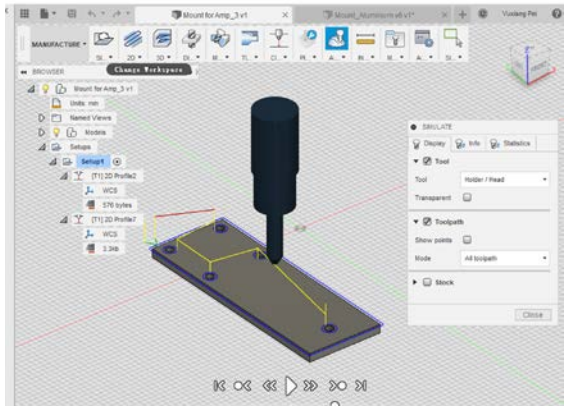
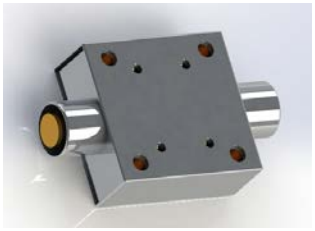
7.7 – 7.31

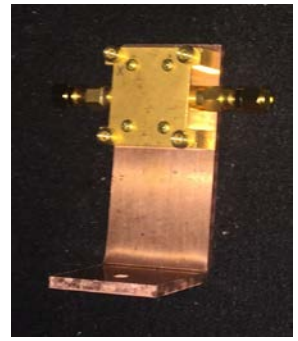
1 d



3 d



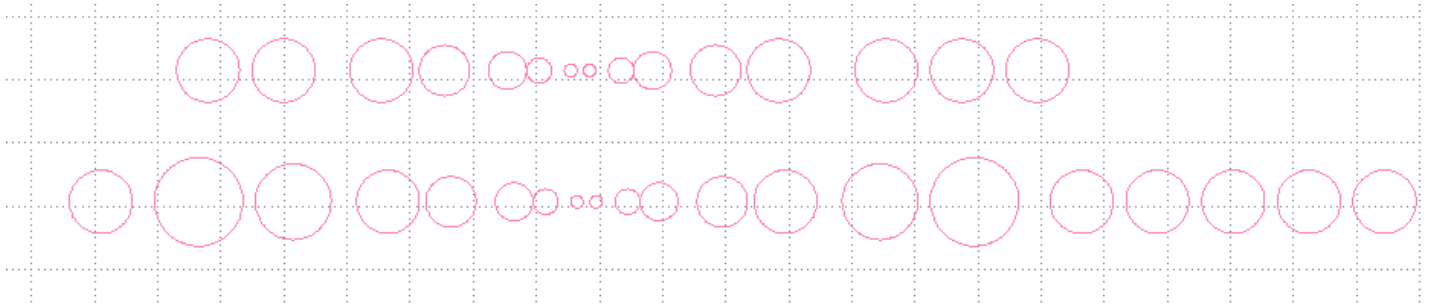
1 d

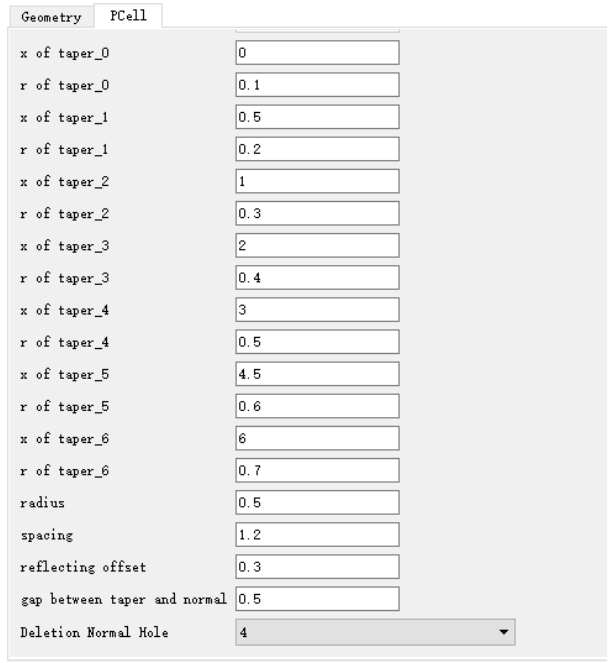


10 d • Programming (lantz & spyre) for SA, windfreak

1 d • AFM/SEM training

2 d • Klayout program for Bragg mirror





8.5 – 8.6 Installation, transmission test, cool down

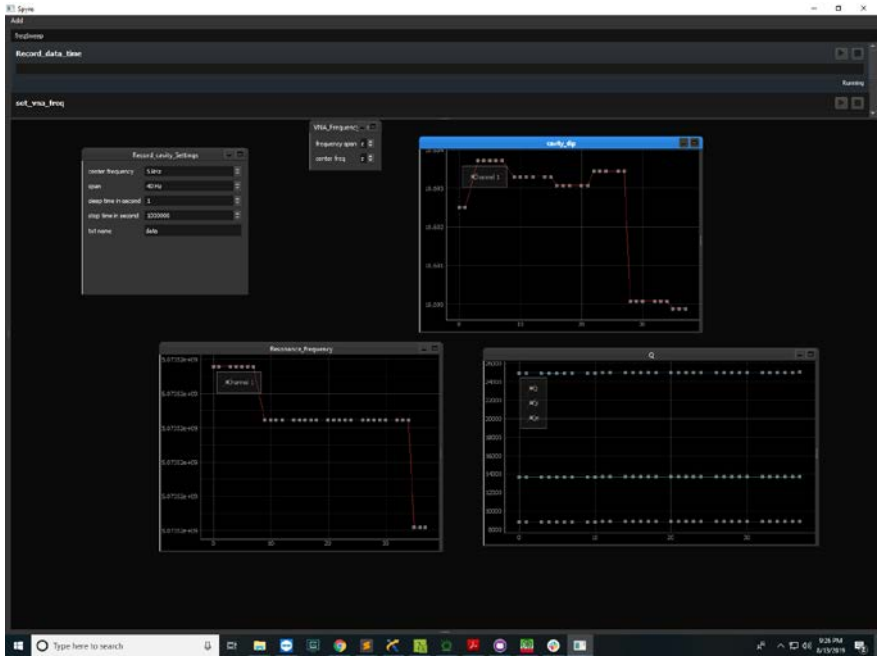
8.7 – 8.10 VNA arrives. Quick setup and programming

8.11 – 8.13 Measure 3D cavity

8.14 – 8.16 Trouble shooting and JTWPA first test

8.17 – 8.21 Fly away on a trip

8.22 – 8.24 DSB lock-in test



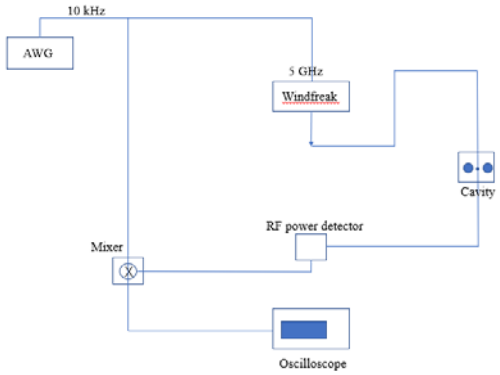
Before next cool down (around 9.5)

- Mount and boards and connection

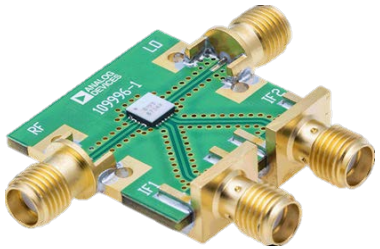
  for the HEMT.

- Test and programming for the digital delay generator

- Room temperature lock in test

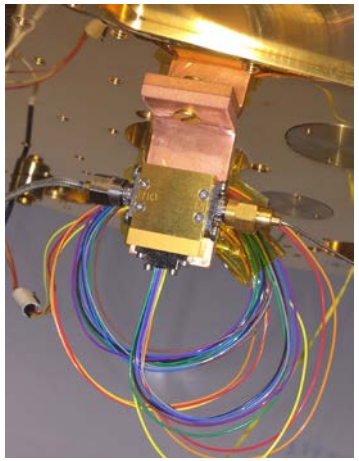


- Design and setup IQ demodulator

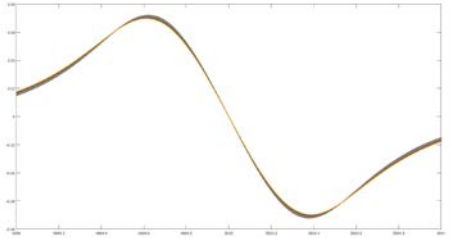


9.3 – 9.11 Worked out and optimized lockin setup

9.12 – 9.18 Machine mount and solder wires for the HEMT



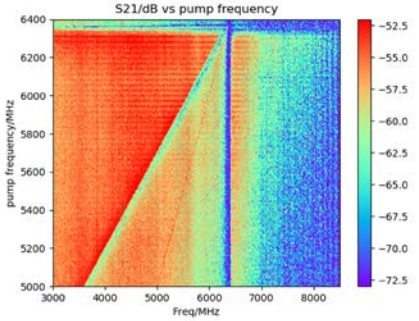
9.19 – 9.20 Simulation of distorted sinewave on cavity noise

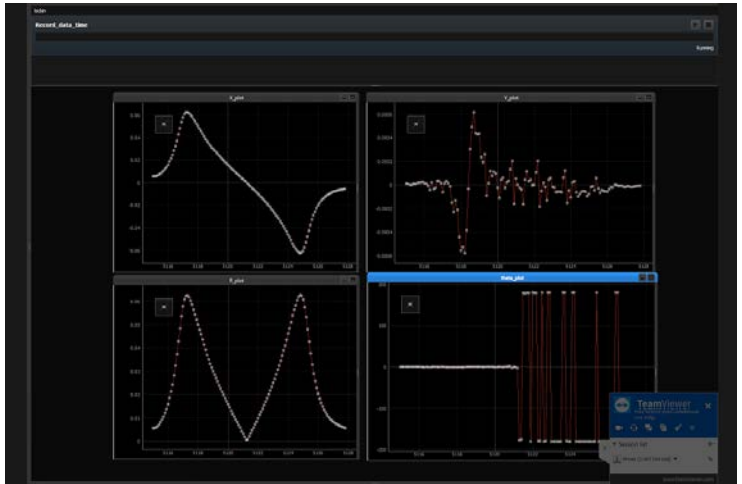


9.21 – 9.22 Cryogenic EPR test with Shobhit

9.23 – 9.24 Connection and programming for new VNA

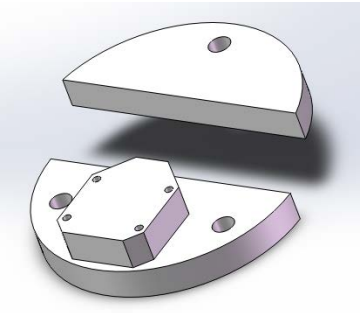
9.24 – 9.25 TWPA test



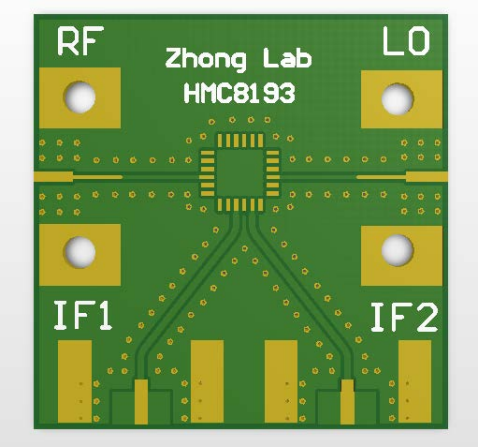


9.26 – 10.2 Travelled to Michigan

Next two weeks

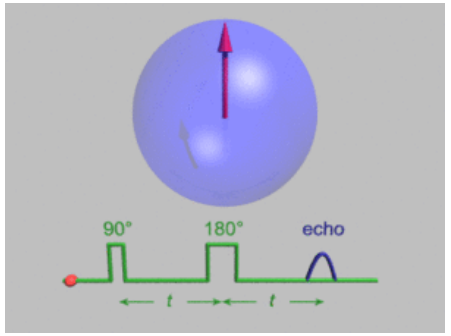


- Some unfinished things



(new mount and plate for attocube, IQ demodulator, TWPA test)

- Plan for next pulsed EPR test (finger crossed)



- Learn the simulation part !

Self-assessment

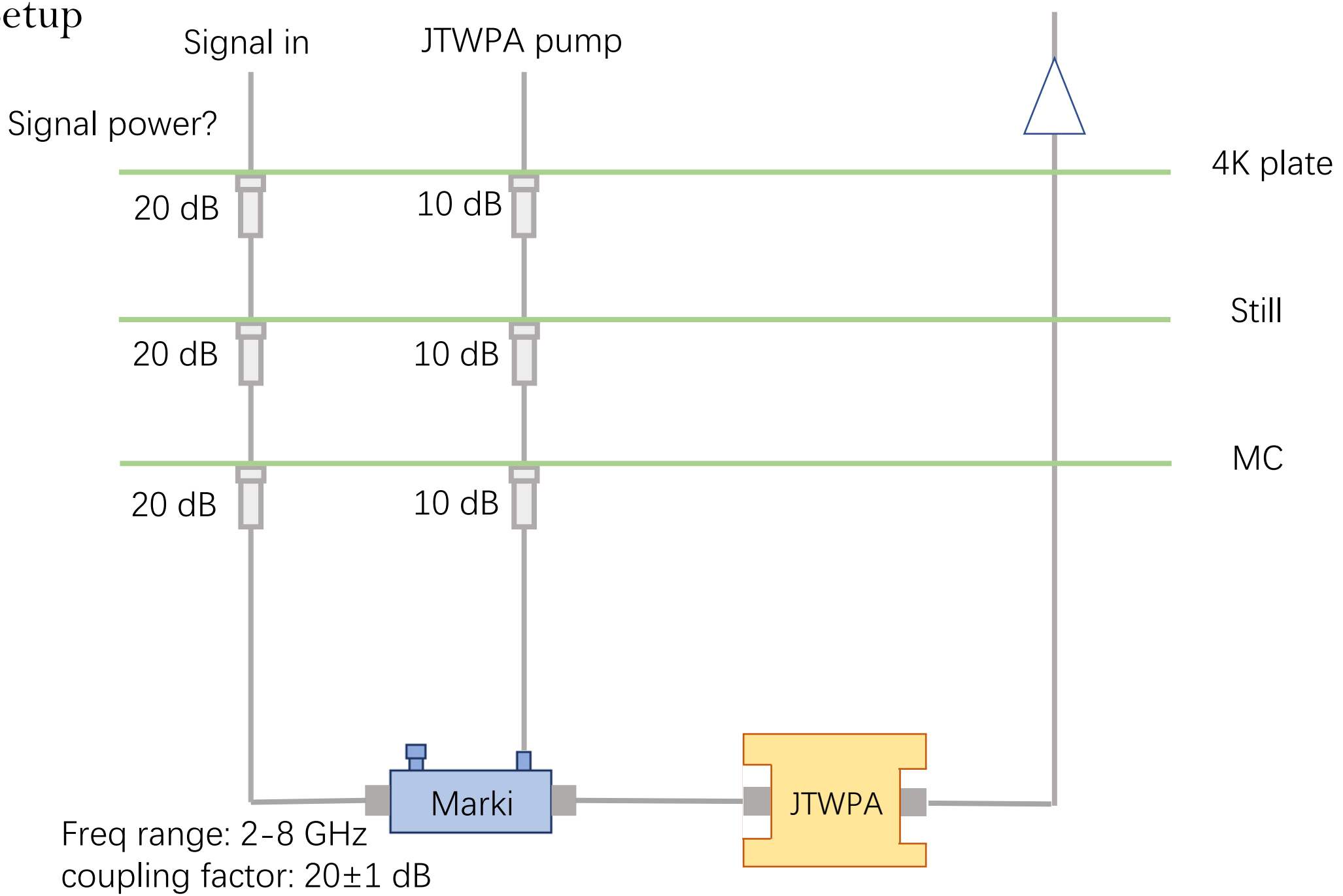
Advantages

- Always happy in doing experiments
- Feeling capable of getting things done
- Never tell lies

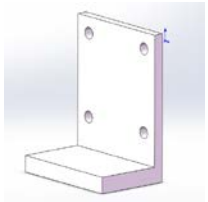
Disadvantages:

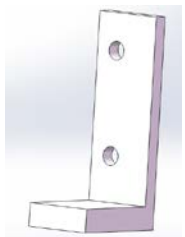
- Paid too much attention to the experimental part
- Like writing notes but not discussing
- Be more mature

Current Setup



Freq range: 2-8 GHz
coupling factor: 20±1 dB





Mount for Amp_3 v1 | Mount_Aluminum v6 v1* | Yuxiang Pei

MANUFACTURE | Sl... | 2D | 3D | Dl... | M... | Tl... | Cl... | Pf... | A... | IN... | M... | A... | Sl...

BROWSER | Change Workspace

- Mount for Amp_3 v1
  - Units: mm
  - Named Views
  - Models
  - Setups
    - Setup1
      - [T1] 2D Profile2
        - WCS
        - 576 bytes
      - [T1] 2D Profile7
        - WCS
        - 3.3kb

SIMULATE

Display | Info | Statistics

Tool
- Tool: Holder / Head
- Transparent

Toolpath
- Show points
- Mode: All toolpath

Stock

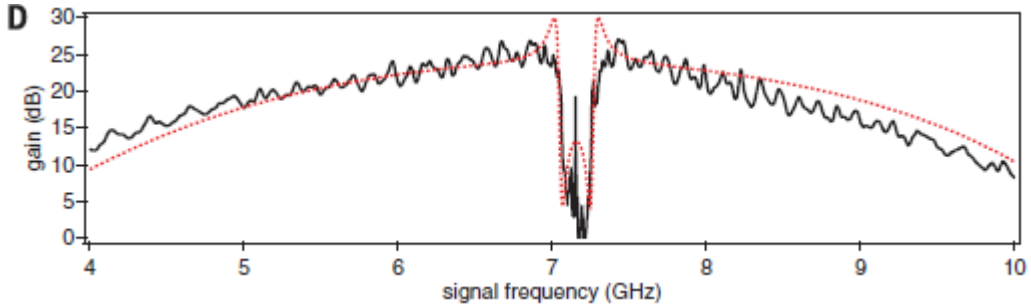
Close

Observe the gain

- Set the spectrum analyzer:

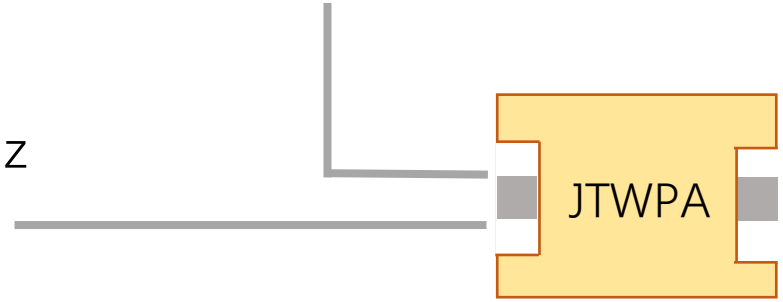
  center frequency: 7.1 GHz 2 GHz bandwidth?

- Pump ON/OFF to observe the gain. Save the figures.



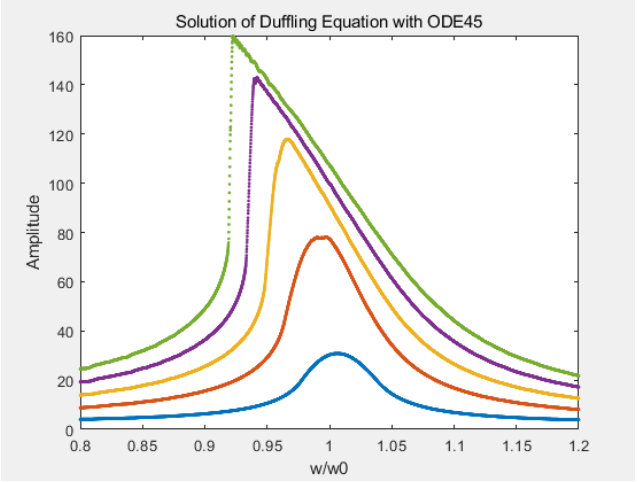
Pump: -20 dB @6.37 GHz
Expected >-80 dB on chip

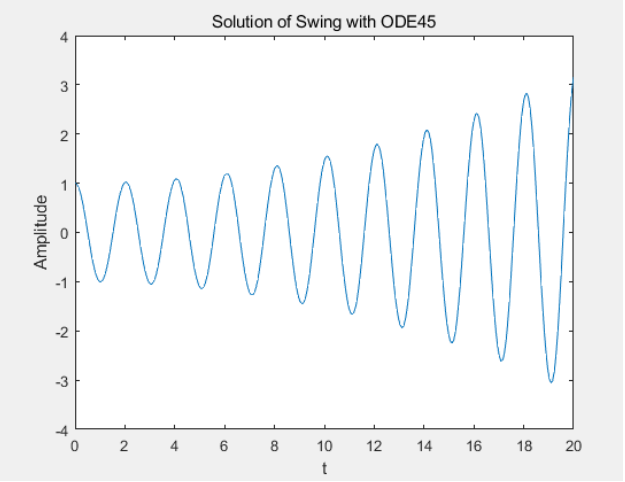
Signal: -40 dB @5.1-9.1 GHz
Expected -110 dB on chip



Simulation:

- Plan to do it after going back to China
- In order to get a thorough understanding of the amp and knowing more about superconducting microwave circuits and quantized transmission line theory





quantum noise from the vacuum or zero-point fluctuations (ZPFs) of the electromagnetic field @ 8 GHz:

$$\frac{hw}{2} = 2.65 \times 10^{-24}\, W/Hz = -196\, dBm/Hz$$

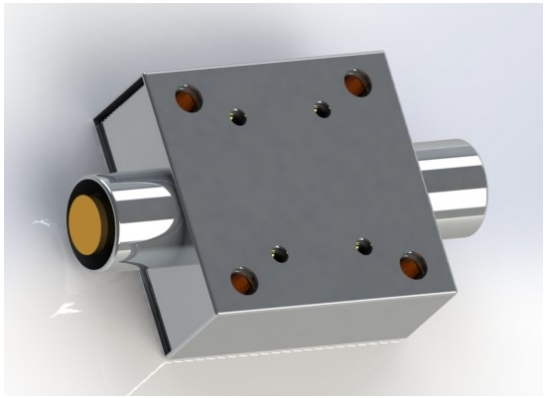
On the Possibility of Breaking the Heterodyne Detection Quantum Noise Limit With Cross-Correlation
ERNEST A. MICHAEL AND FELIPE E. BESSER

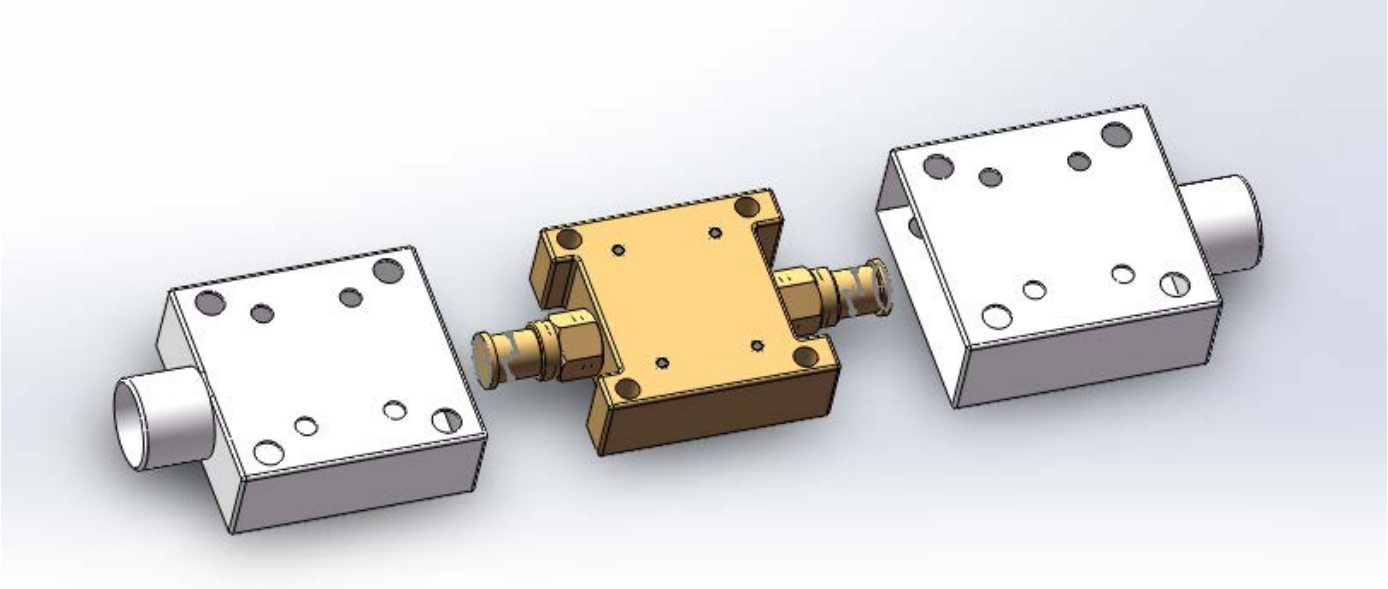
Pump power: aroud -70 dB

Phase noise<-126 dB

Magnetic shield

Placed the order.





Cryogenic RF swithes

- solid-state RF switches

  switching element: silicon diode, FET, MMIC

  have no moving parts, operating life infinite

- sensitive to ESD

  power handling capability depends on switch design, connector type, operational frequency, temperature exposure

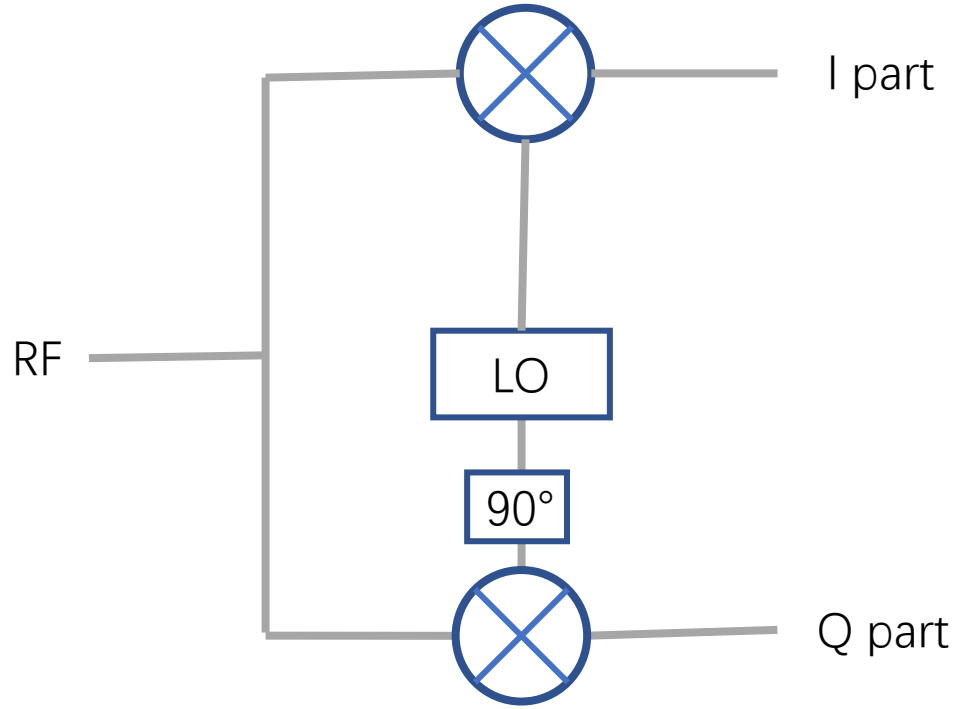
Cryogenic RF swithes

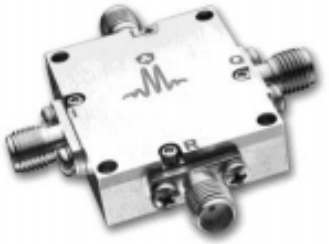
- Electromechanical switches
- Drive current: 0.125 A
- Heat up fridge
- Around 1000 $

Radiall

Demodulate the IQ parts of signal

SignalCore SC5312A
400 MHz - 6 GHz

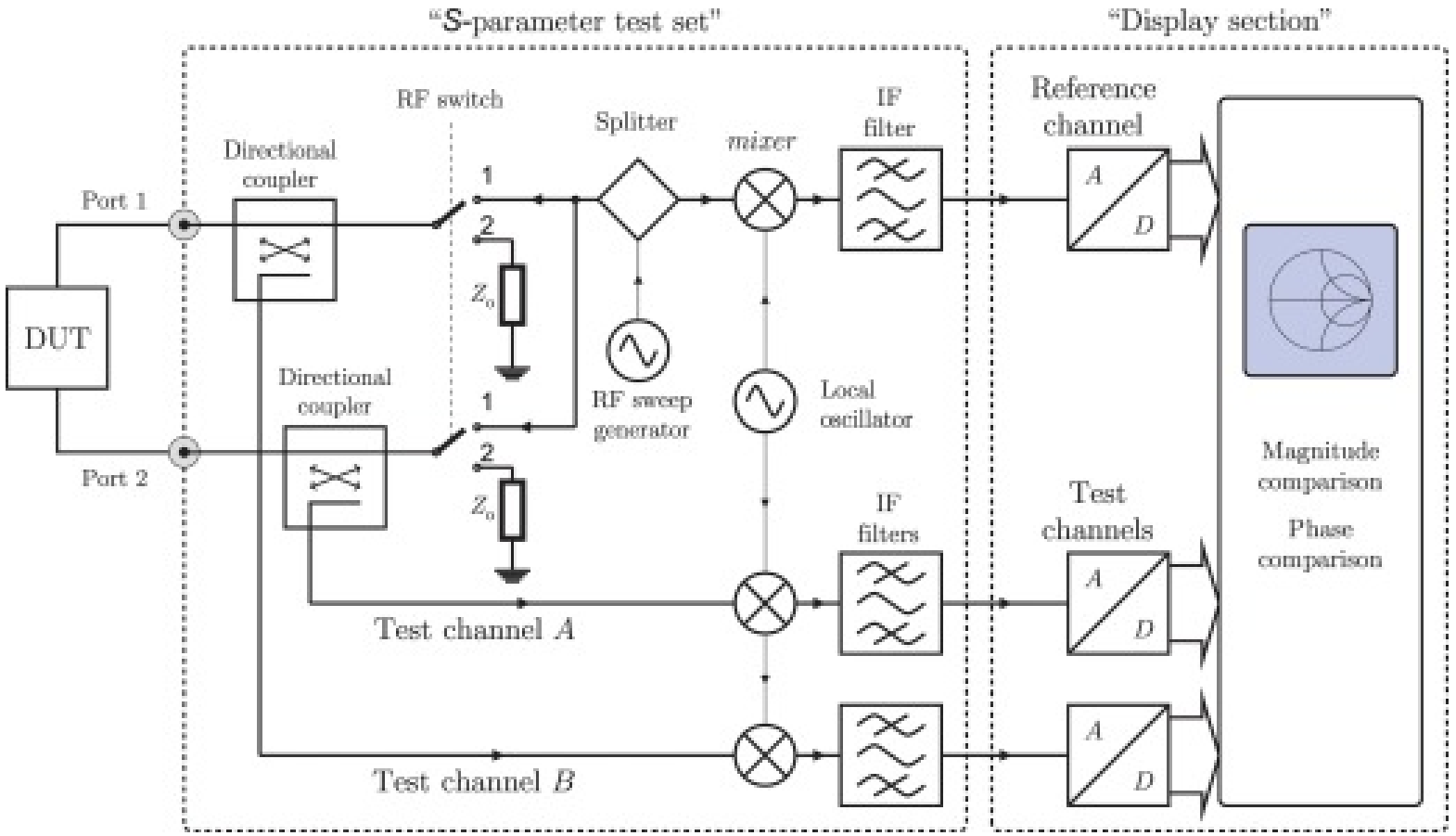




Marki IQ-0255
2.0-5.5 GHz

IQM-1650-02
DC-1.65 GHz

Demodulate the IQ parts of signal



Typical structure of VNA

Combine measurement with resonator