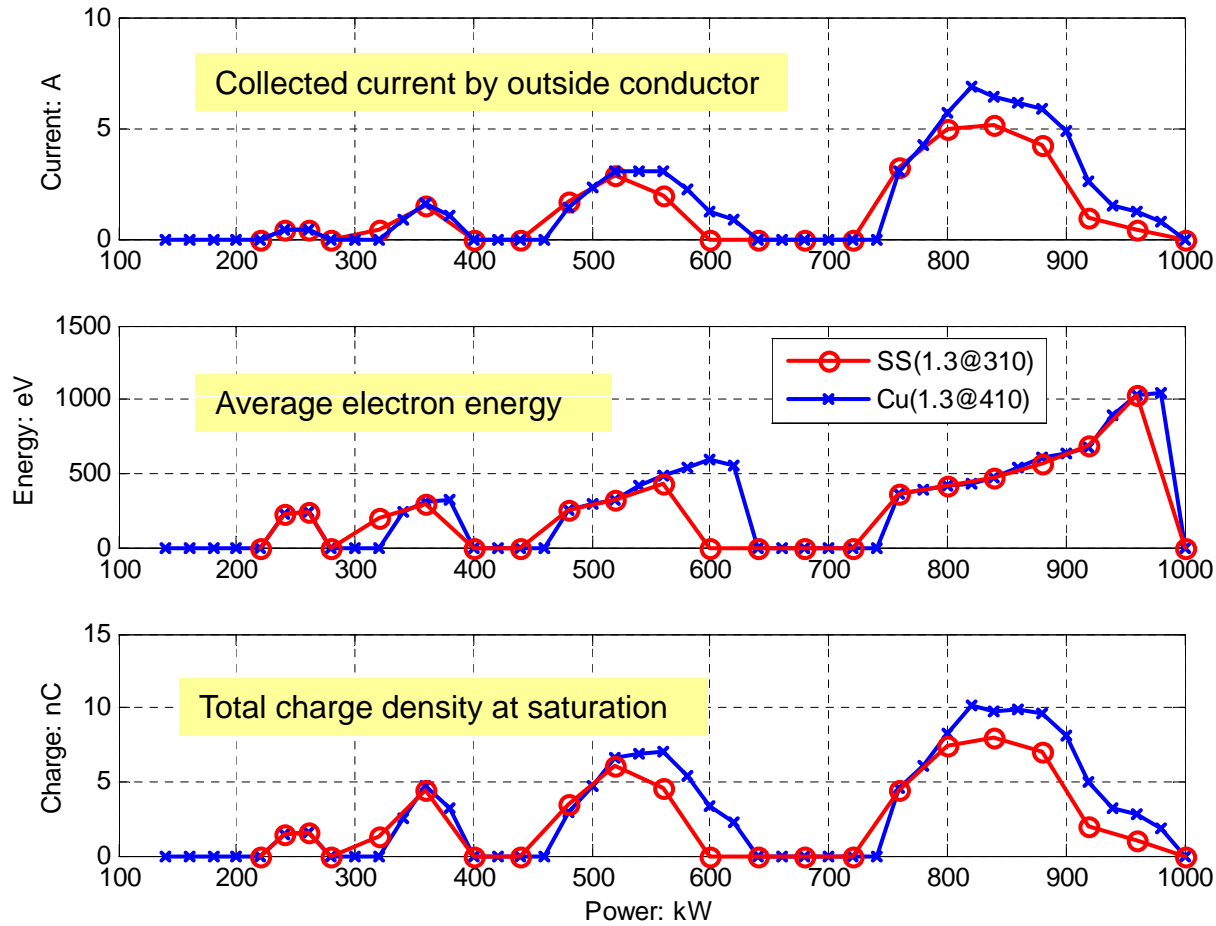


ILC TW Operating Point (280 kW)

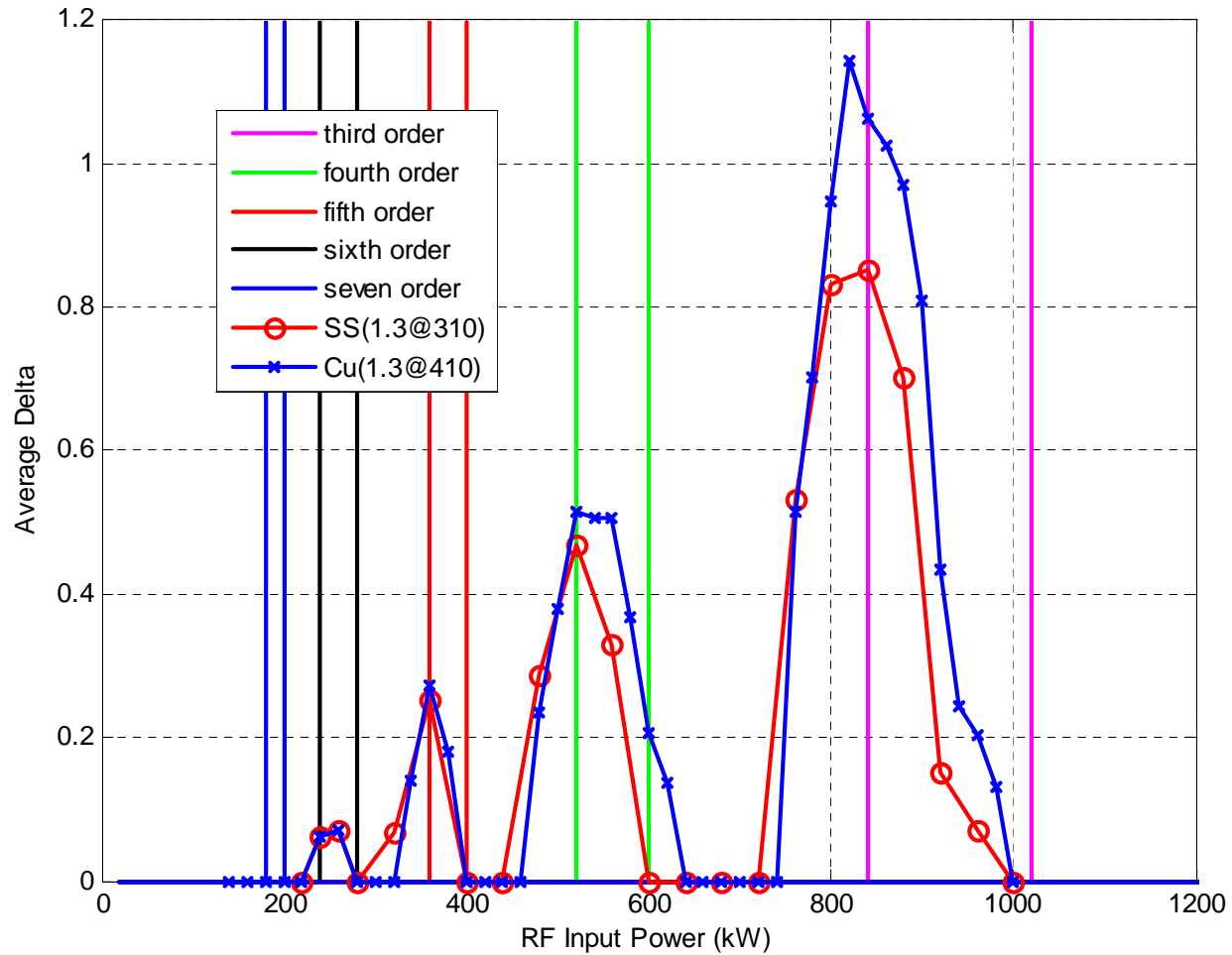
600mm long straight Copper plated SS coax section test results



# MAGIC simulation results on 24cm long straight coaxial line

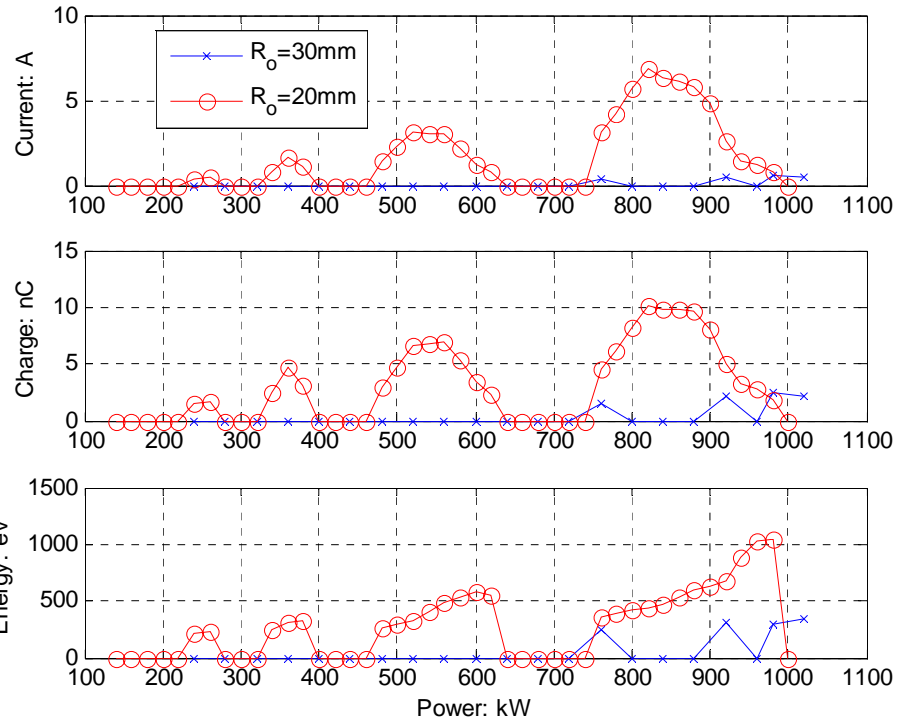
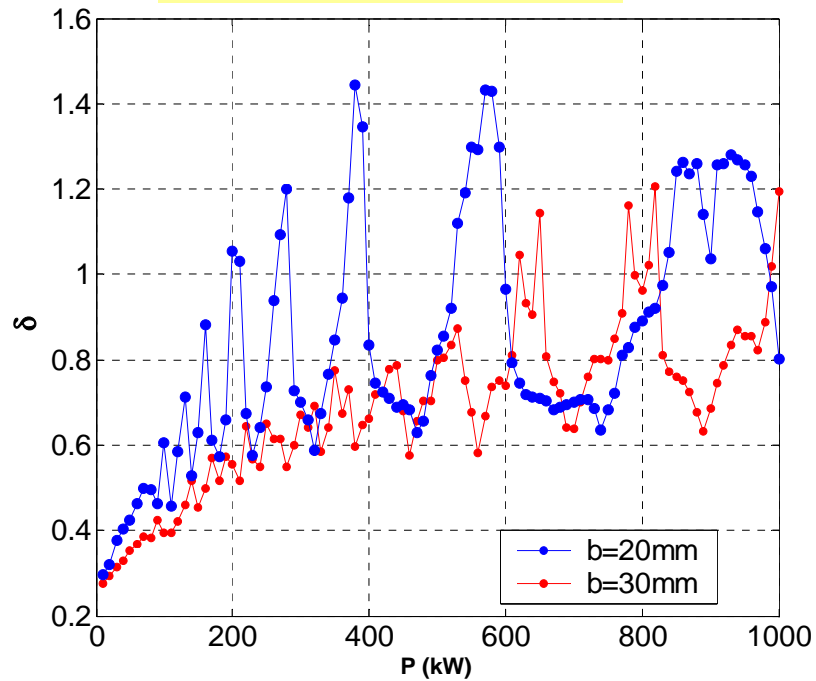


# MAGIC simulation results and Lixin Ge's 'Resonant Finder' Results



MAGIC simulation results on 24cm long straight SS coaxial line with different apertures at same impedance (70Ohm)

Lanfa Wang's results



Comparisons of 40 mm ID and 60 mm ID Simulations of Multipacting