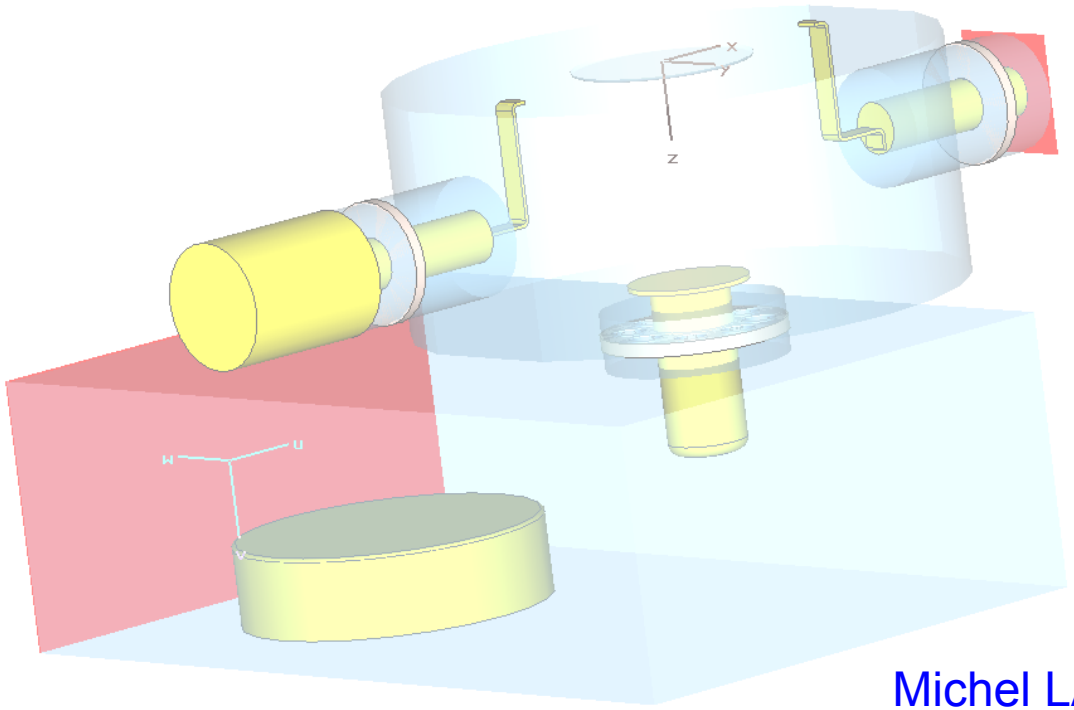
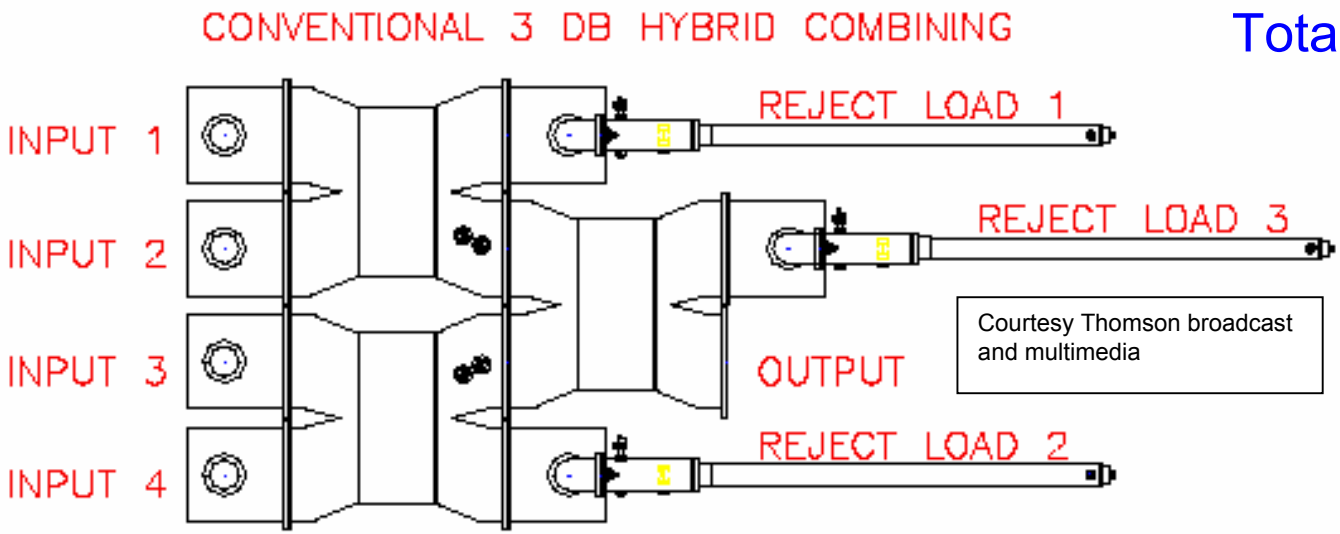
# Cavity power combiner (CaCo)




Michel LANGLOIS

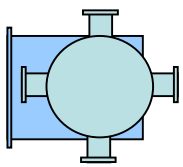
# Cavity vs. hybrid combiners

- Size at 500 MHz (WR1800 waveguide)




Total volume 1247 l

Cavity combiner yes, the scale is identical



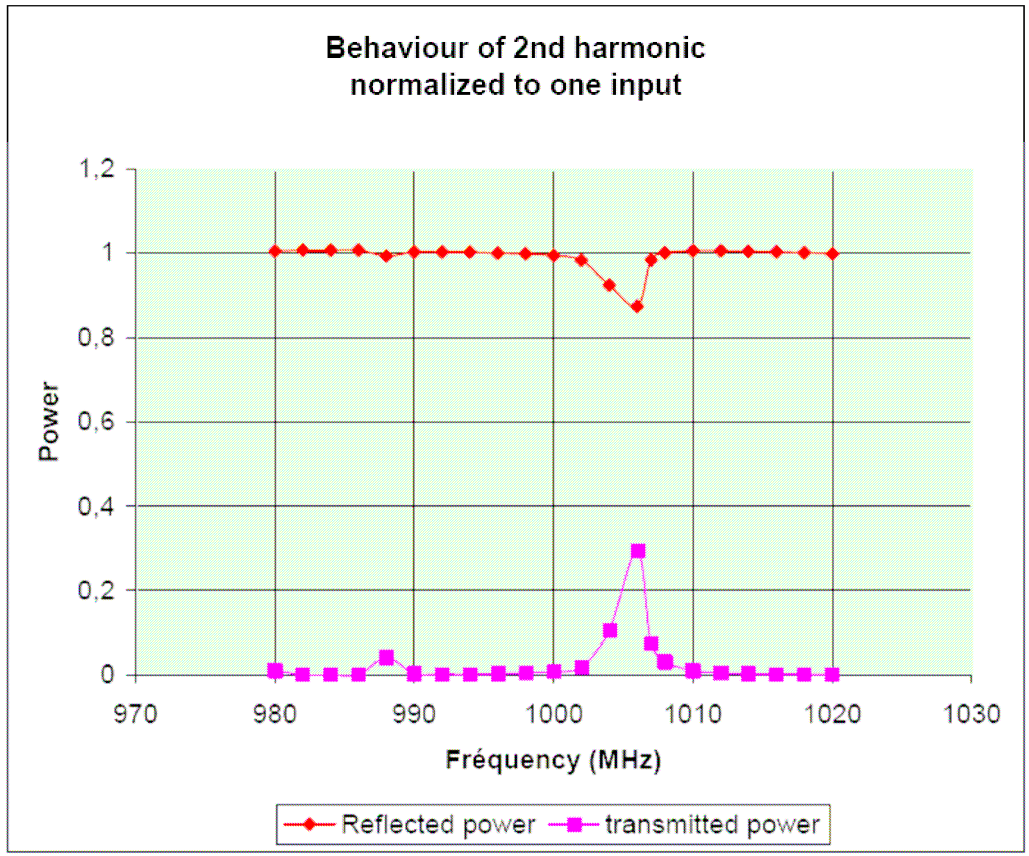
Total volume 103 l

# Cavity vs. hybrid combiners

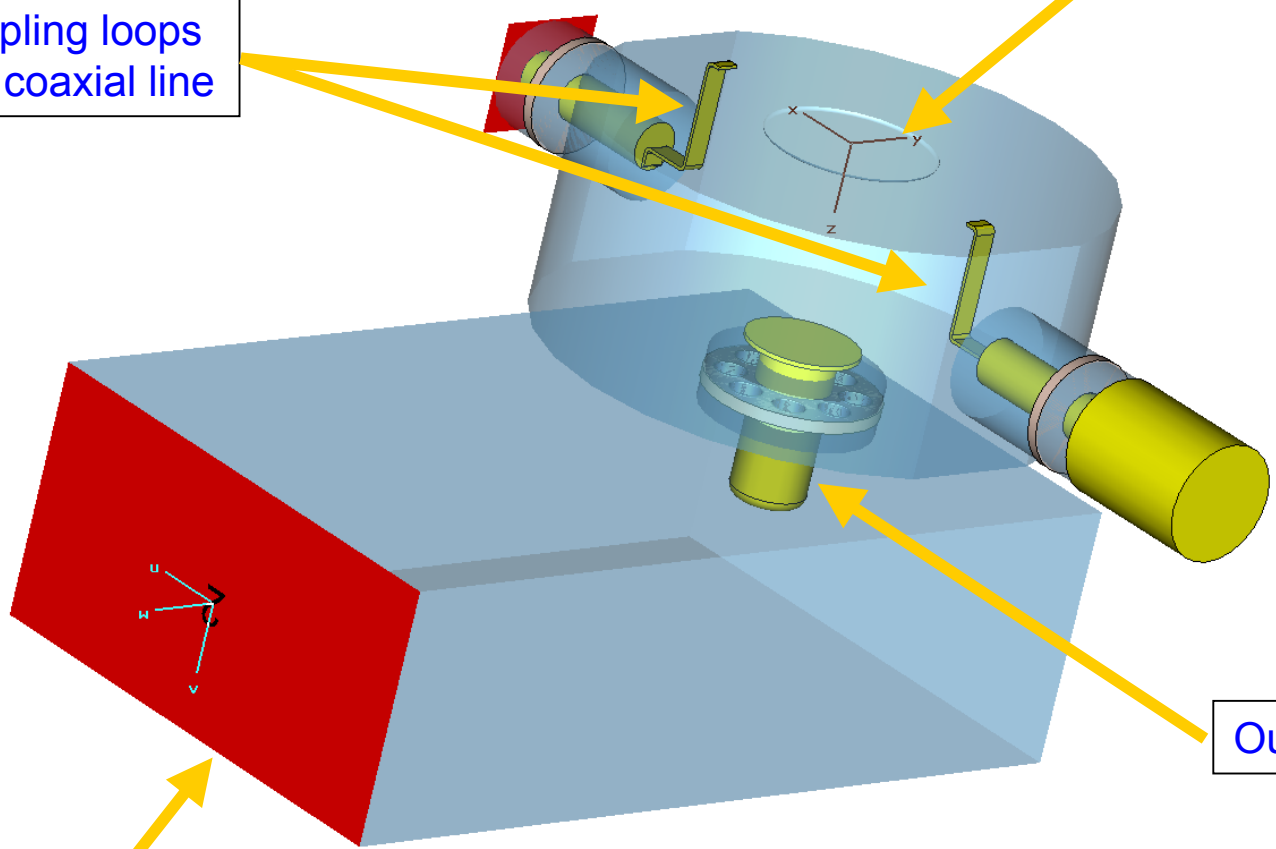
- Harmonic filter

•Narrow band

•Poor insulation between channels

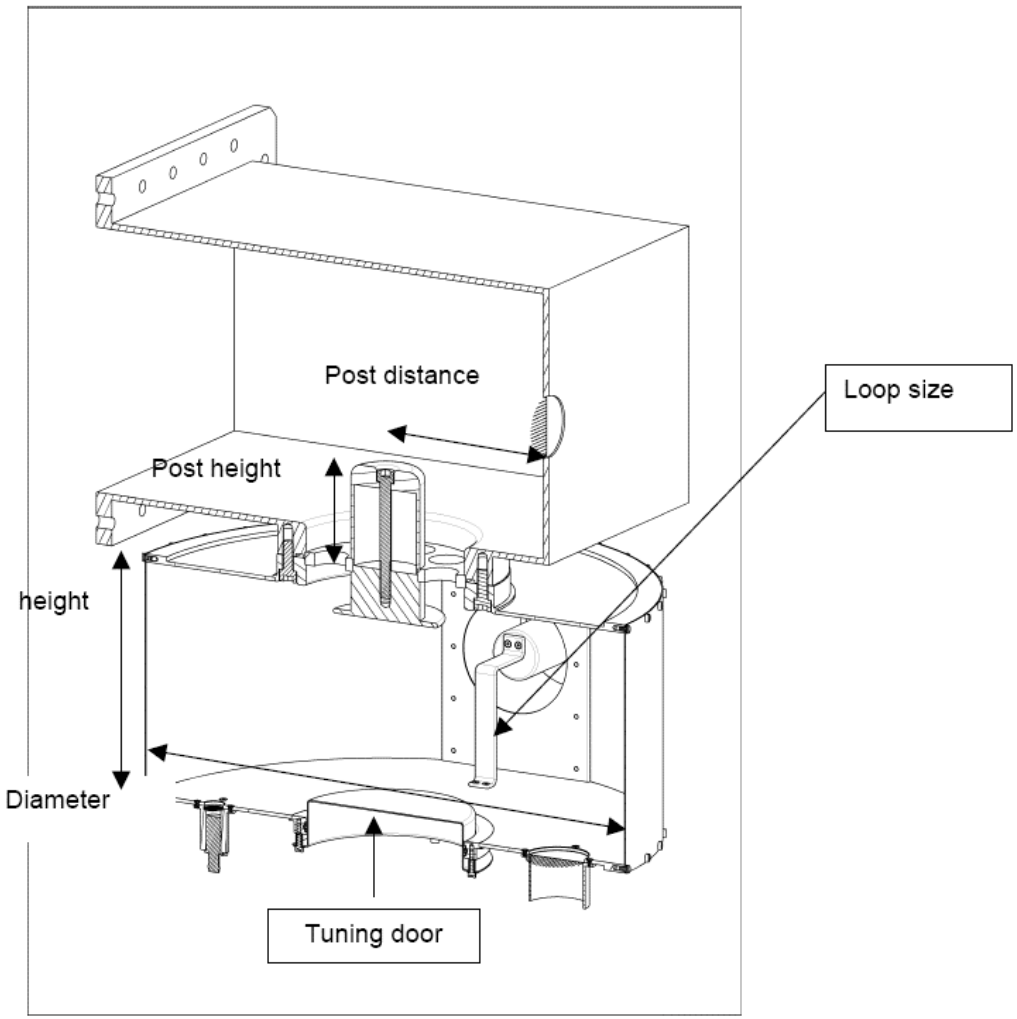


# Implementation for ALBA: CaCo

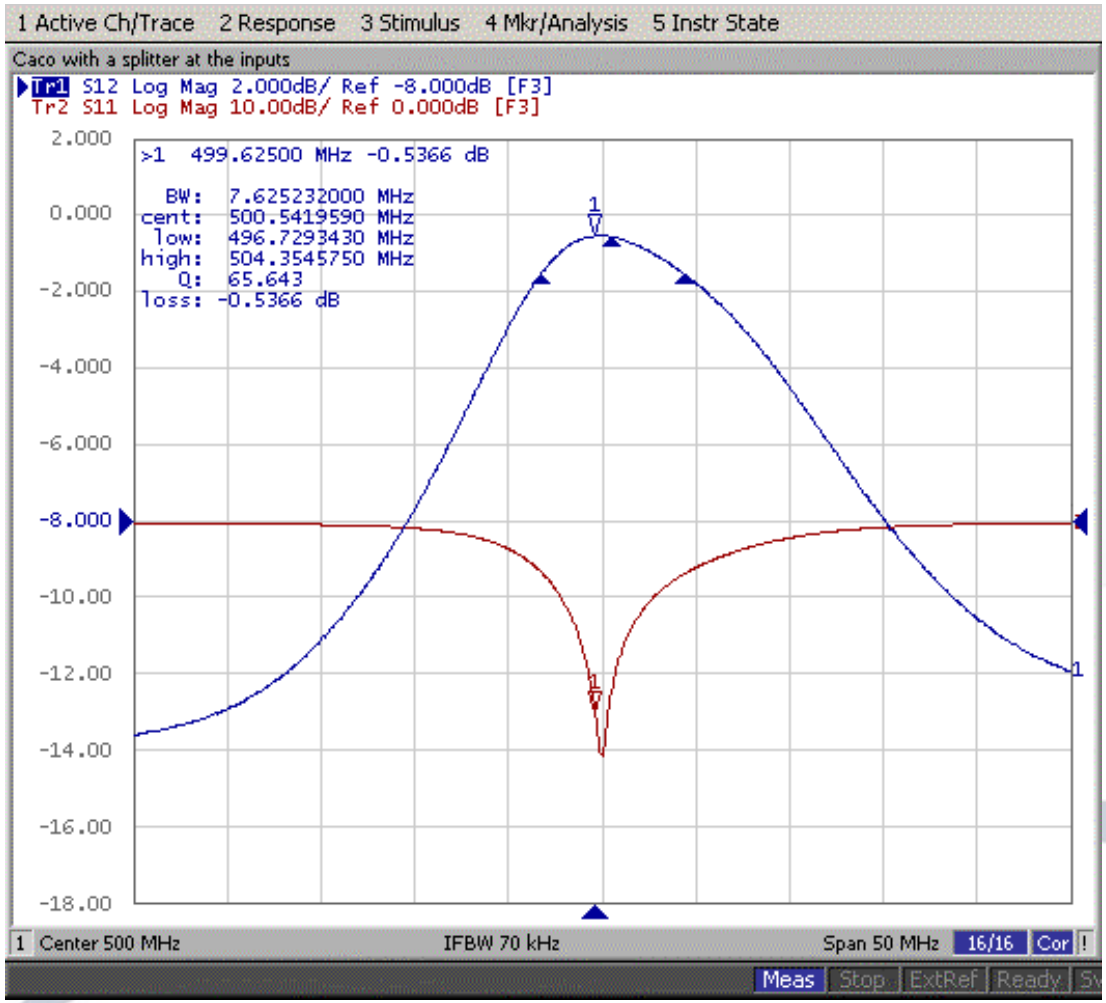


# Main design parameters

- Diameter
- Height
- Loop size
- Post dimension
- Post position
- Tuning door

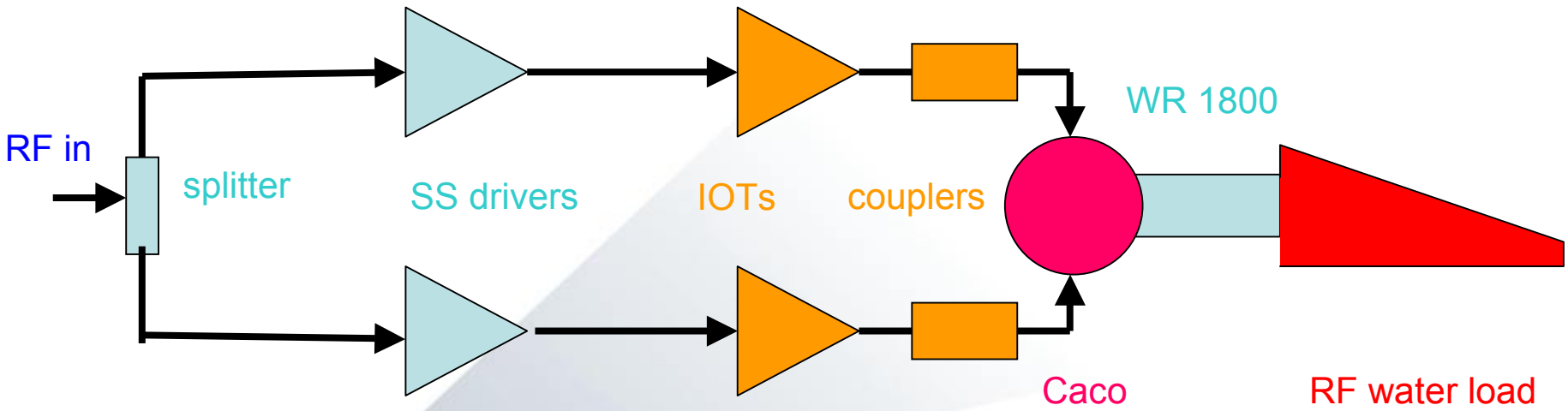


# Low level measurements




- Bandwidth :7.6 MHz
- Transmitted power relative to 1 input : 2.93 dB
- Reflected power relative to input 1 : -26.6 dB
- Reflected power relative to input 2 : -28 dB

# High power measurement set-up



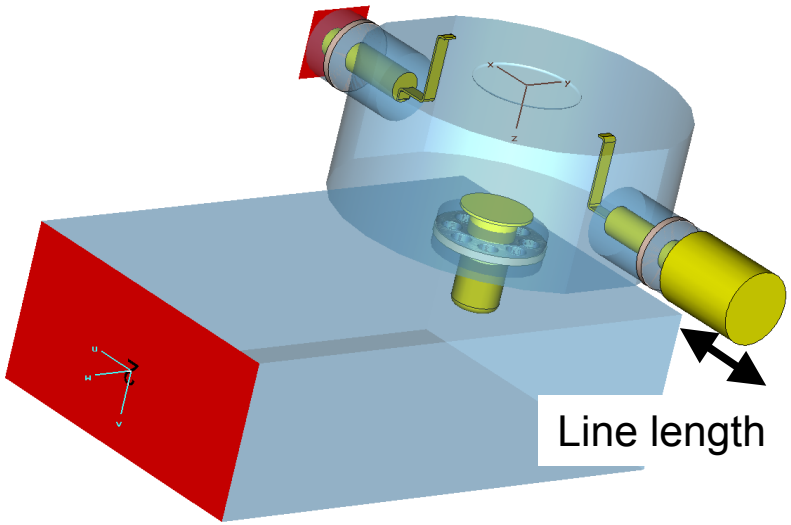

- The output power of each IOT was assessed as $V_{beam}$*$I_{beam}$-(boiler power)

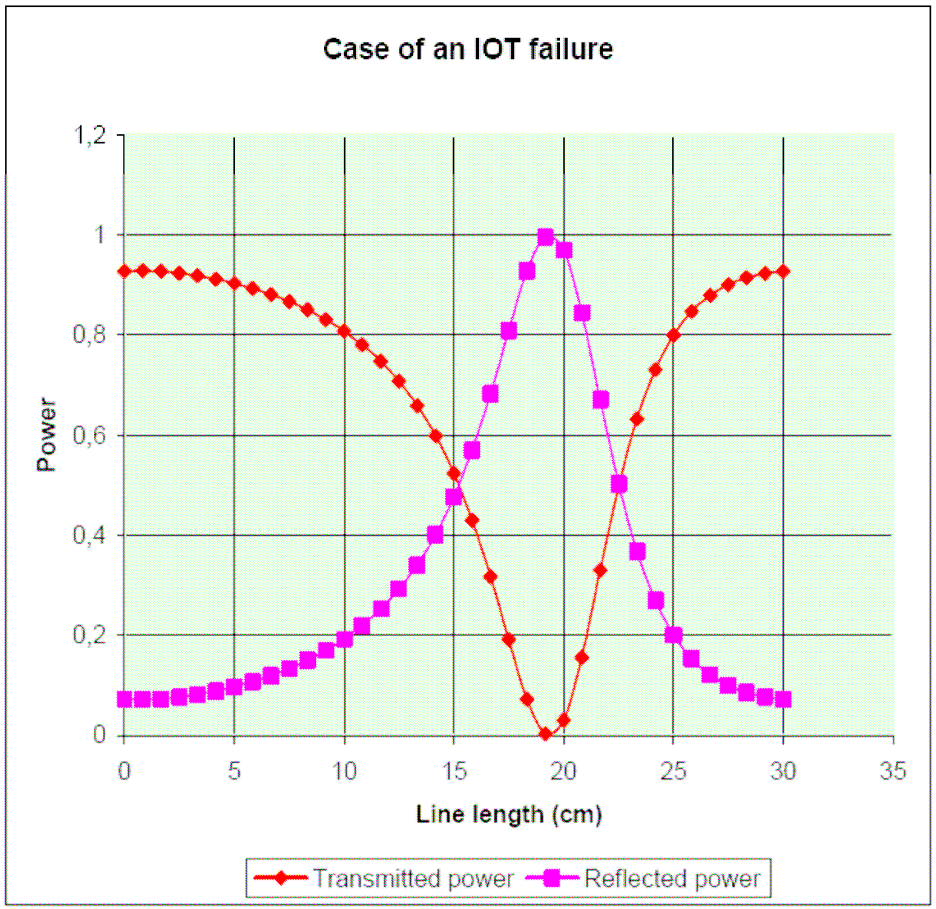
# CaCo : successful factory power test

| | IOT1 | | | OUTPUT | IOT2 | | |
|---|---|---|---|---|---|---|---|
| | efficiency % | reflected kW | calorimetric kW | POWER kW | calorimetric kW | reflected kW | efficiency % |
| both IOTs on | 72,0 | 3,5 | 82,8 | 154,2 | 71,4 | 3,1 | 67,0 |

At 150 kW, the highest wall temperature was 46ºC

# What if one amplifier trips?




Transmission depends on the electrical distance between the CaCo and the IOT cavity

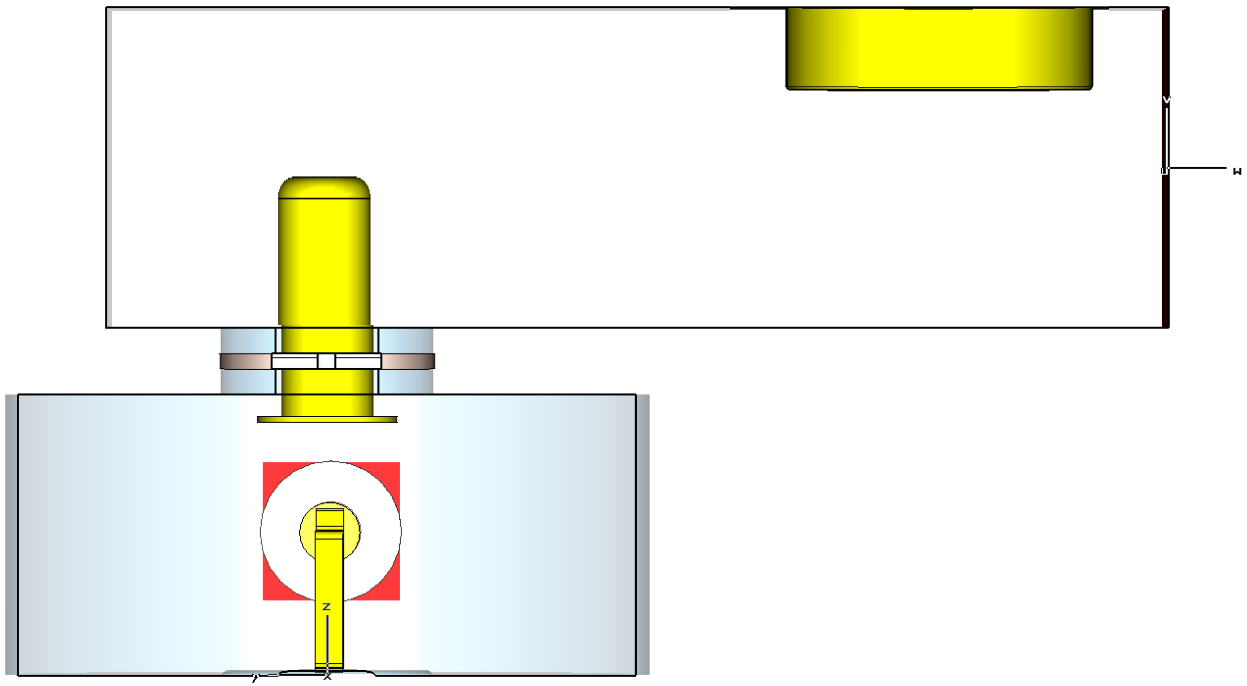
# What if one amplifier trips? (cont)

| | IOT1 efficiency % | IOT1 reflected kW | IOT1 calorimetric kW | OUTPUT POWER kW | IOT2 calorimetric kW | IOT2 reflected kW | IOT2 efficiency % |
|---|---|---|---|---|---|---|---|
| both IOTs on | 72,0 | 3,5 | 82,8 | 154,2 | 71,4 | 3,1 | 67,0 |
| IOT 2 off | 48,8 | 5,6 | 54,2 | 52,2 | -2 | 10 | 0 |
| IOT 1 off | 0 | 6 | -0,1 | 31,0 | 31,1 | 3,9 | 33,7 |

The values of reflected power are dubious, especially when one IOT is off.

# Possible improvements

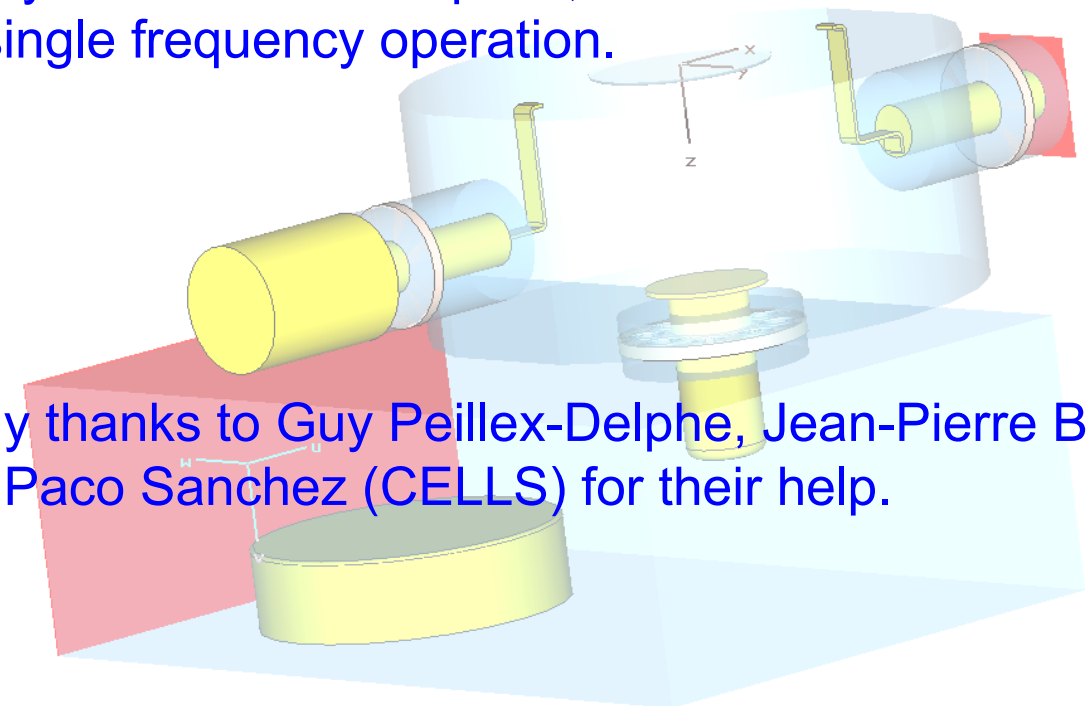
- Plunger in the waveguide



- Modification of the post height

# Conclusion

- Cavity combiner save space, filter harmonics and look promising for single frequency operation.




- Many thanks to Guy Peillex-Delphe, Jean-Pierre Buge (TED) and Paco Sanchez (CELLS) for their help.