DDS design status

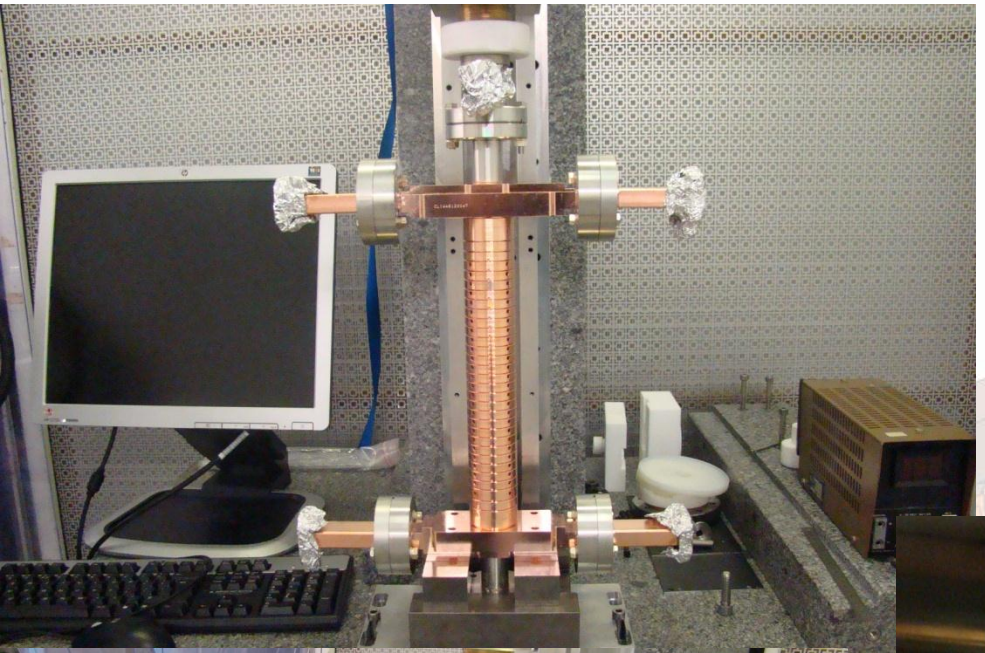
Task 9.2-Sub-task 2

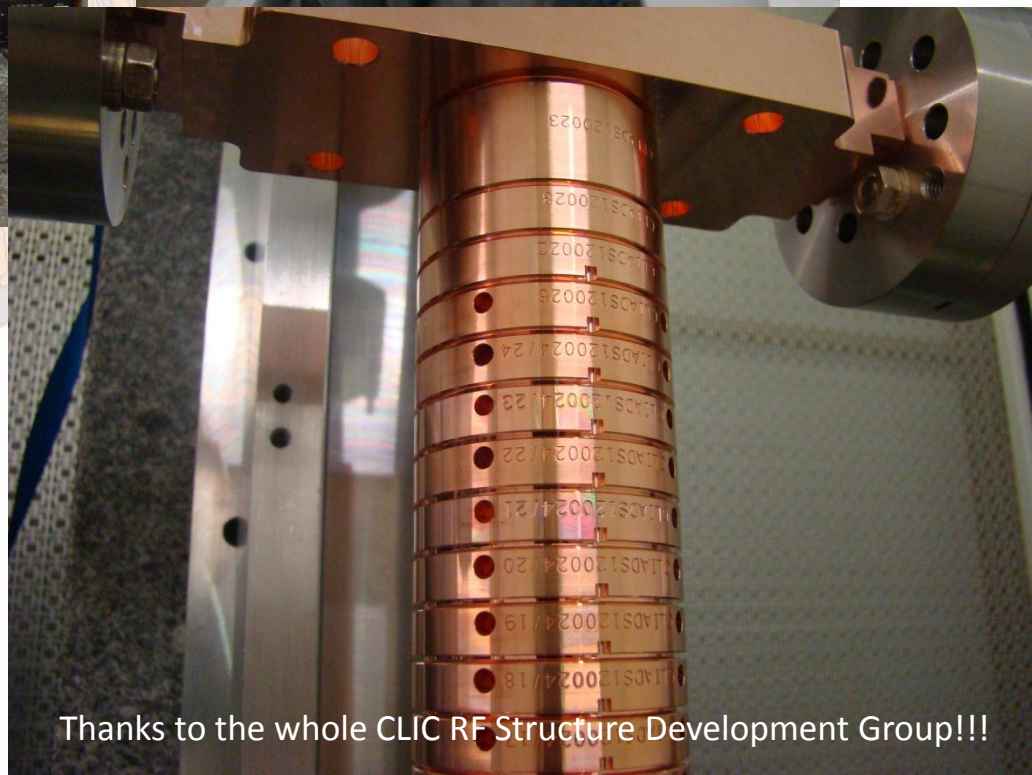
Alessandro D'Elia on behalf of Roger M. Jones

The University of Manchester

The Cockcroft Institute of Accelerator Science and Technology

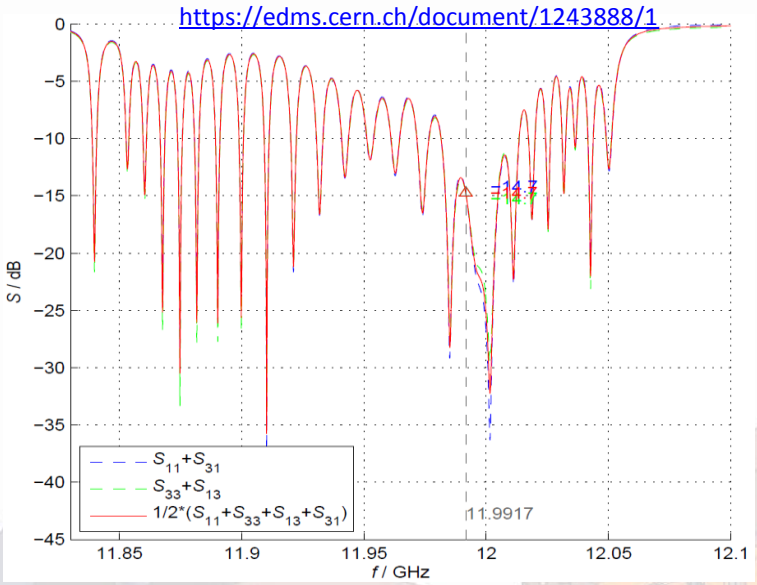
CLIC_DDS_A First Prototype before bonding

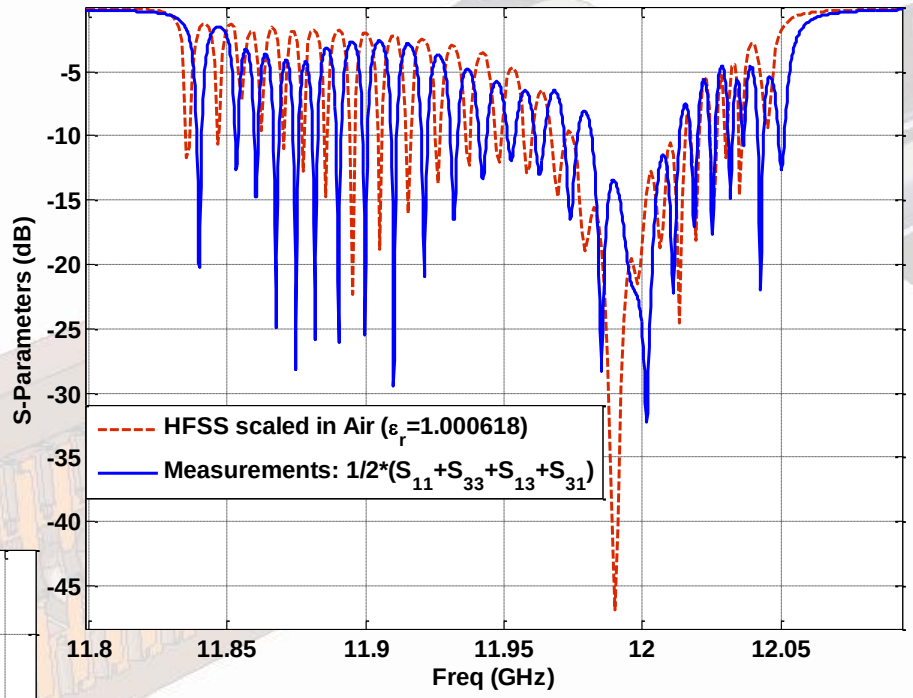


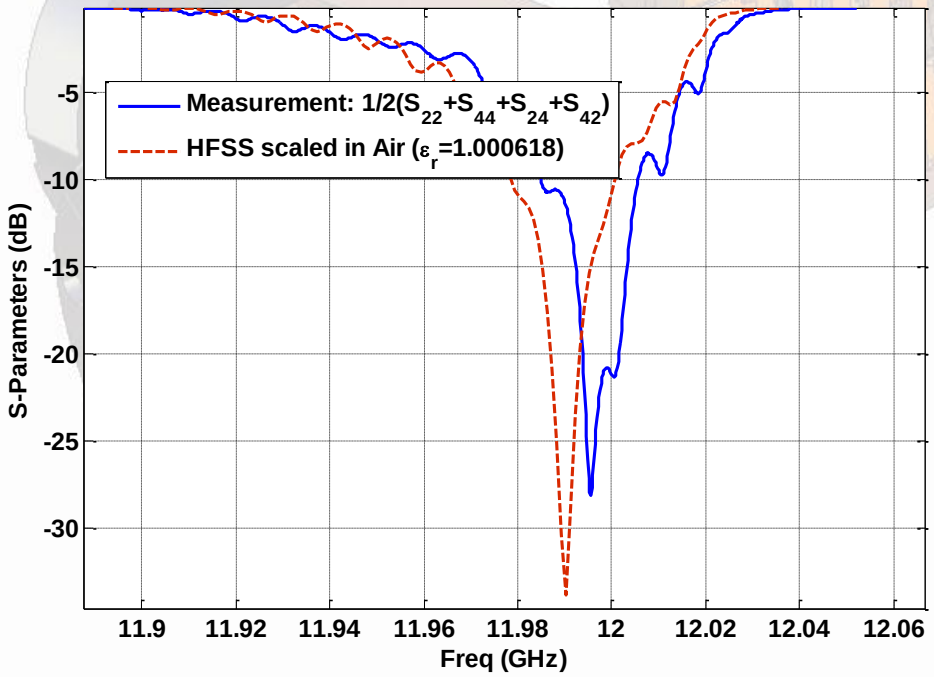


CLIC_DDS_A RF Check before bonding

https://edms.cern.ch/document/1243888/1



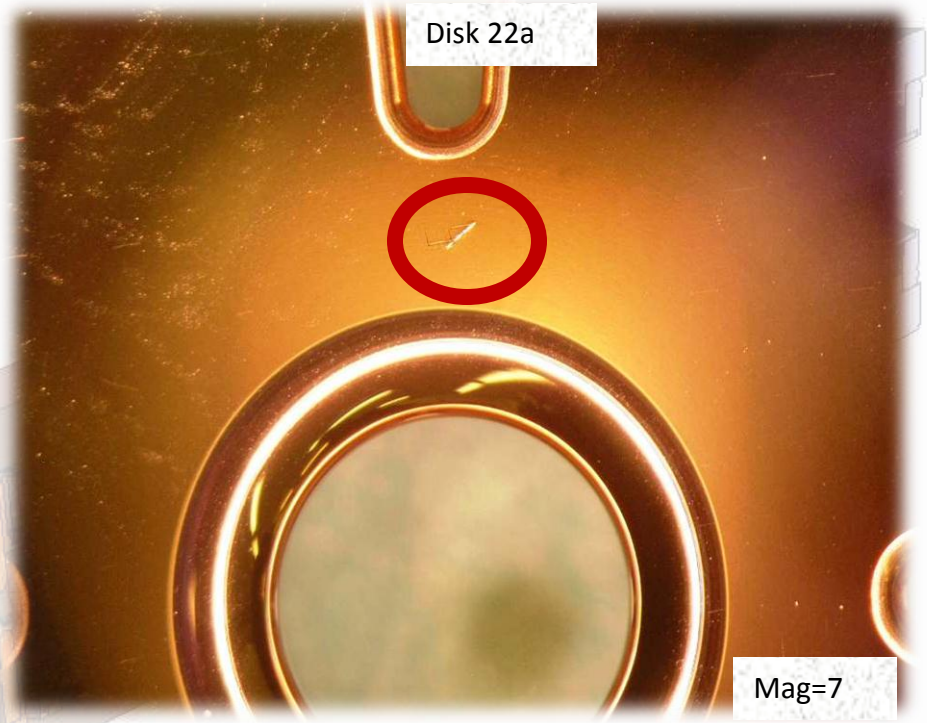




From these measurements it seems that we are ~ 10MHz off (higher). Not really consistent with the RF check of the single cells done last year. Anyway we are in the tuning range➔**OK** from the RF point of view

October 2012

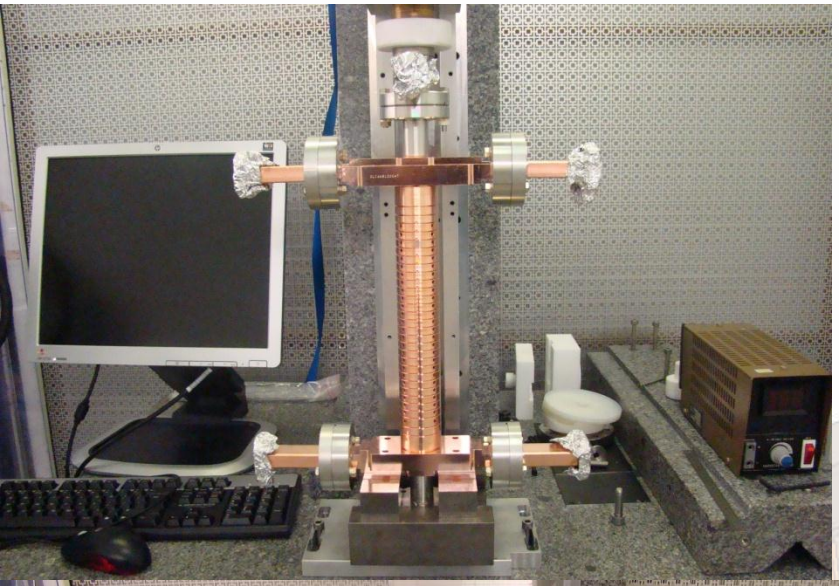
CLIC_DDS_A Inlet inspection

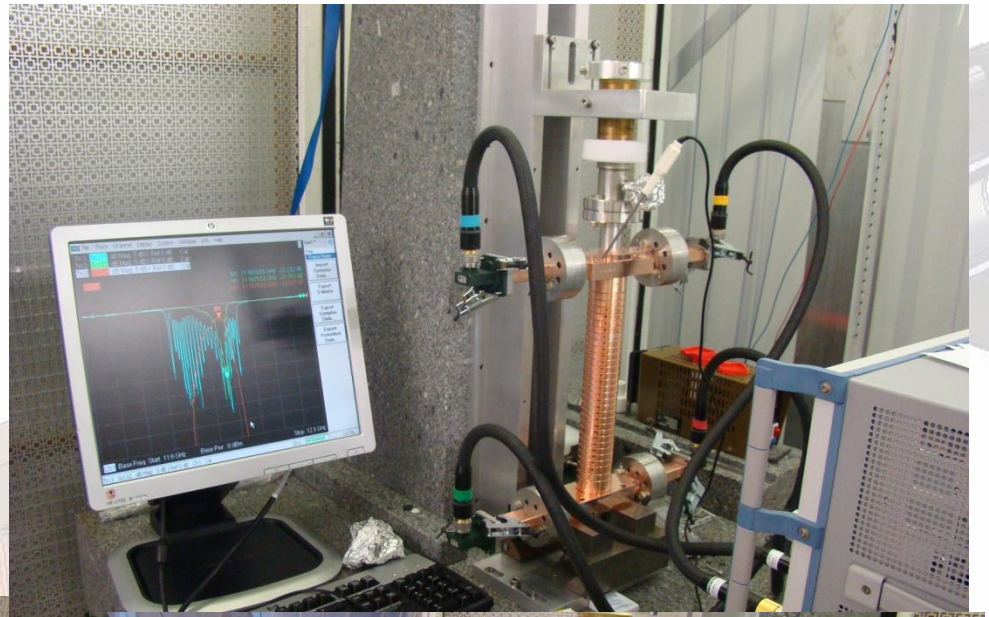


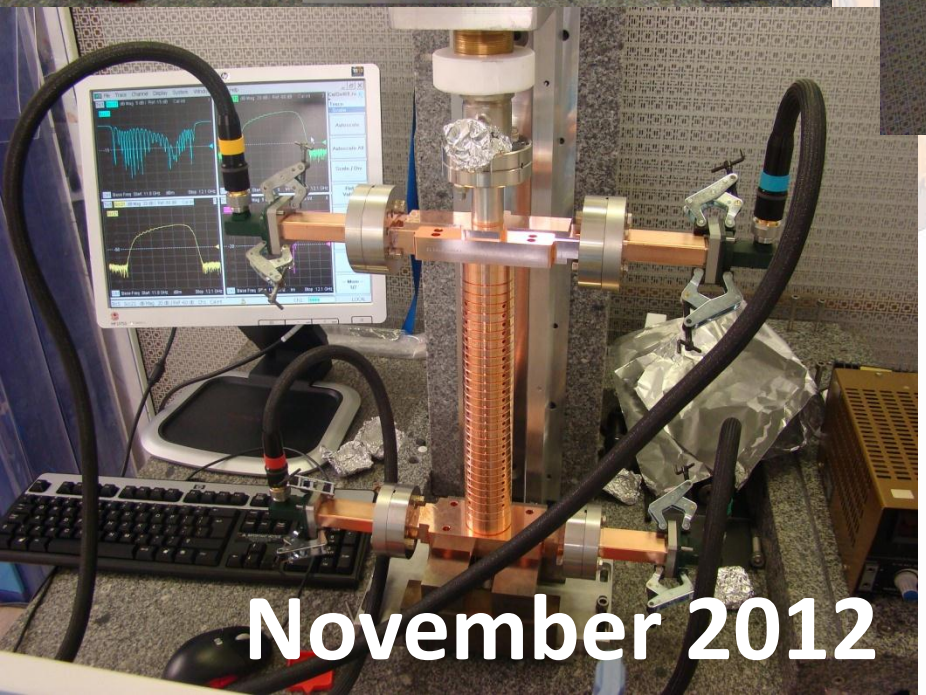
Disk inspection showed some marks/scratches on the disks. In particular, we decided, as suggested by Toshi, to re-machine disks N10, N22 and N24.

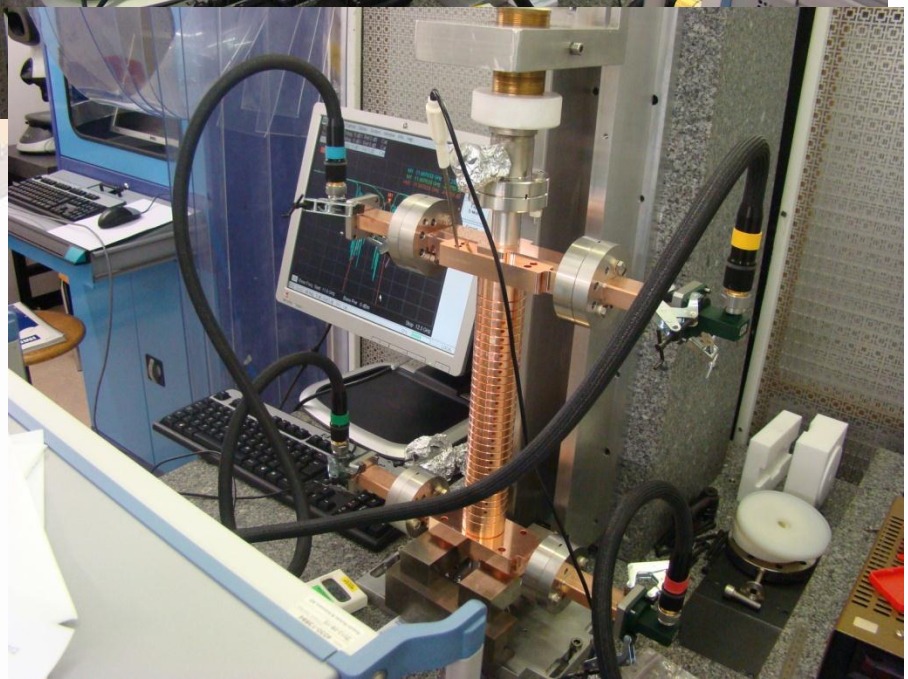
Courtesy of Andrey

New RF Check before bonding



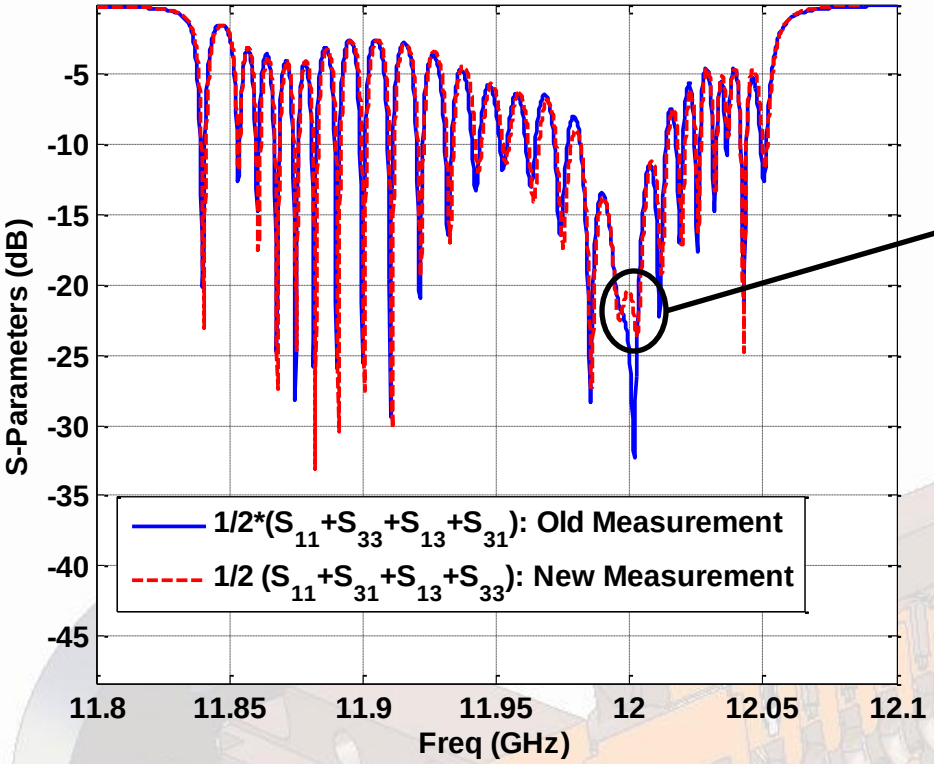


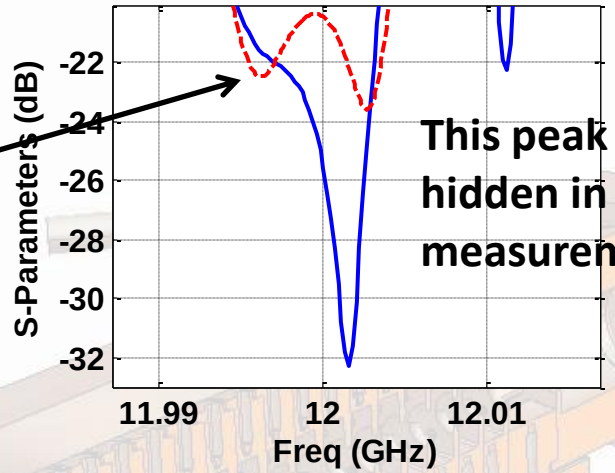




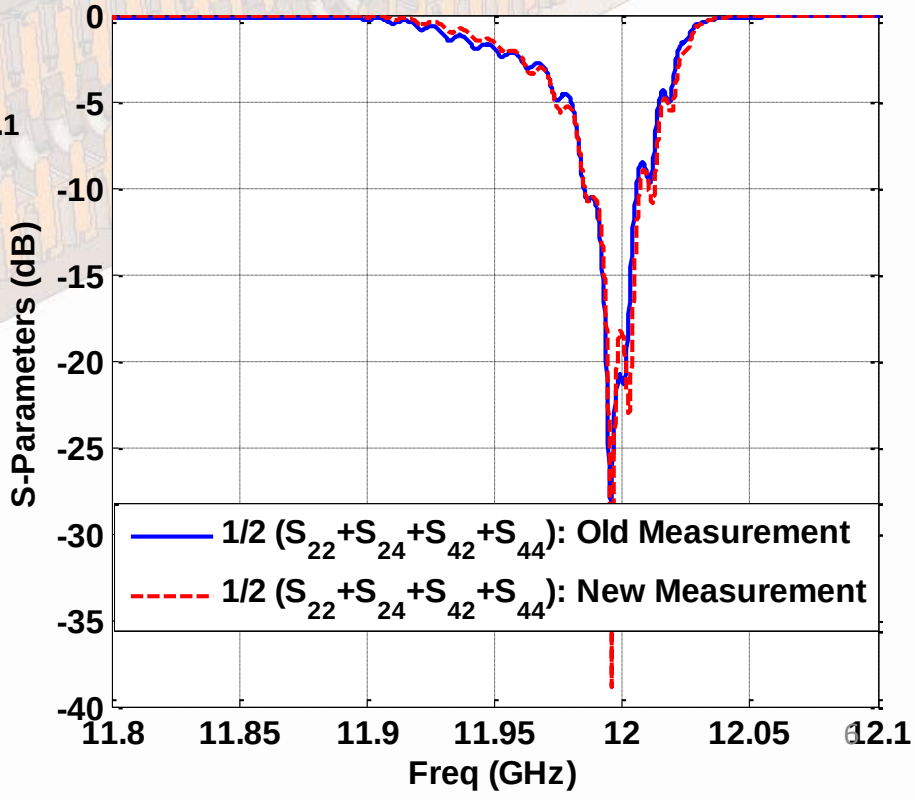
November 2012

https://edms.cern.ch/document/1252807/1



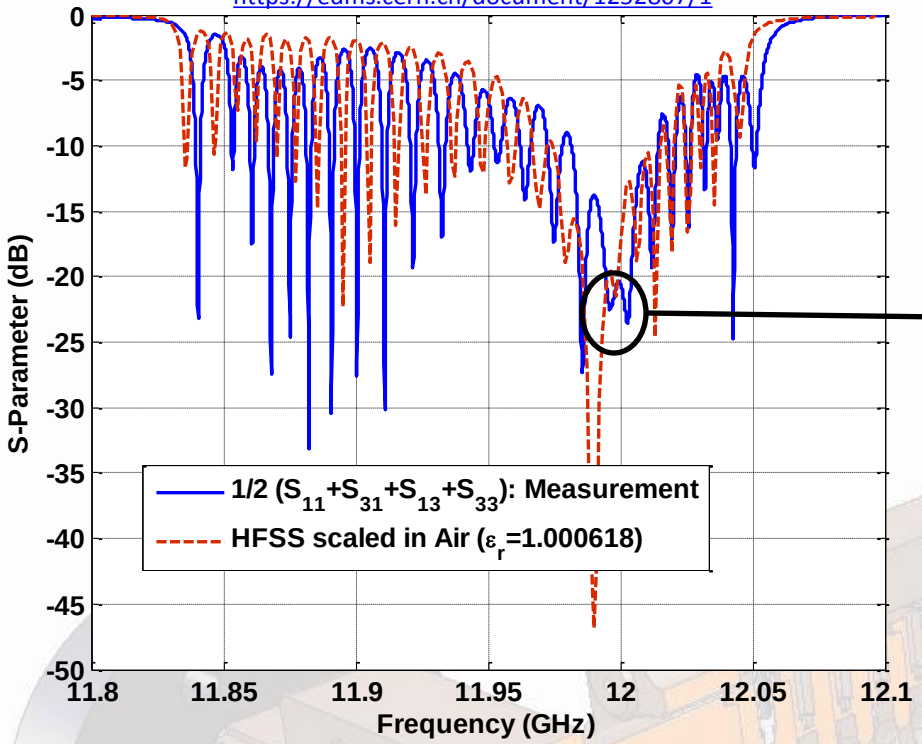


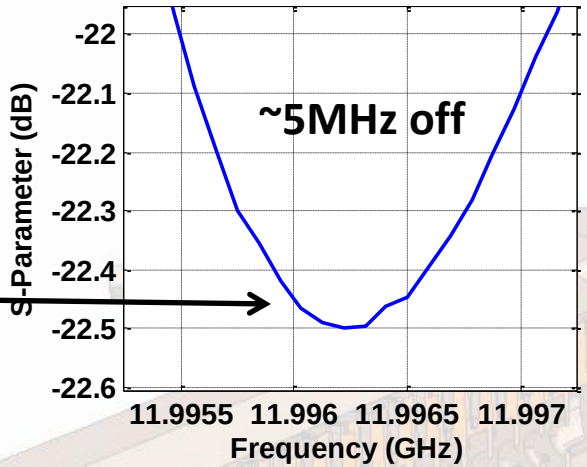
This peak was hidden in the old measurements

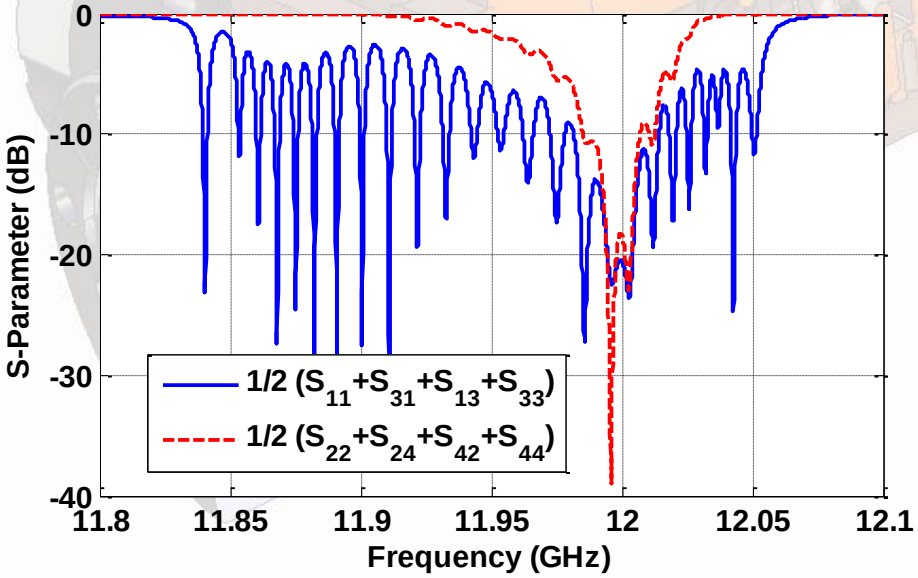


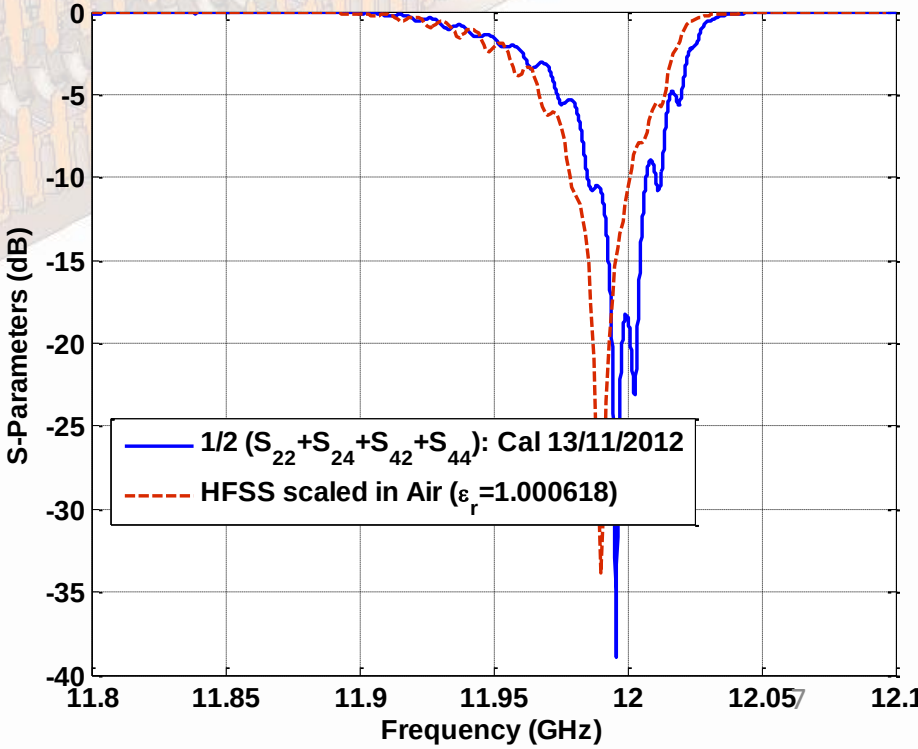
Comparison of old (2/10/2012) and new (13/11/2012) measurements

https://edms.cern.ch/document/1252807/1





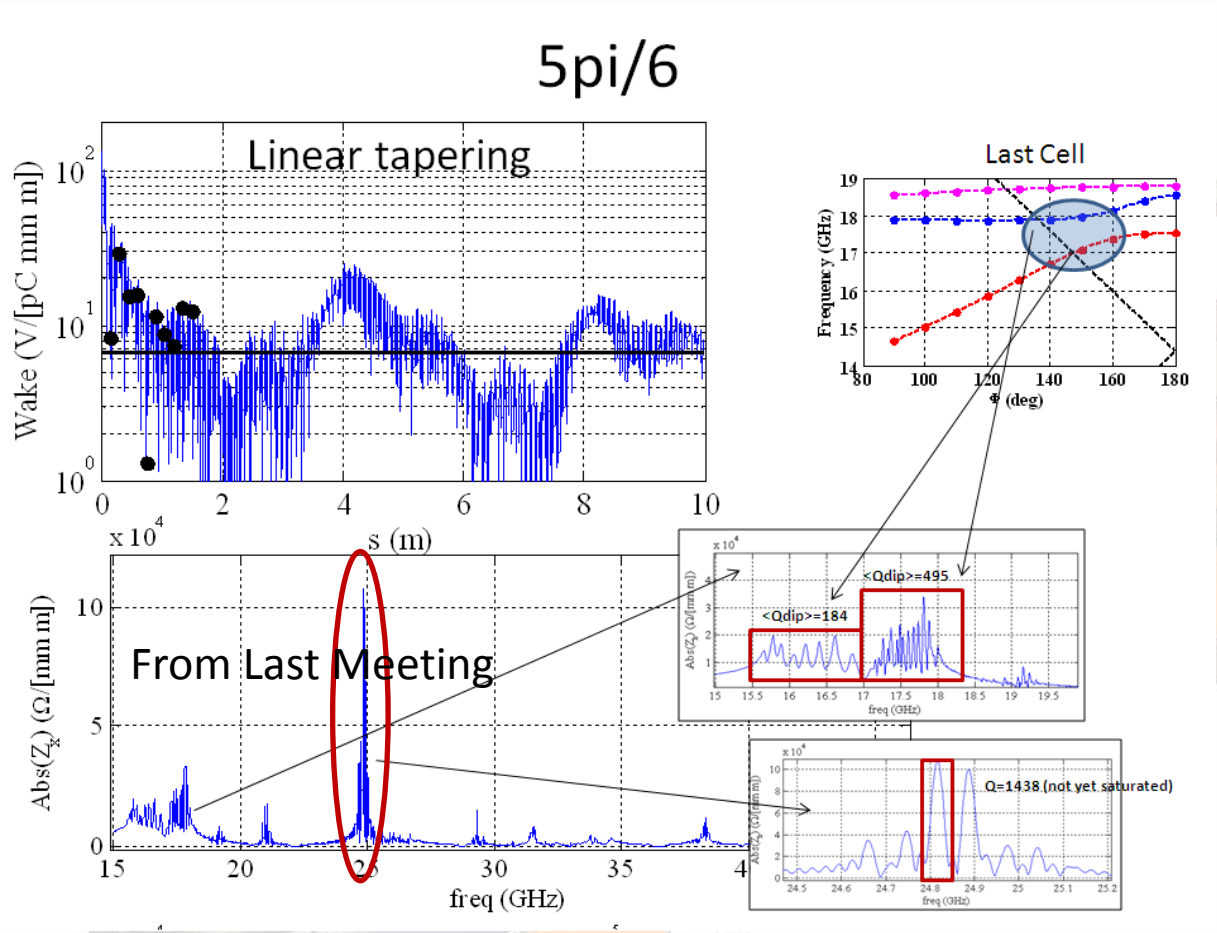




Comments and Status of CLIC_DDS_A

- The actual $2\pi/3$ peak was hidden in the previous measurement
- The actual peak is only ~5MHz off from the target frequency (11.9918GHz in Air, 22.9°C, humidity 50%)
- The actual frequency is now pretty consistent with single cell measurements done last year (<2MHz off with respect to HFSS simulations)
- We are fully within the tuning range of 20MHz
- Disks will be cleaned (etching) until 14/12/2012
- CW2 2013 – the bonding of the disk stack

Other studies



We explored structures with phase advance different than 120°. In particular higher phases should result in a reduction of the kicks because of the larger iris apertures. What we have learnt is that for first dipole band this is surely valid but for higher bands (in particular band from 5th to 7th) we experience an enhancement of the kicks.

Who told you that phase advance must be a constant in a TW?

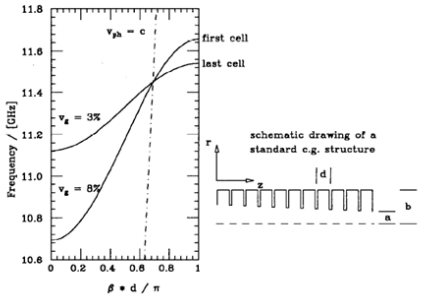
SLAC/AP-86
July 1991
(AP)

Investigation of a Constant Gradient * Structure with Constant Iris Size

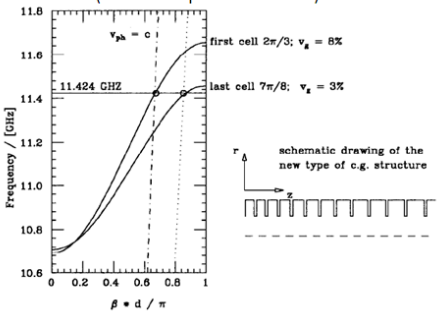
Norbert Holtkamp[1]
Stanford Linear Accelerator Center
Stanford University, Stanford, California 94309

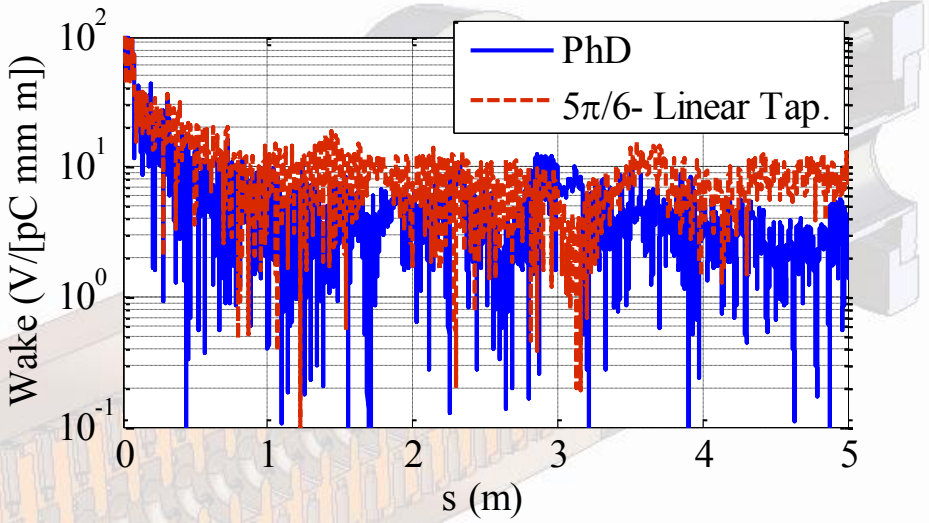
Thanks to Alexej who had memory of this paper (the only one I found on this subject!!!)

Standard way
(const phase advance)



A different way
(non const phase advance)

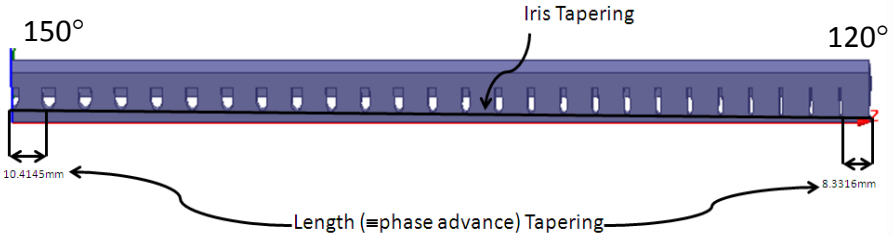


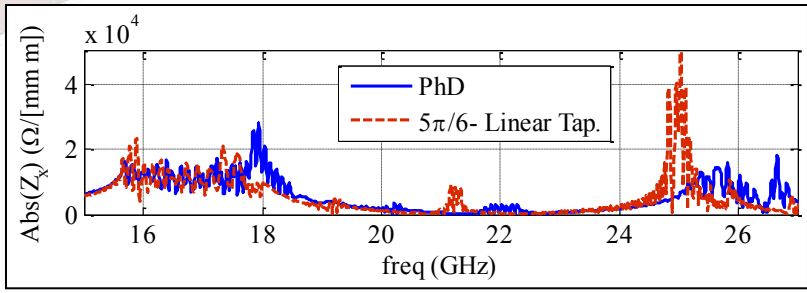


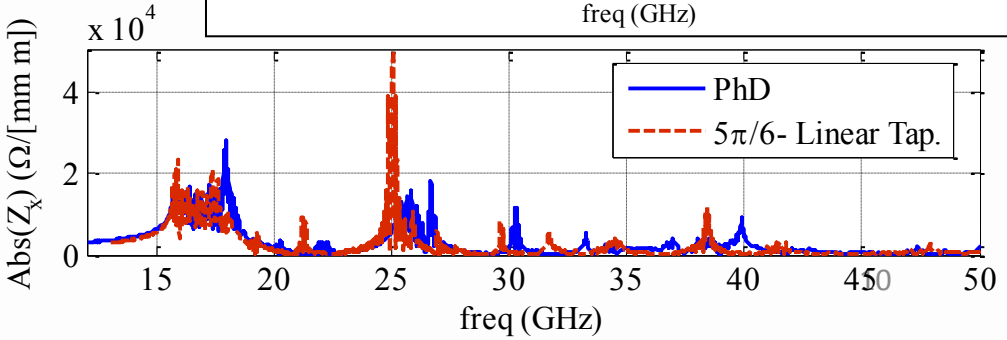
Full Structure

- L has been linearly tapered
- Iris have been linearly tapered

Thanks to Igor for the idea







Conclusions

- CLIC_DDS_A first prototype is almost ready to be tuned (bonding is foreseen for the 2nd week of January) and then RF tested in power
- The results of these tests will lead the further steps on DDS activity for CLIC
- Nevertheless studies on an improved DDS design are still continuing