

Q_{ext} estimations for the "Broad-Hook"-HOM coupler

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20.9.2010

"Classical" LEP hook design as starting point (priv.com. WW)

reminder

coaxial 50-Ohm-port
(connector not modelled)

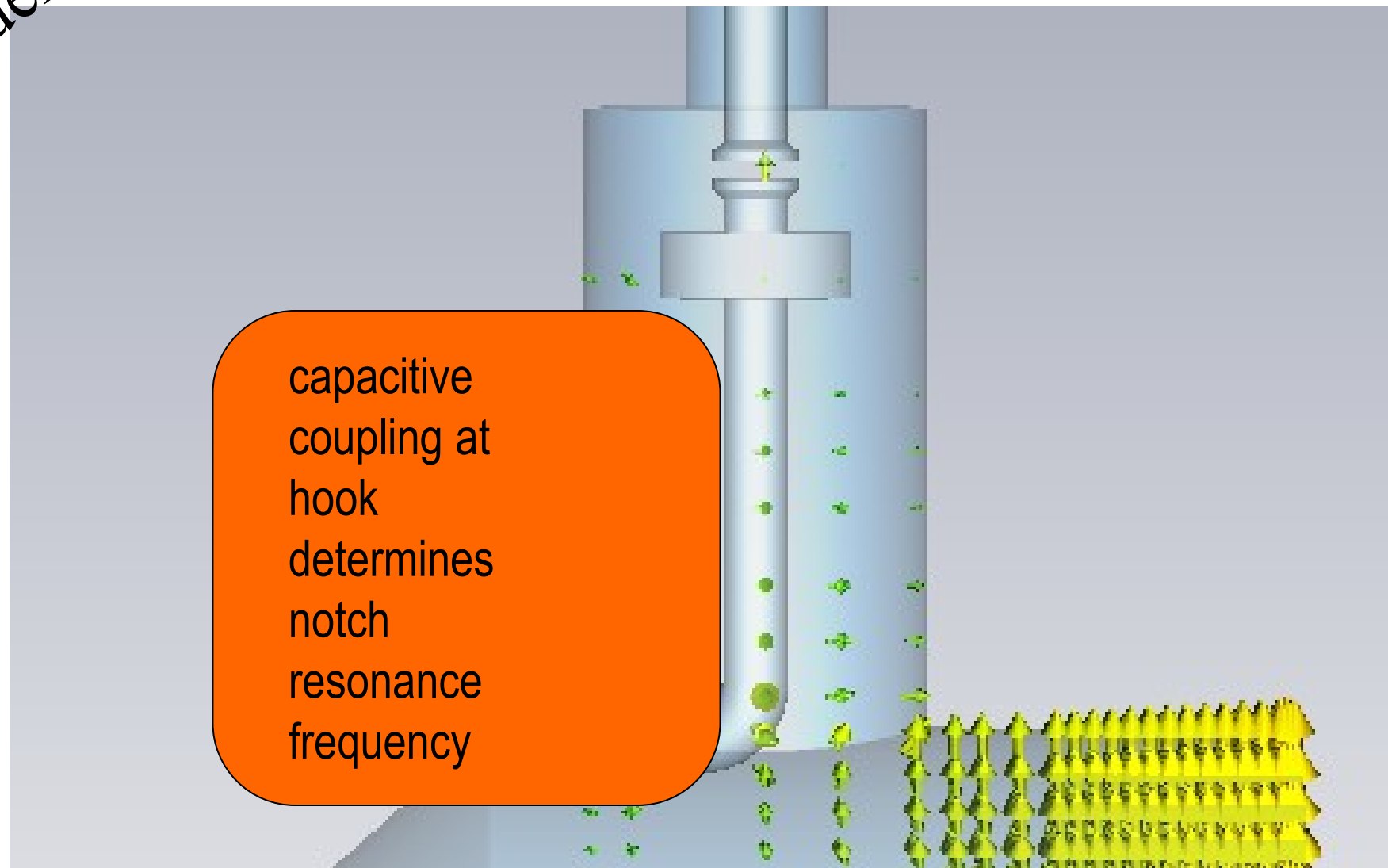
adjustable capacitive coupling

support carries liquid helium

combined E-/H-field coupling,
capacity couples to outer
conductor

E-field geometry @ 704 MHz

reminder

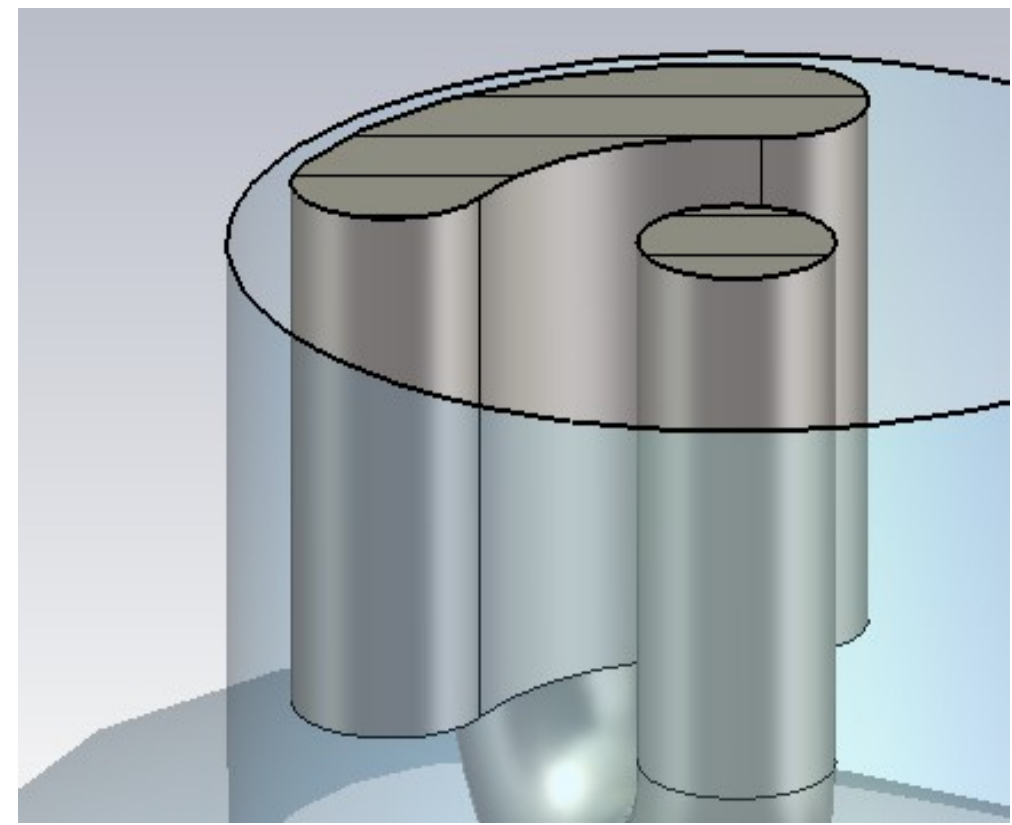
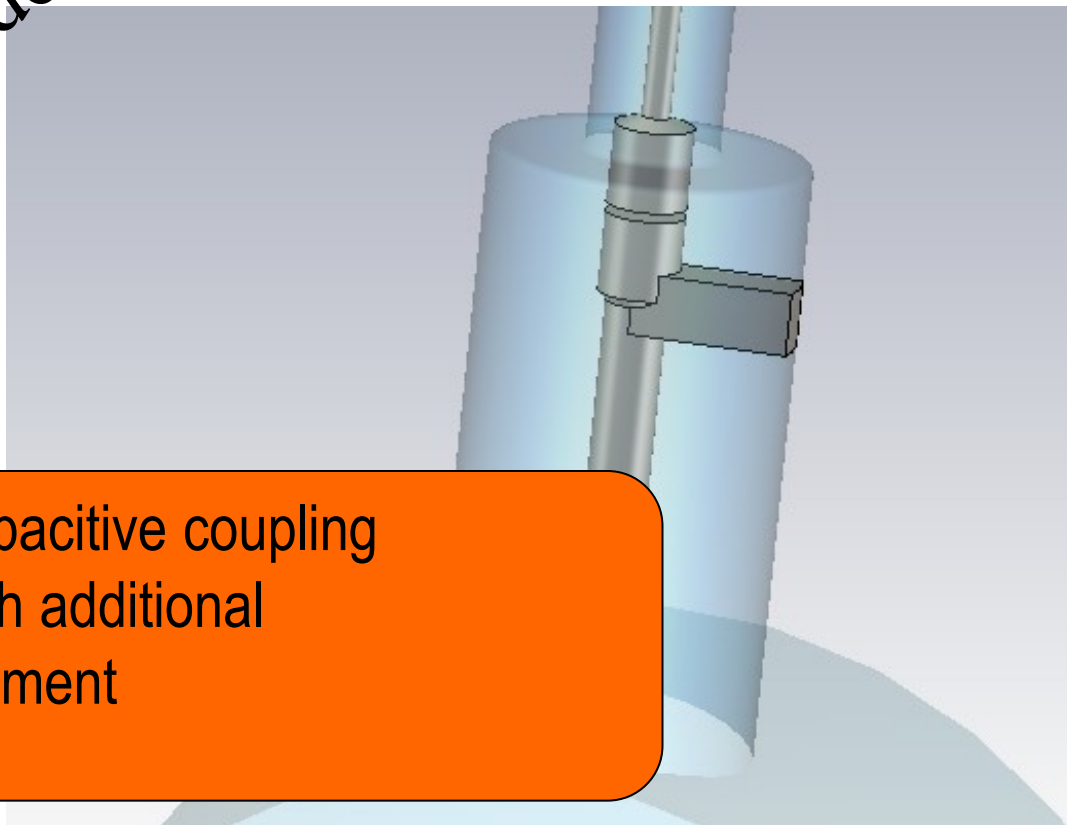


strong capacitive coupling between "hook" and outer conductor

Pure hook not tunable for 704 MHz => Modification of hook end in order to adjust fundamental mode notch filter

reminder

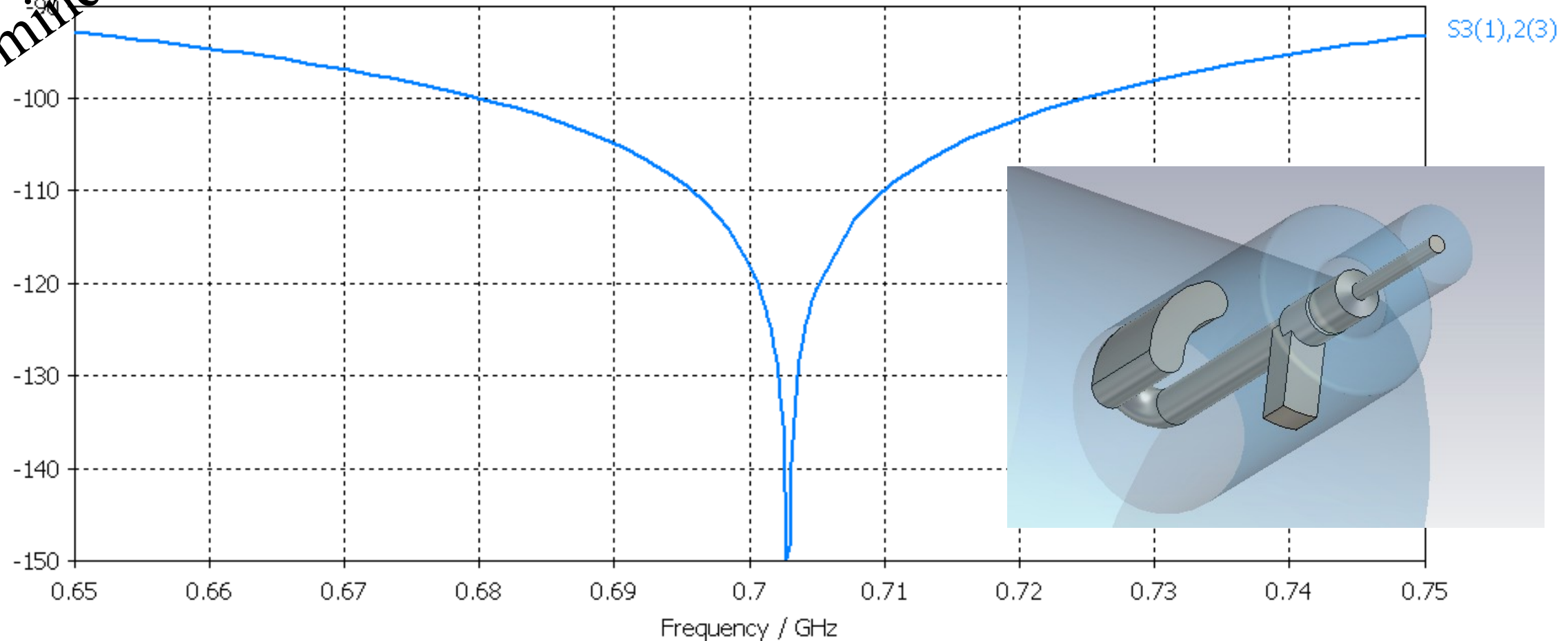
enlarge capacitive coupling
at hook with additional
surface element



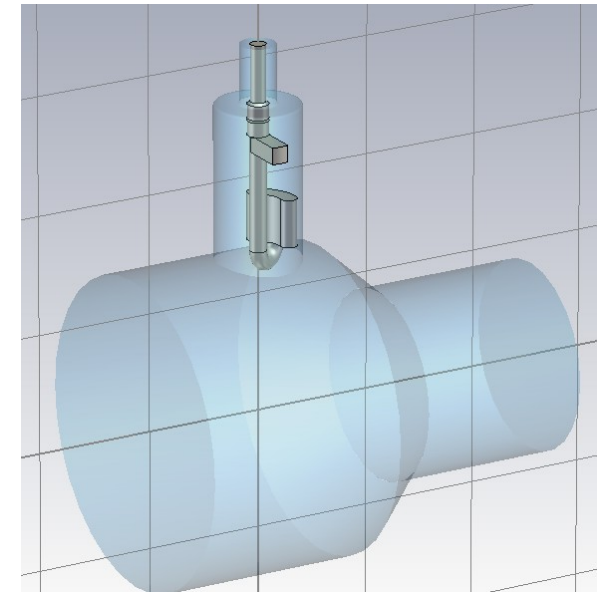
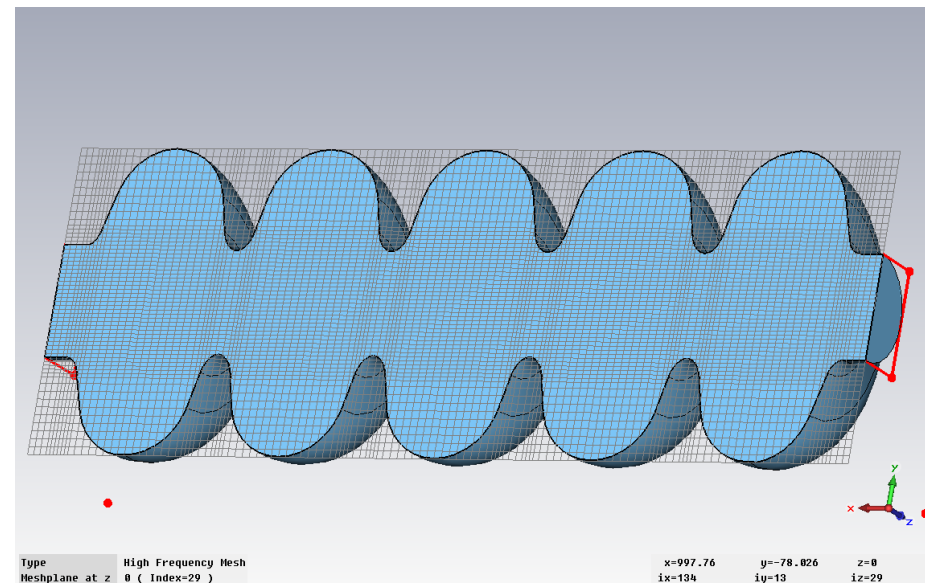
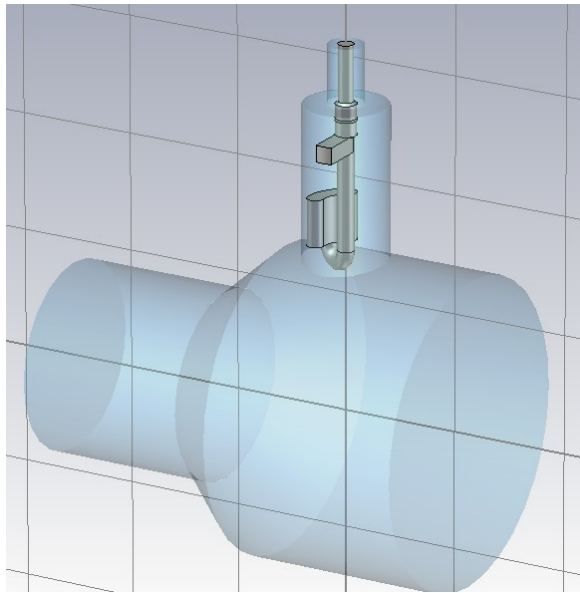
Waveguide(TM_0)–Coax–Transmission blocked @ fundamental mode frequency => Tuning ok

reminder

S-Parameter Magnitude in dB

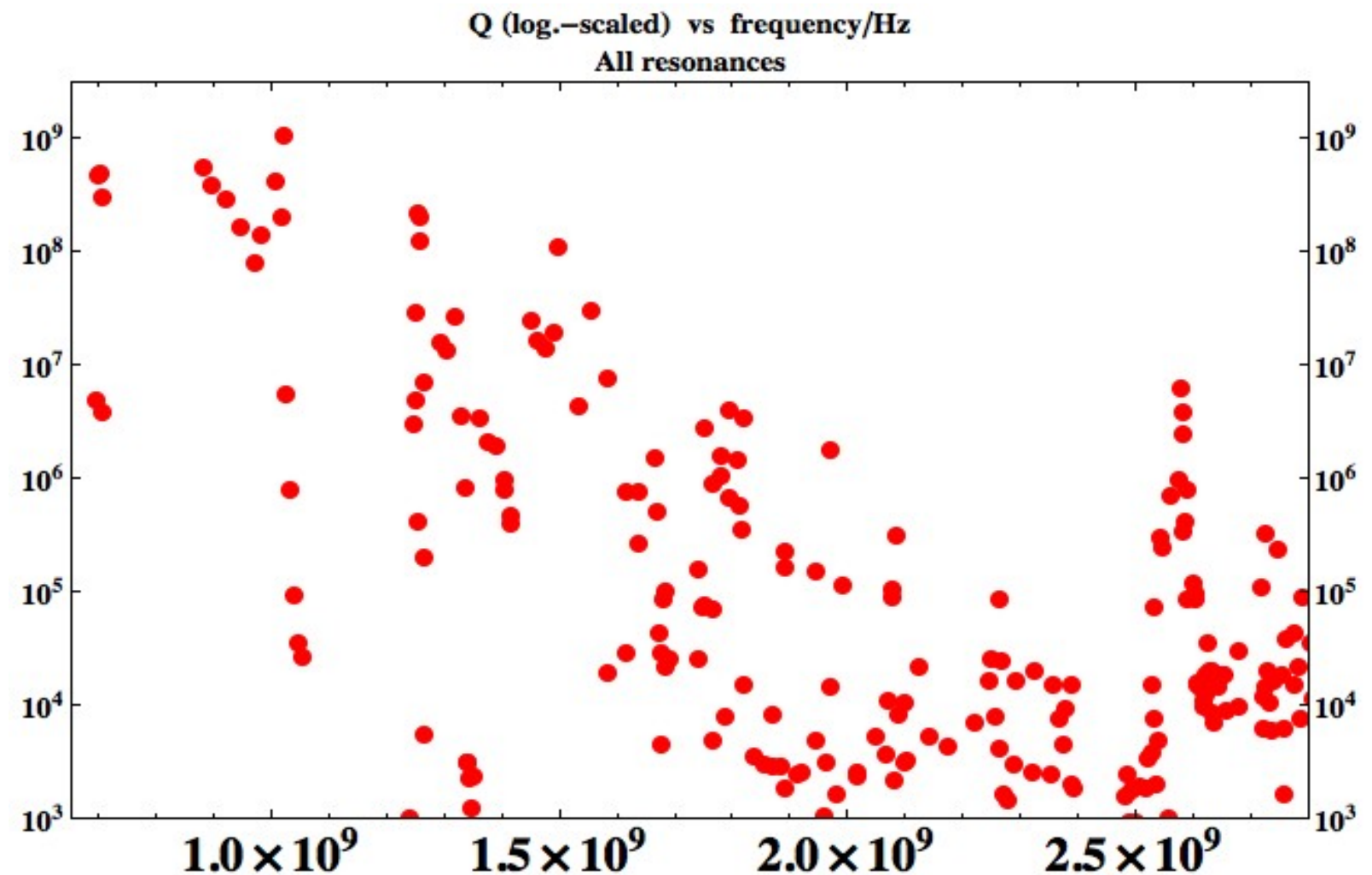


Q-ext estimations based on:



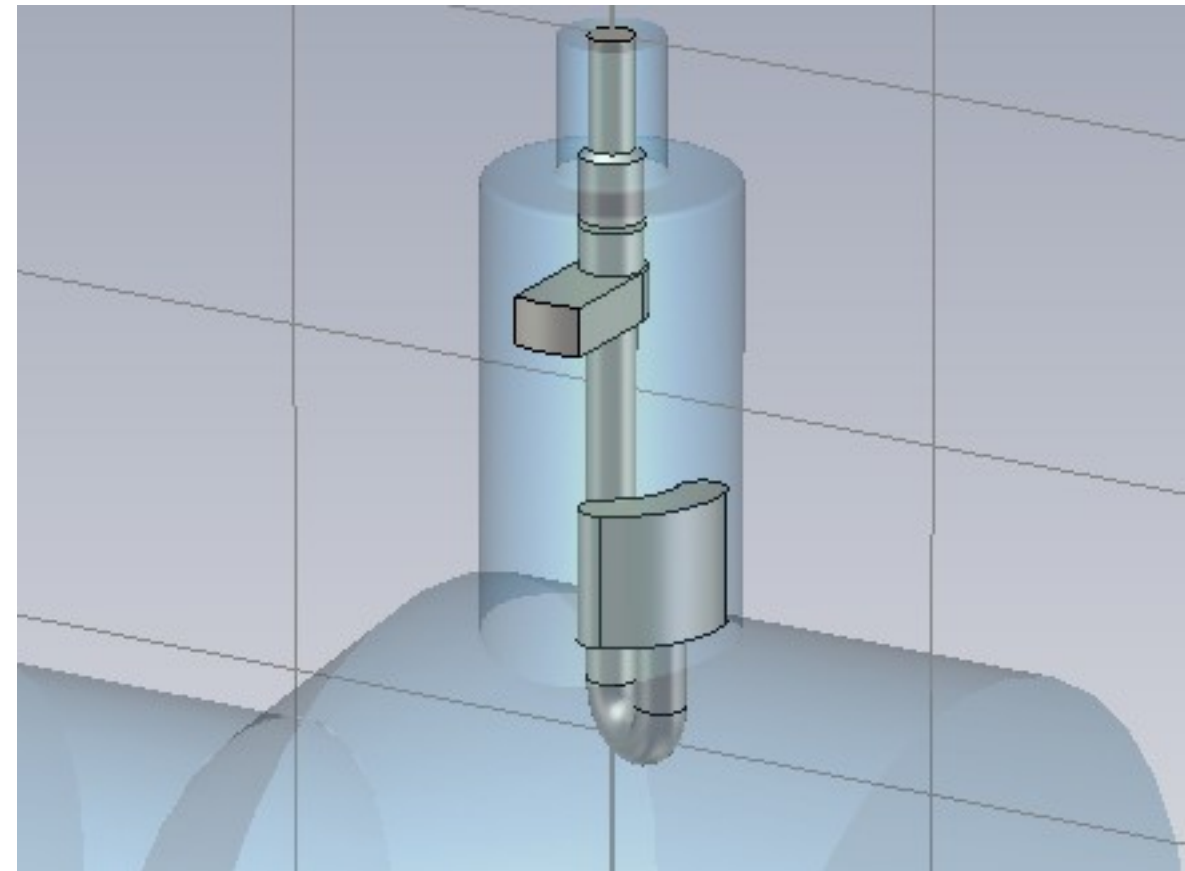
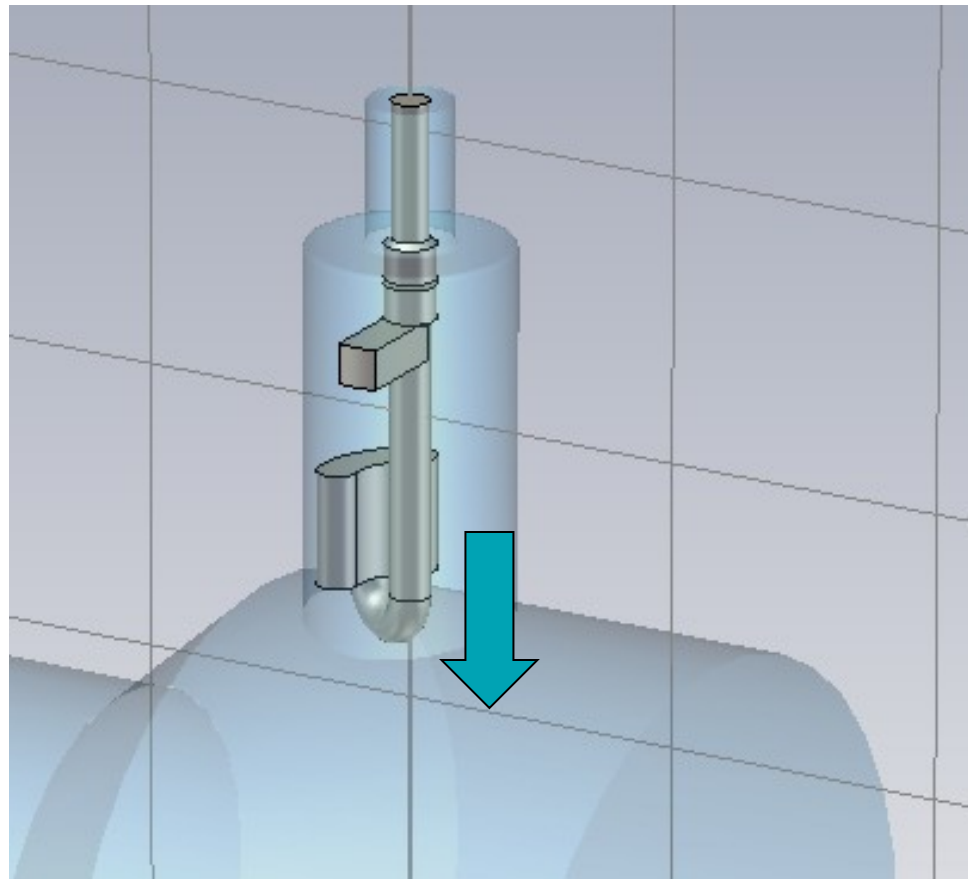
- CSC-coupling of 8 modes in D=130mm-coupler-cavity-connection (TE₁₁, TM₀₁, TE₂₁, TM₁₁, TE₀₁)
- couplers left-right mirrored-symmetric (But: cavity asymmetric, no coupler calc for D=140mm-pipe up to now)
- D=80mm beam pipes left open (but most below cut-off)

This (cst-computation, csc-concatenation, q-fit-proc.) gives:



- $Q_{\text{fundamental}} 3.0 \cdot 10^8$
- much steeper $Q(f)$ decrease than filter-free coax, BUT: still too high 1-1.5 GHz
- Is it possible to put coupler port closer to cavity waist (cav.design used from 21.7.2010)

Our attempts to improve coupling



- increase penetration depth: but poor effect, not nice for dark current
- flip hook to come closer to cavity: but total change of filter behaviour, not tuned yet