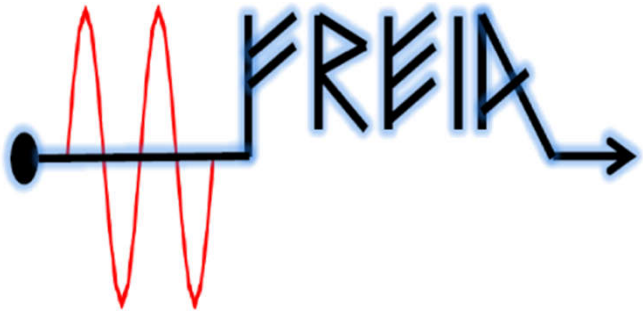




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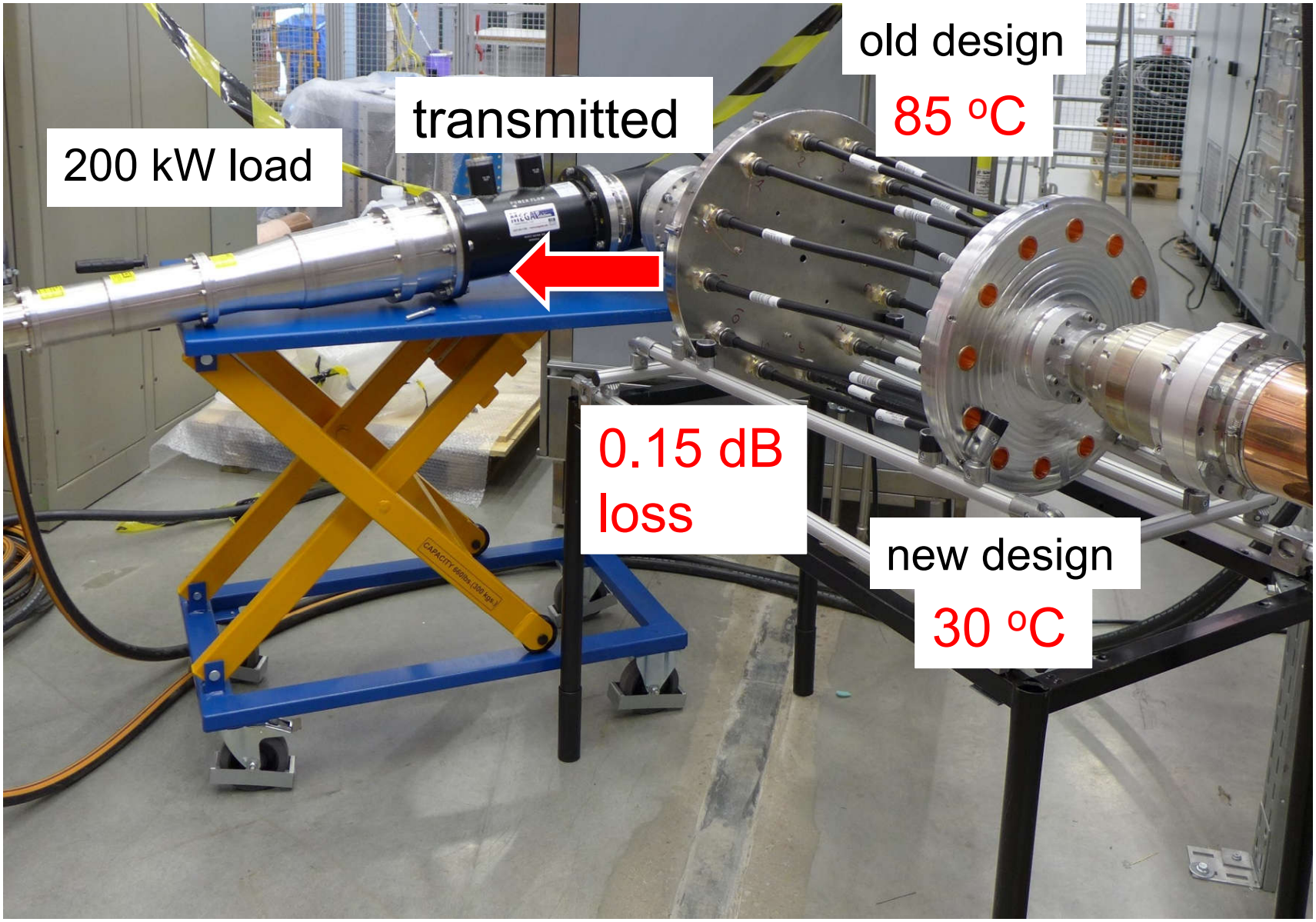
High-Power Tests of the Circular Combiner

Vitaliy, Magnus

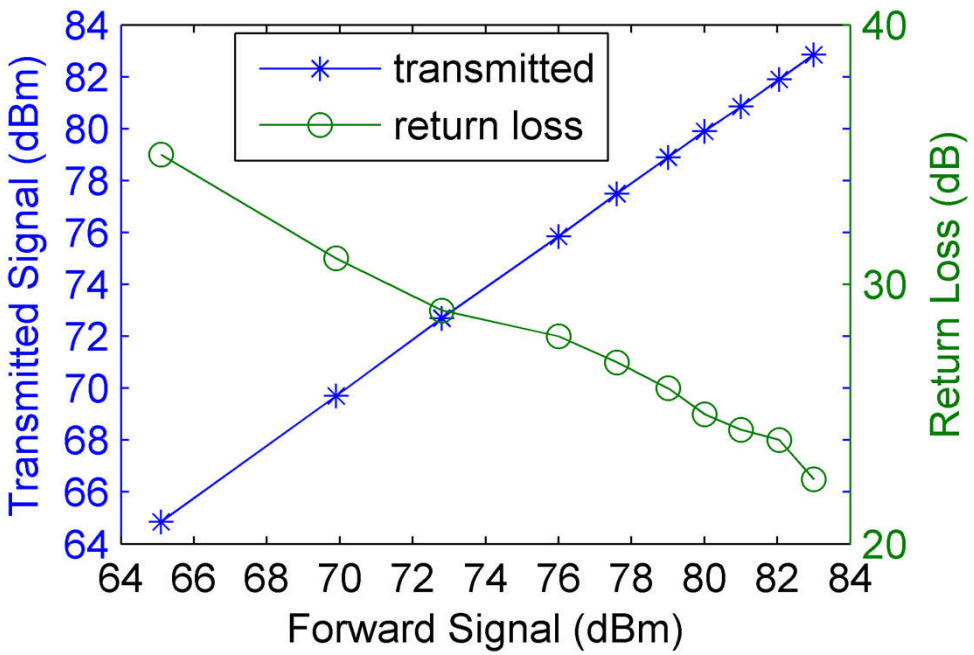
thanks to Johan and Anders

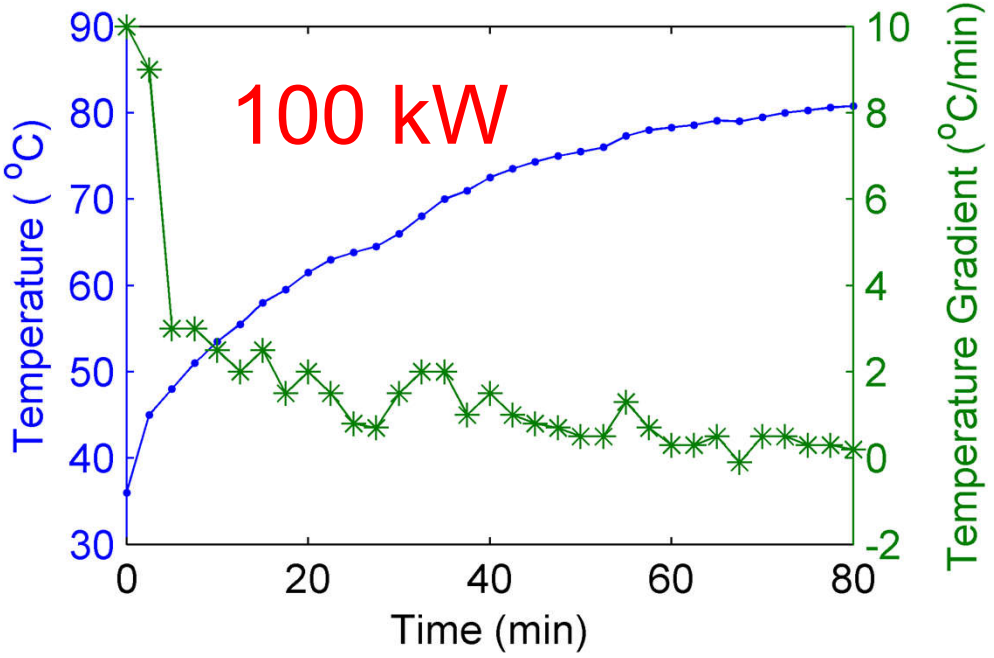
2016

Test Bench


200 kW load
transmitted
old design
85 °C
0.15 dB
loss
new design
30 °C
forward
reflected

RF and thermal characterization

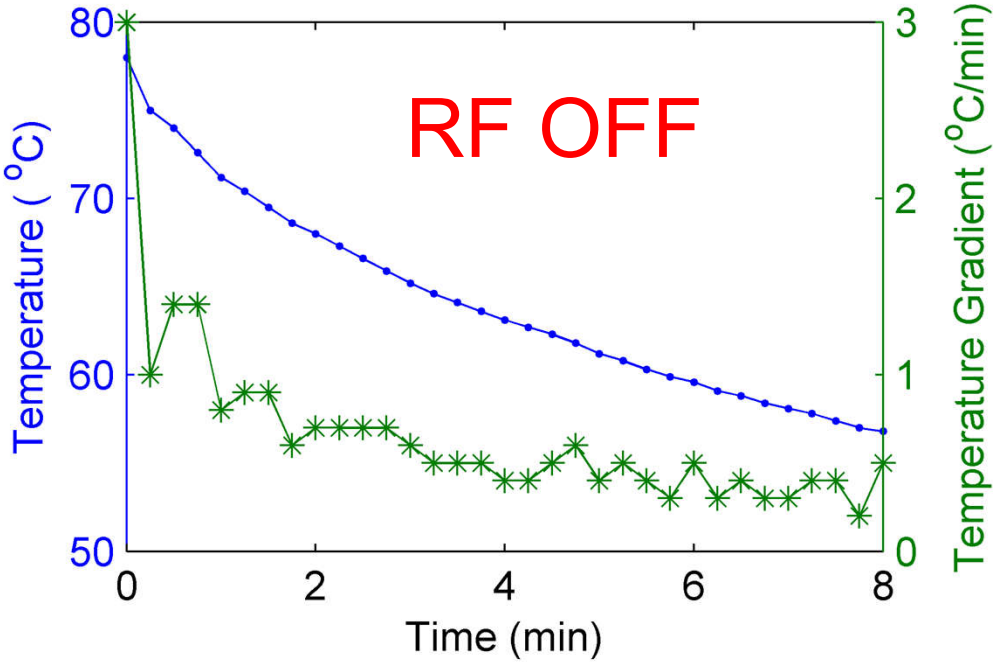




Mean RF power loss in the two combiners is 0.15 ± 0.01 dB

Matching is better than 25 dB in the worst case

The steady-state temperature is estimated to be 85 °C at most.



Calorimetric estimate of RF losses

$$\frac{dT}{dt} = \alpha_{RF}(T) \quad \beta_{cool}(T)$$

$\beta_{cool} = 1.3\ ^{o}\text{C/min}$ at $T = 75\ ^{o}\text{C}$

$\alpha_{RF} \quad \beta_{cool} = 0.76\ ^{o}\text{C/min}$

$\alpha_{RF} = 2\ ^{o}\text{C/min}$ at $T = 75\ ^{o}\text{C}$

$$P_{RF} = mc \left.\frac{dT}{dt}\right|_{RF} = mc\ \alpha_{RF}(T)$$

$m = 10$ kg, $c = 500$ J/(kg K),

$P_{\text{RF, cal}} = 170$ W

$P_{\text{RF, RF}} = 172.5$ W

Almost all RF power is dissipated in the old combiner

