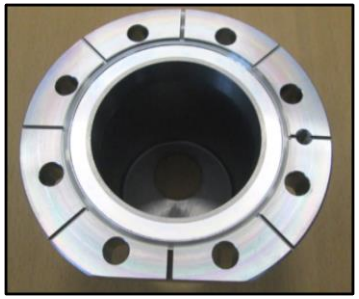
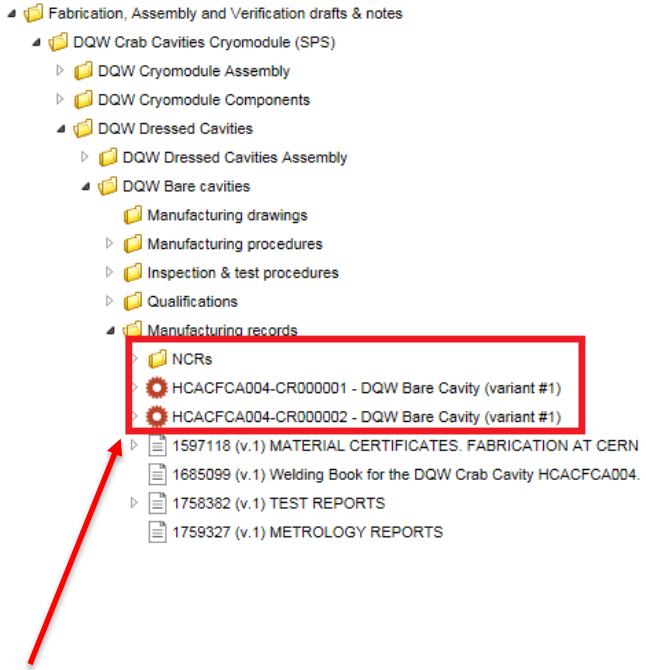
DQW- FPC/HOM Port Non-Conformities

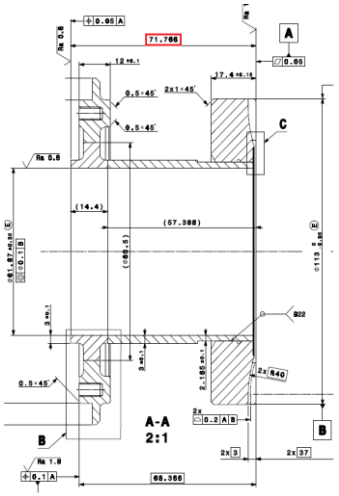


Additional grooves on flanges for HOM coupler alignment

Machining mistake after weld on DQW #1 HOM port, an extra weld was introduced to address the length



Non-conformity reports (EDMS/MTF)

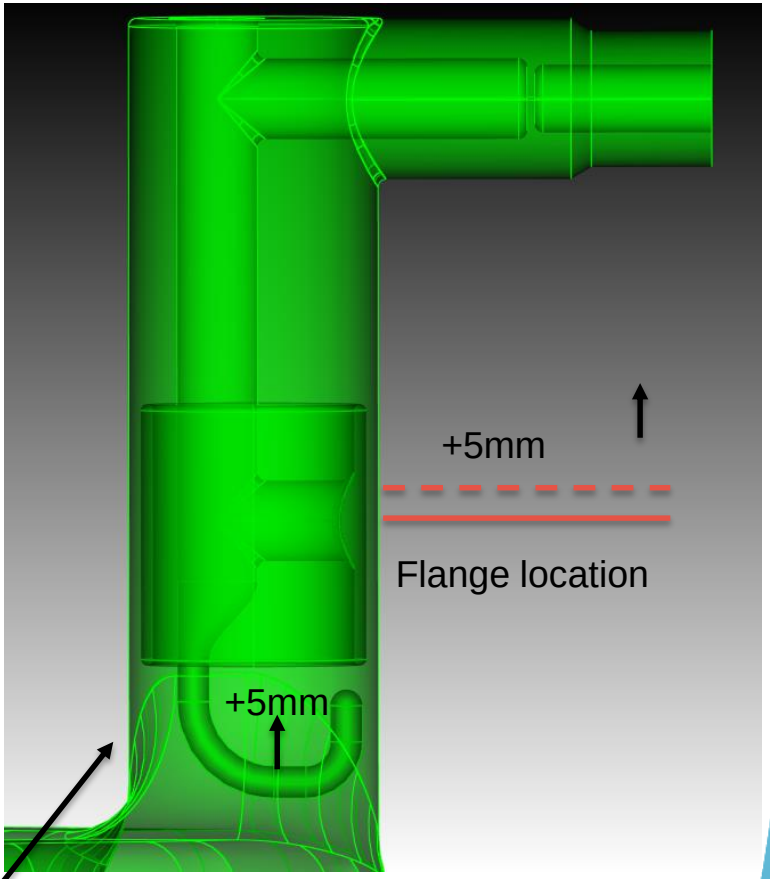


Overlength in all HOM & FPC ports on both cavities $+5$ mm.

Effect of HOM Port Non-Conformity

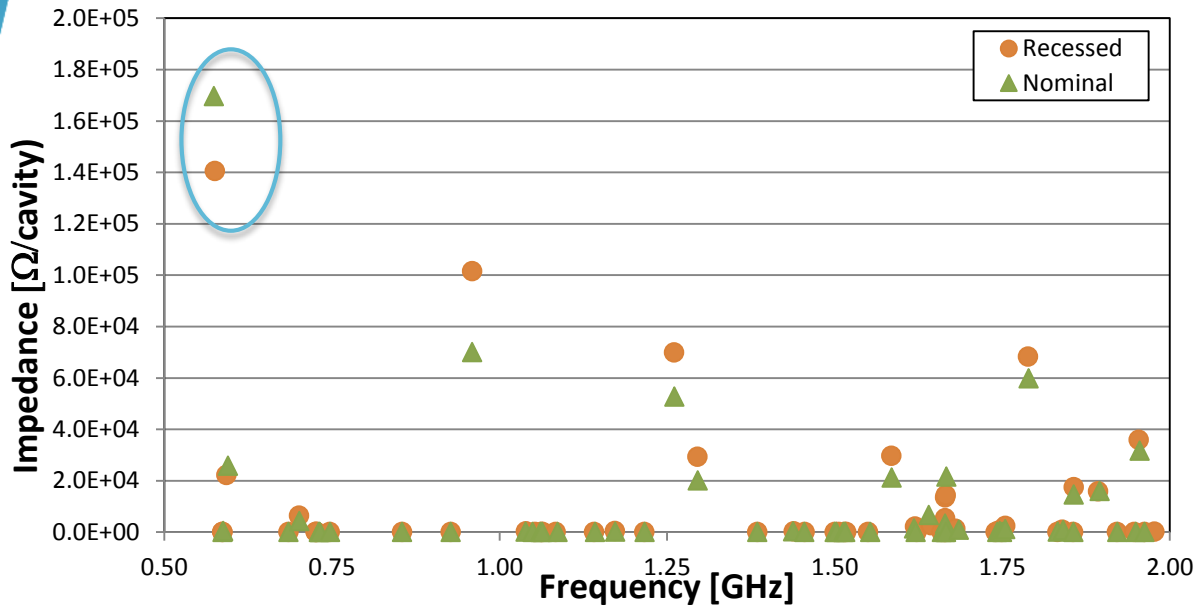
- Cavity flange $+5\ \mathrm{mm}$ above the nominal position
- Possible impact on gasket heating & impedance
- Impact on the gasket heating calculated by BNL (B. Xiao): $4\ \mathrm{mW}$ → None
- Based on simulations, the max impedance increase $< 30\%$, no effect is anticipated in SPS.

Decision: Proceed with current length for HOM Ports



HOM Coupler
DQW-SPS Cavities

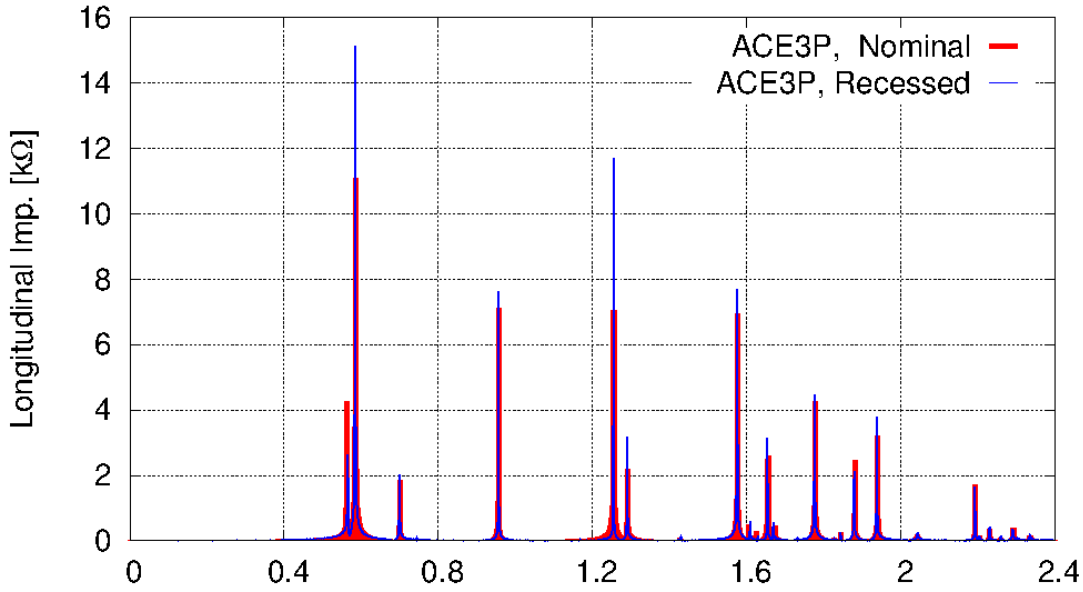
Longitudinal Impedance Comparison



Frequency domain
The difference is ~25%
for the largest impedance

ACE3P Comparison, time domain
Wake: 300m, 0.8M Tet

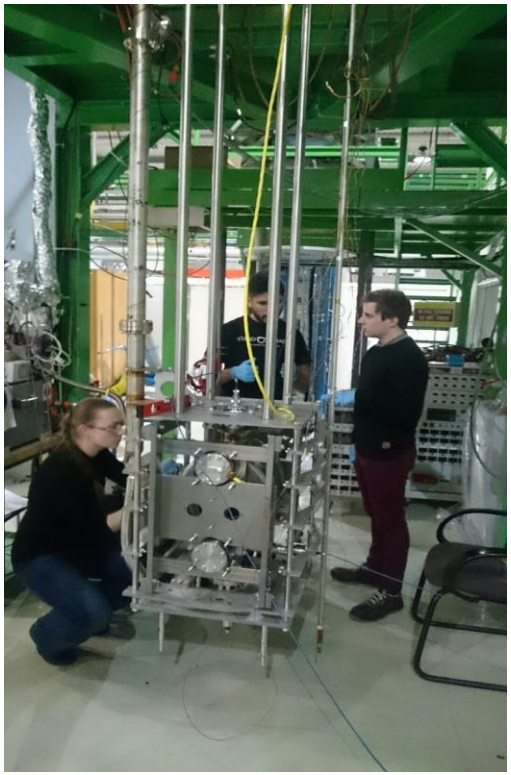
To get converging imp. results, a wake of ~5km is required



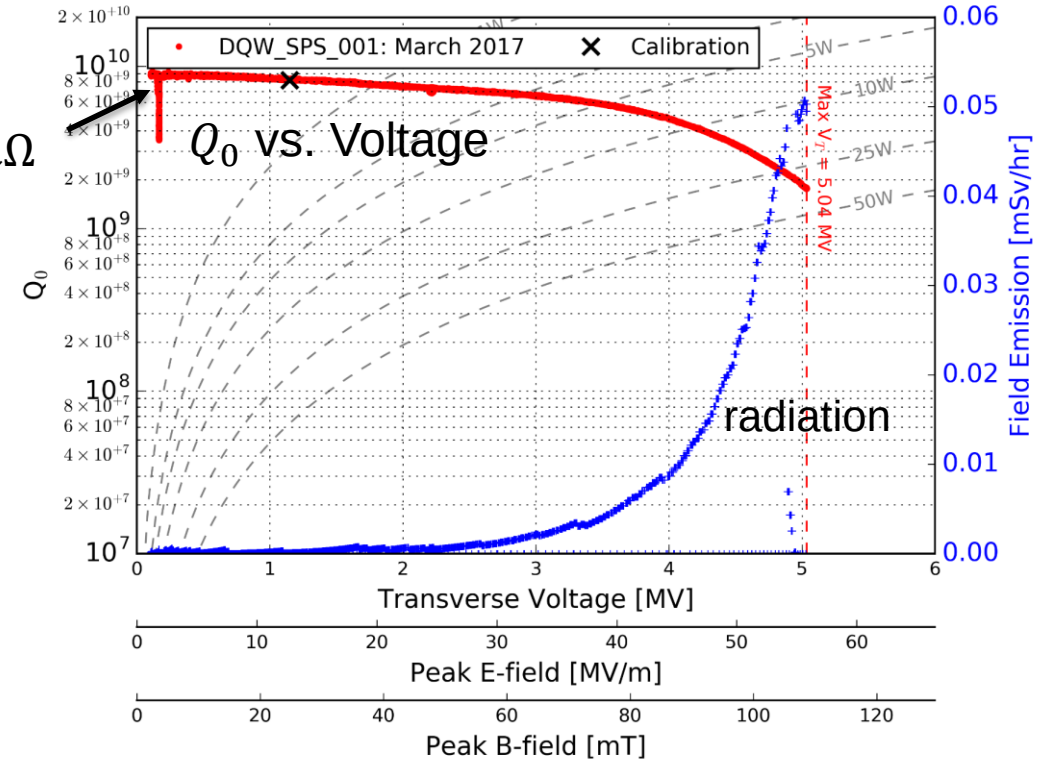
Q_0 vs. Voltage

Excellent result in first test $V_T = 5.0$ MV (Nominal $V_T = 3.4$ MV)
$E_p, B_p = 57$ MV/m, 104 mT (CERN DQW #2 RF testing next week)

Important aspect is to preserve through cavity dressing.
Also to determine a performance target (margin) for series production*

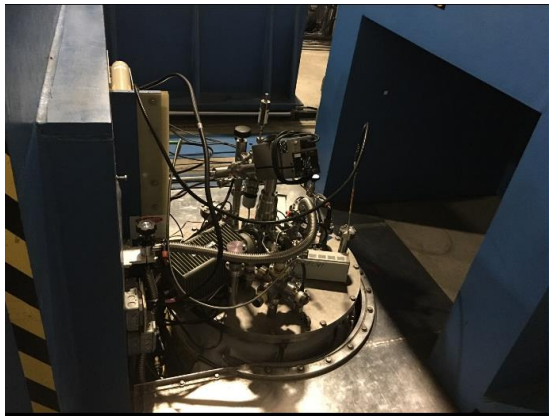


10 $n\Omega$

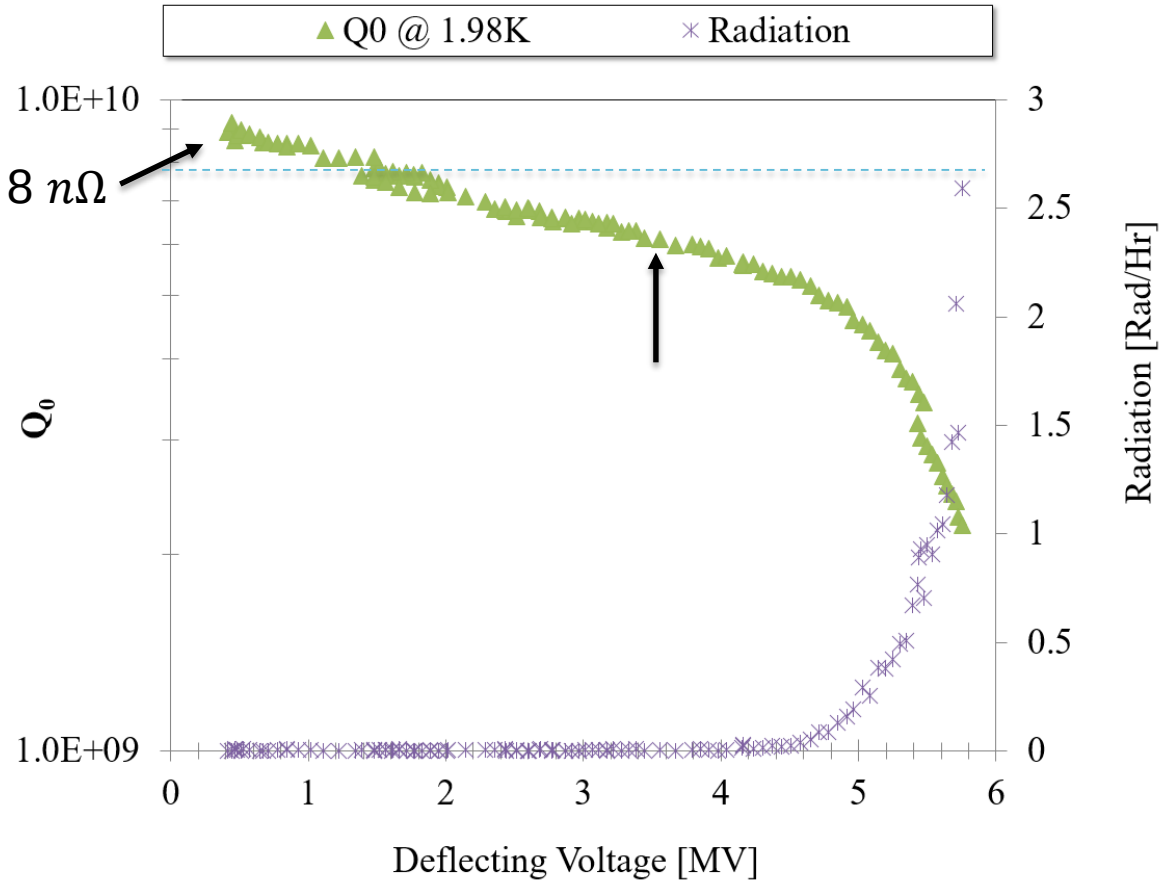


*USLARP want this performance target now for CD1 review

USLARP-DQW #1



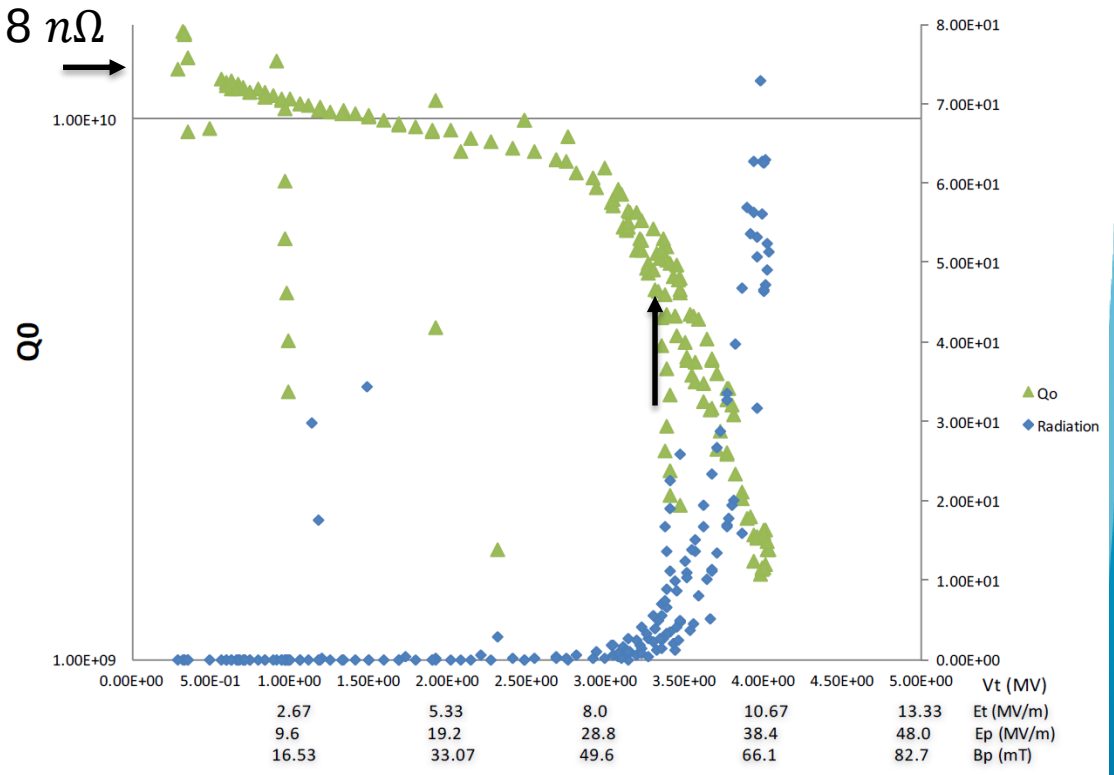
Best field and Q_0 achieved so far $V_T = 5.76$ MV
$E_p, B_p = 63\ \mathrm{MV/m}, 123\ \mathrm{mT}$



USLARP DQW #2 testing foreseen soon

USLARP-RFD #1

Suspicion for an earlier quench (4 MV) of inadequate chemistry after the final welds, being re-processed and test in coming weeks



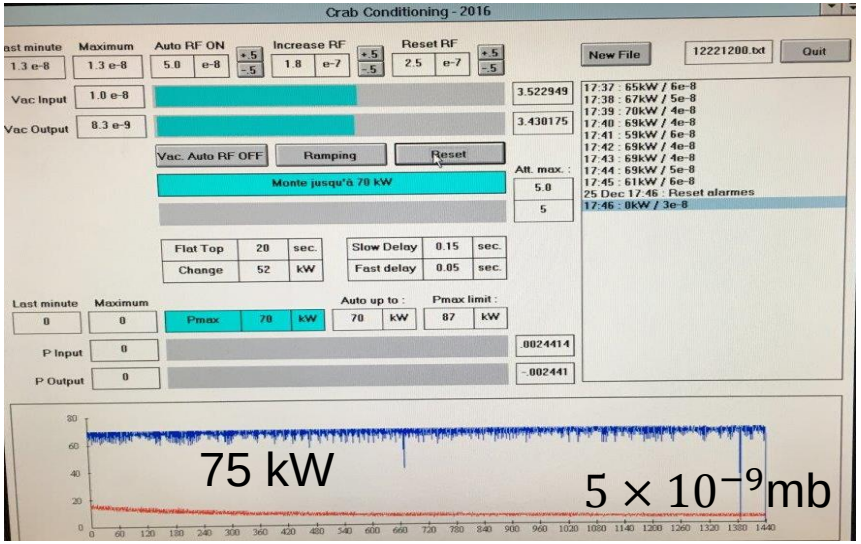
USLARP RFD #2 ready for testing as well

Power Coupler Conditioning

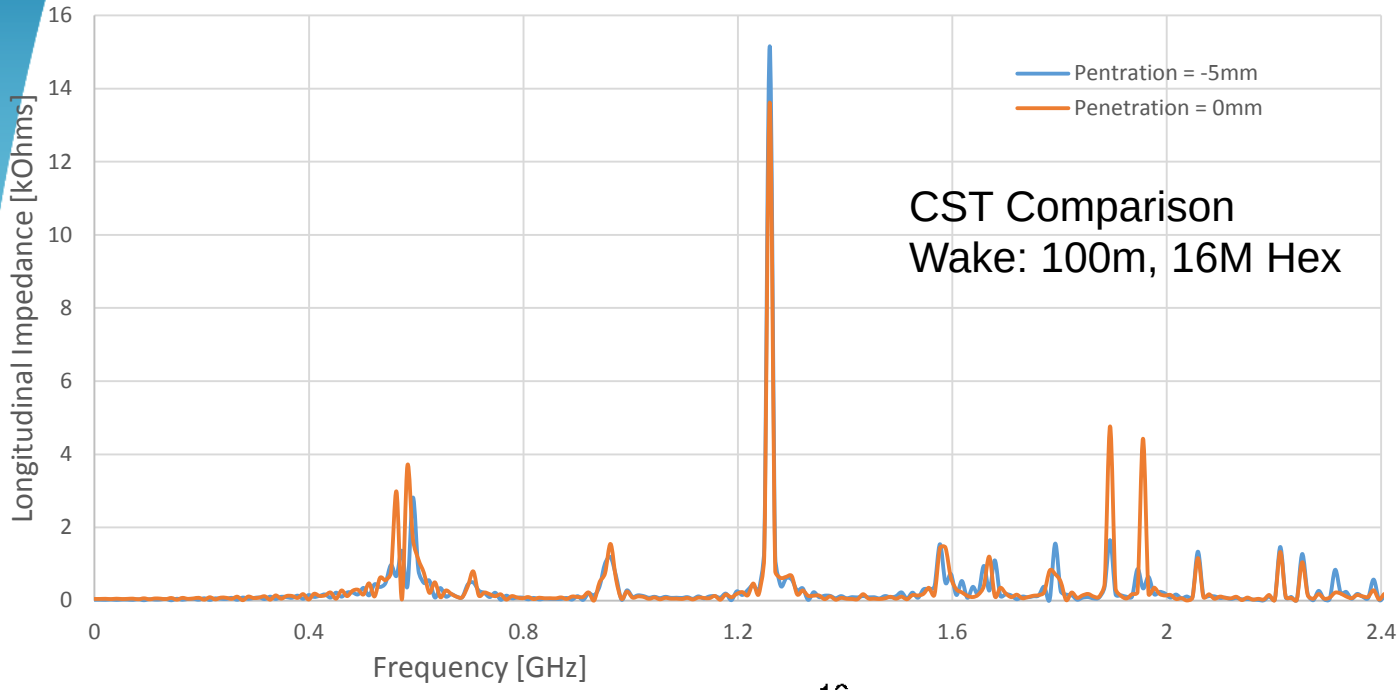
30 kW CW on a load (thermal limitation due to the test box in stainless steel).

75 kW pulsed up to 10 ms @52.6 Hz

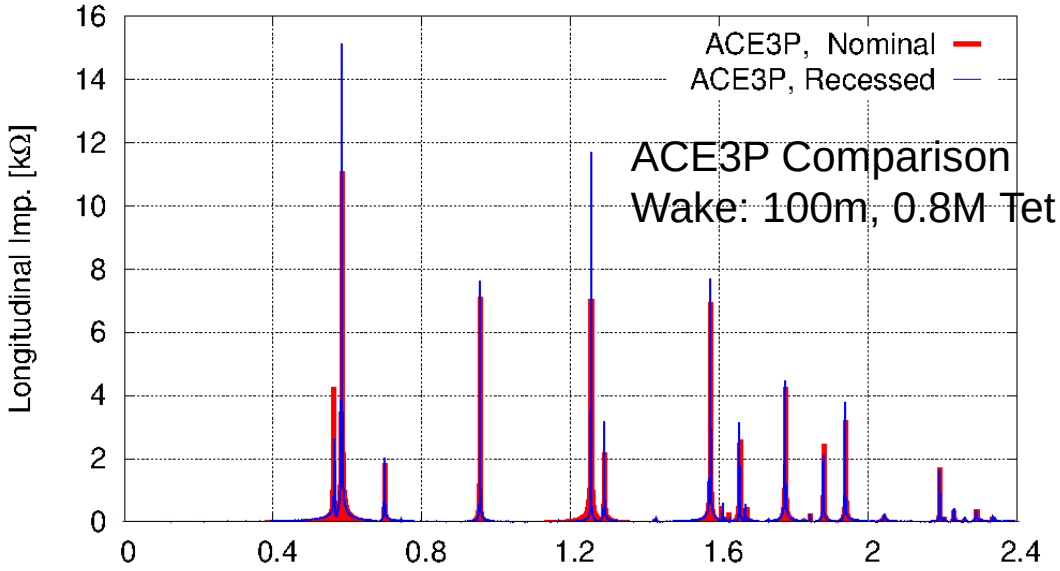
75 kW, 500 μs @10 Hz on a short circuit at all phases over $\lambda/2$ (equivalent to 300 kW peak, limited due to the RF power)



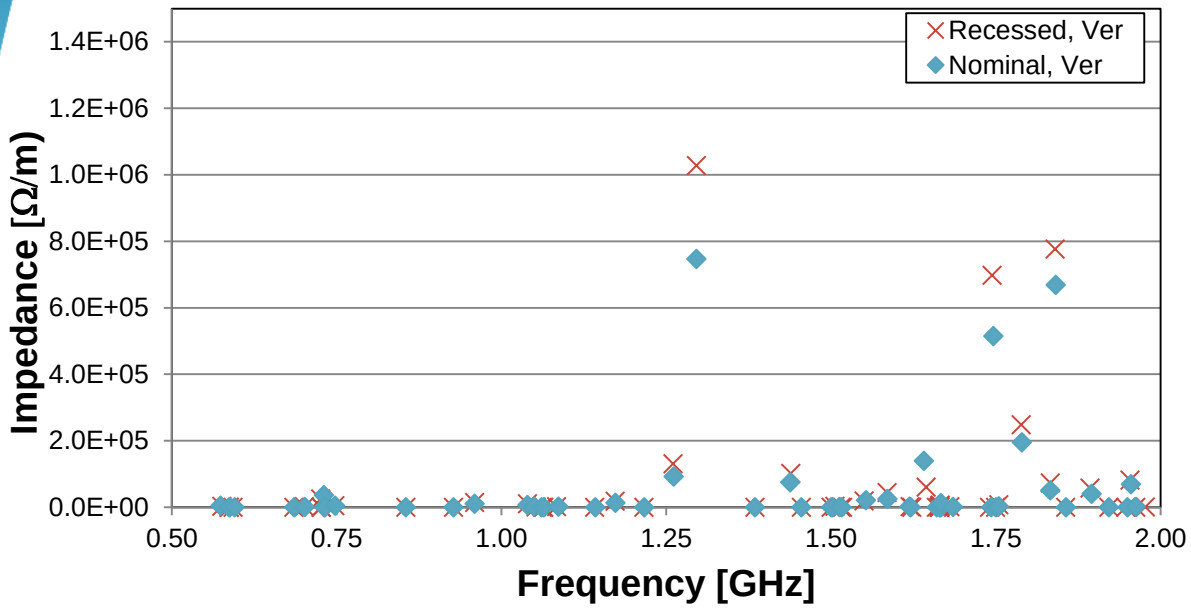
Longitudinal Imp, Code Comparison



Time domain results are quantitatively different between the two codes



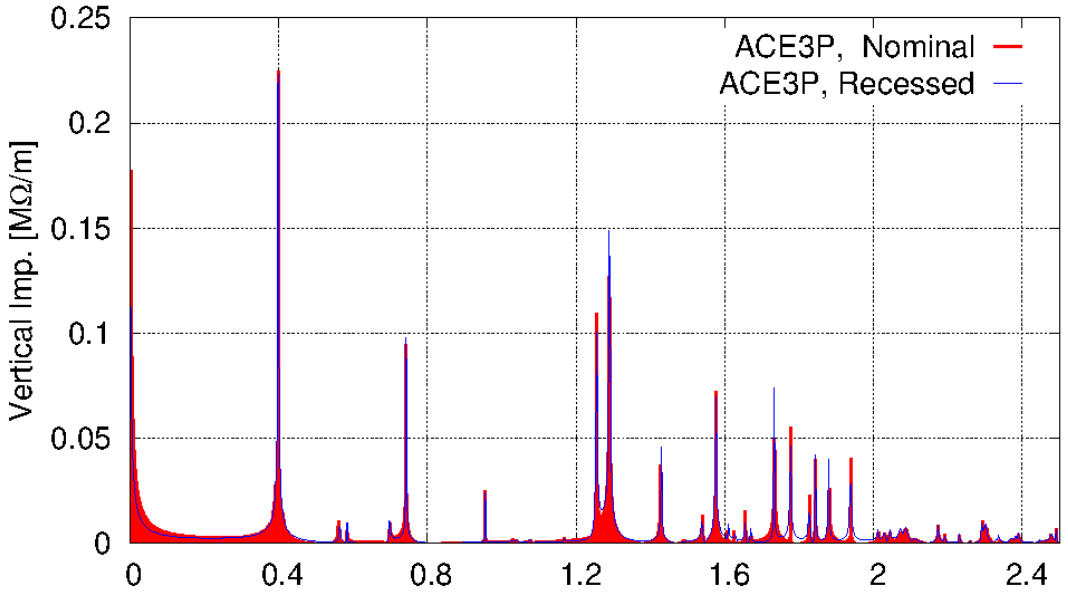
Vertical Impedance



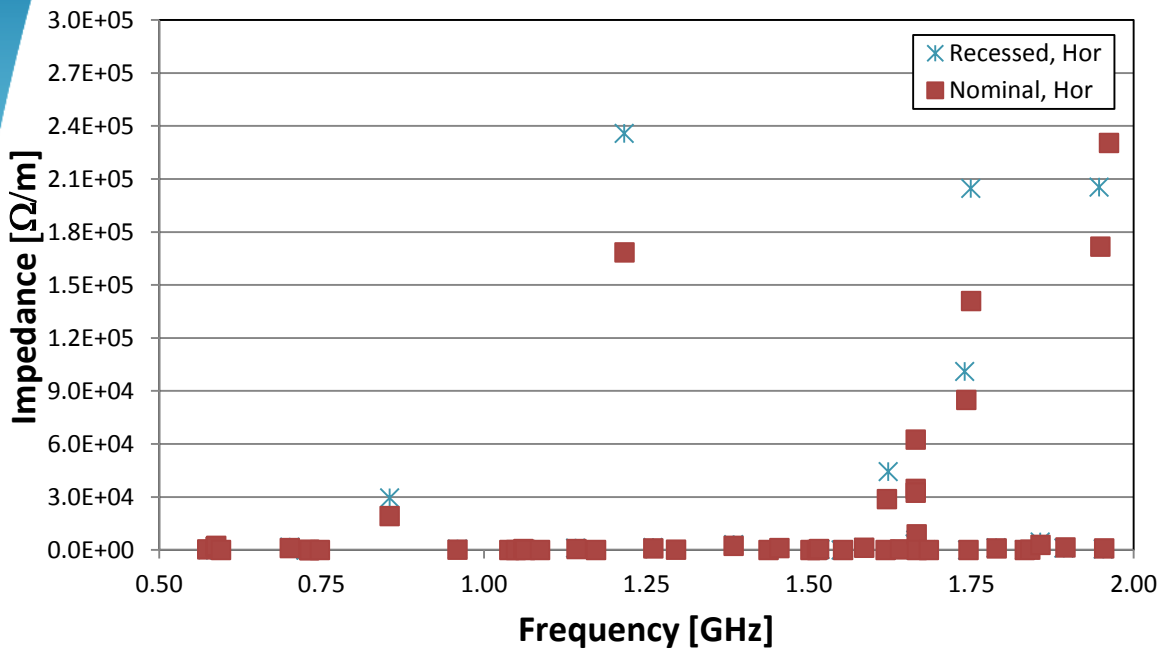
CST Freq domain, 0.3M Tet

Again $\leq 25\%$ difference due to retraction of HOM filter by $5\ \mathrm{mm}$

Qualitatively similar results, but time domain results require much longer wake computation to resolve the magnitude



Horizontal Impedance Comparison



CST Freq domain, 0.3M Tet

Again $\leq 30\%$ difference due to retraction of HOM filter by $5\ \mathrm{mm}$

Impedance in horizontal smaller by x5 or more compared to vertical

Qualitatively similar results, but time domain results require much longer wake computation to resolve the magnitude