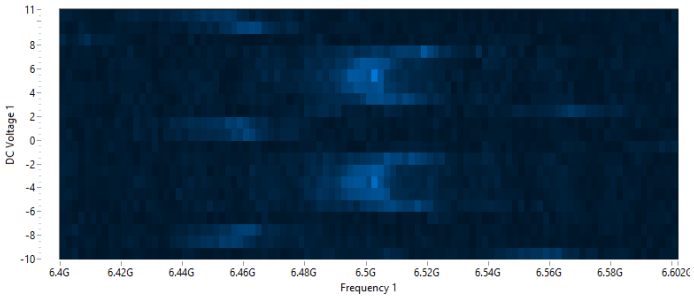
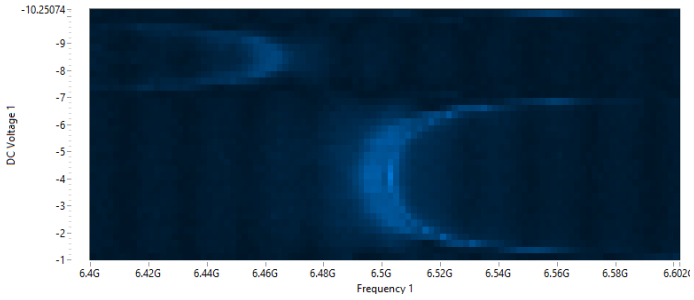
Coil sweep

Monday, October 25, 2021 2:26 PM

211025/1004 Coil sweep UHFLI AWG sequence: spectroscopy UHFLI output range 1.5V Rect_wave_amp: 1 AWG HL in LabView: +-1m Sampling freq: 1.7578125E+6 RO_LO_P: 5.0 dBm Averages: 1k DC Voltage 1: Coil voltage: set from -10V to 10V with step size 1V f_LO: 6.4 GHz to 6.6 GHz in 2MHz steps (60 pts)	**Coil sweep** 
211025/1010 Coil sweep UHFLI AWG sequence: spectroscopy UHFLI output range 1.5V Rect_wave_amp: 1 AWG HL in LabView: +-1m Sampling freq: 1.7578125E+6 RO_LO_P: 5.0 dBm Averages: 10k DC Voltage 1: Coil voltage: set from -1V to -10V with step size 0.25V f_LO: 6.4 GHz to 6.6 GHz in 2MHz steps (60 pts)	**Coil sweep** 
211025/1011 Coil sweep UHFLI AWG sequence:	**Coil sweep** 

spectroscopy

UHFLI output range 1.5V
Rect_wave_amp: 1

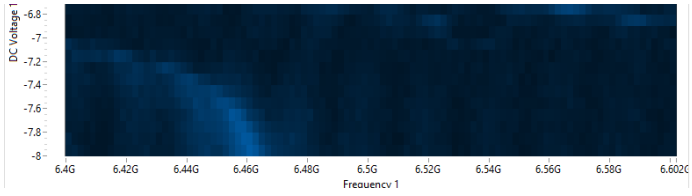
AWG HL in LabView: +-1m

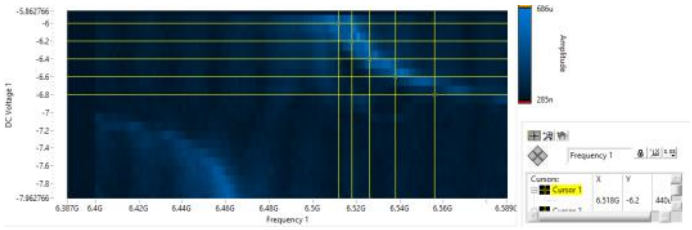
Sampling freq: 1.7578125E+6
RO_LO_P: 5.0 dBm

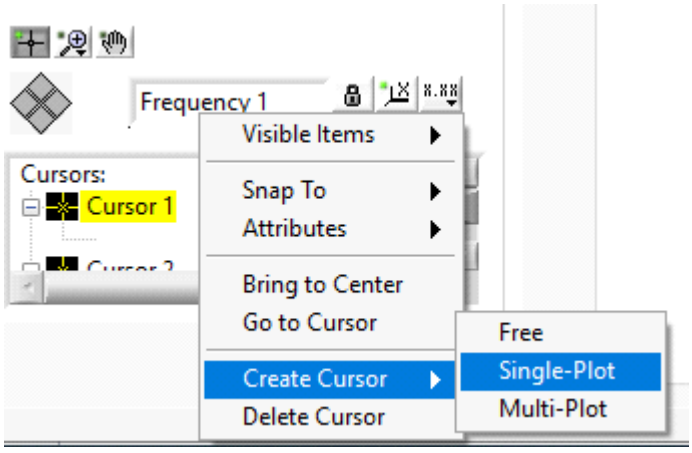
Averages: 10k

DC Voltage 1:
Coil voltage: set from -8V to -6V with step size 100mV

f_LO: 6.4 GHz to 6.6 GHz in 2MHz steps (60 pts)







211026/1014
Coil sweep

UHFLI AWG sequence:
spectroscopy

UHFLI output range 1.5V
Rect_wave_amp: 1

AWG HL in LabView: +-1m

Sampling freq: 14.0625E+6
ShotRepFreq: 27.46582E+3

RO_LO_P: 5.0 dBm

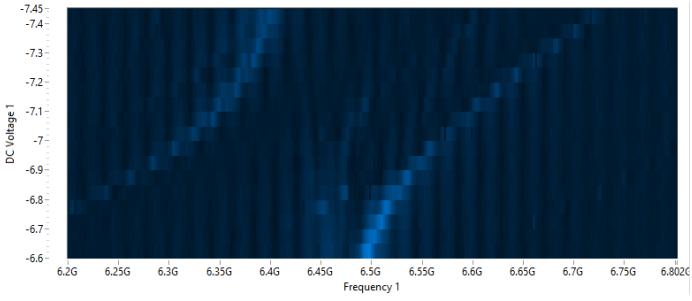
Averages: 5k

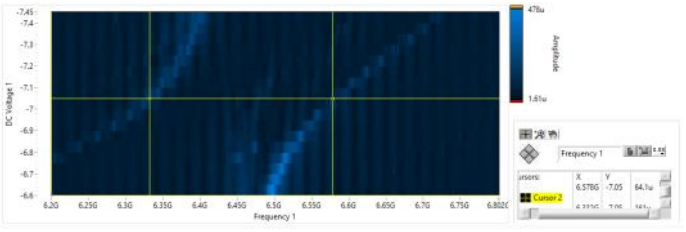
DC Voltage 1:
Coil voltage: set from -6.6V to -7.4V with step size 50mV

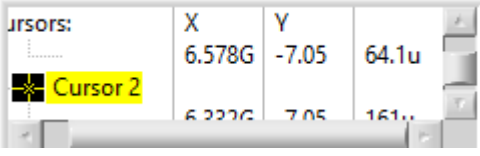
f_LO: 6.2 GHz to 6.8 GHz in 2MHz steps (60 pts)

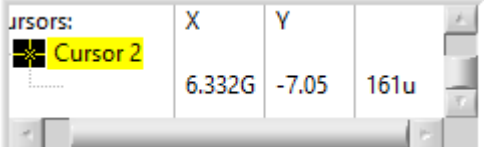
Approx of g: 2g = 6.578 - 6.332 = 0.246

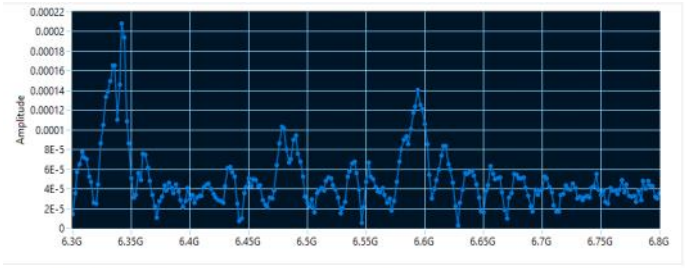
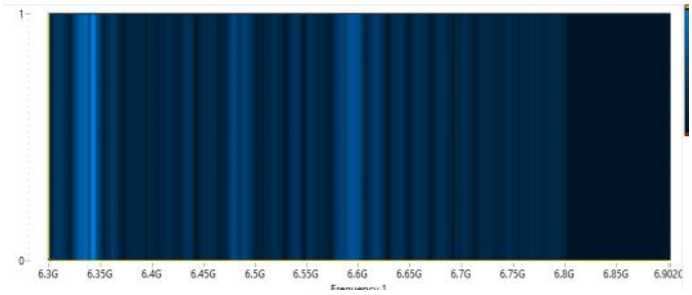
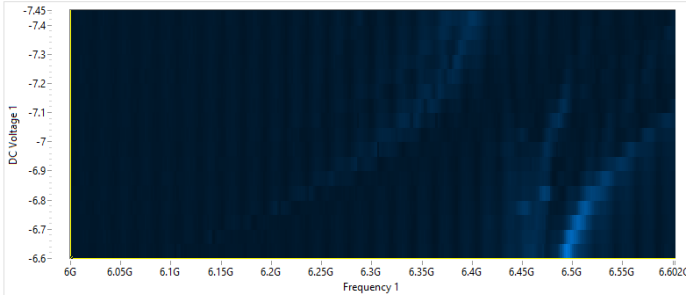
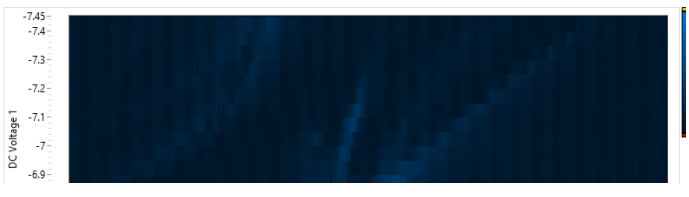
Coil sweep









GHz	
211025/1015 Coil sweep UHFLI AWG sequence: spectroscopy UHFLI output range 1.5V Rect_wave_amp: 1 AWG HL in LabView: +-1m Sampling freq: 14.0625E+6 ShotRepFreq: 27.46582E+3 RO_LO_P: 5.0 dBm Averages: 5k DC Voltage 1: Coil voltage: -7.05V f_LO: 6.3 GHz to 6.8 GHz in 2MHz steps (60 pts)	**Coil sweep**  
211026/1016 Coil sweep UHFLI AWG sequence: spectroscopy UHFLI output range 1.5V Rect_wave_amp: 1 AWG HL in LabView: +-2m Sampling freq: 14.0625E+6 ShotRepFreq: 27.46582E+3 RO_LO_P: 5.0 dBm Averages: 5k DC Voltage 1: Coil voltage: set from -6.6V to -7.4V with step size 50mV f_LO: 6.2 GHz to 6.8 GHz in 2MHz steps (60 pts)	**Coil sweep** 
211027/1005 Coil sweep UHFLI AWG sequence: spectroscopy UHFLI output range 1.5V Rect_wave_amp: 1	**Coil sweep** 

AWG HL in LabView: +-3m

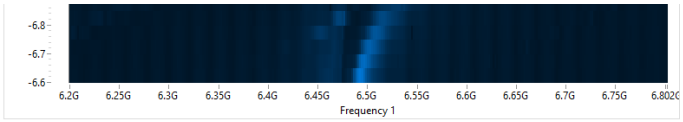
Sampling freq: 14.0625E+6
ShotRepFreq: 27.46582E+3

RO_LO_P: 5.0 dBm

Averages: 5k

DC Voltage 1:
Coil voltage: set from -6.6V to -7.4V with step size 50mV

f_LO: 6.2 GHz to 6.8 GHz in 2MHz steps (60 pts)



211027/1007
Coil sweep

UHFLI AWG sequence: spectroscopy

UHFLI output range 1.5V
Rect_wave_amp: 1

AWG HL in LabView: +-0.5m

Sampling freq: 14.0625E+6
ShotRepFreq: 27.46582E+3

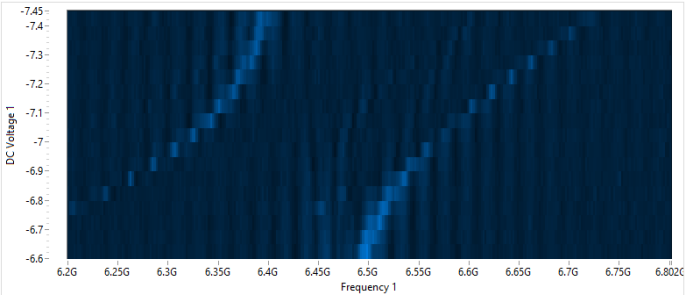
RO_LO_P: 5.0 dBm

Averages: 5k

DC Voltage 1:
Coil voltage: set from -6.6V to -7.4V with step size 50mV

f_LO: 6.2 GHz to 6.8 GHz in 2MHz steps (60 pts)

Coil sweep



211027/1008
Coil sweep

UHFLI AWG sequence: spectroscopy

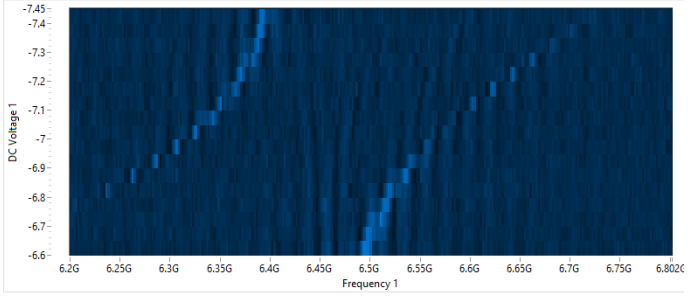
UHFLI output range 1.5V
Rect_wave_amp: 1

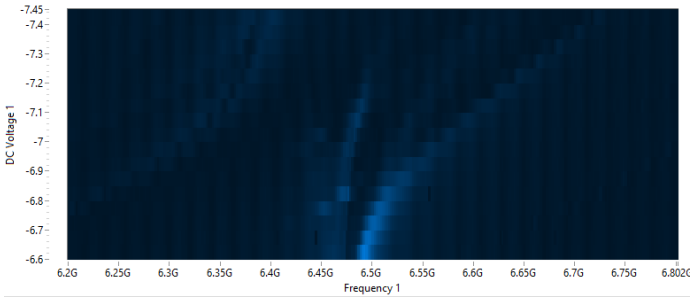
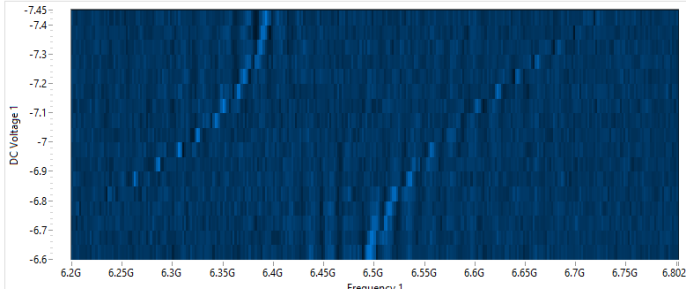
AWG HL in LabView: +-0.25m

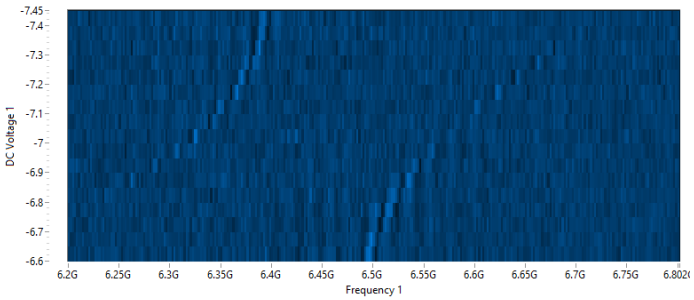
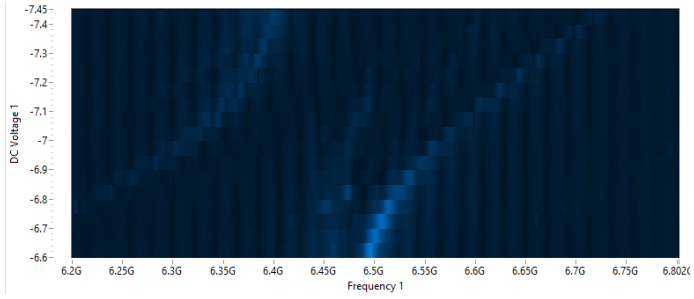
Sampling freq: 14.0625E+6
ShotRepFreq: 27.46582E+3

RO_LO_P: 5.0 dBm

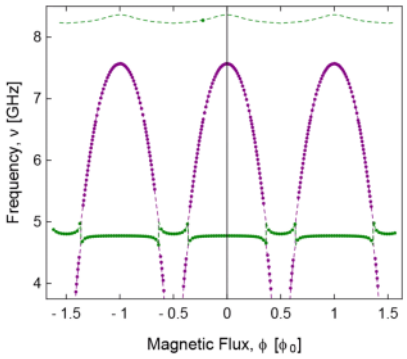
Coil sweep



Averages: 5k DC Voltage 1: Coil voltage: set from -6.6V to -7.4V with step size 50mV f_LO: 6.2 GHz to 6.8 GHz in 2MHz steps (60 pts)	
211029/1003 Coil sweep UHFLI AWG sequence: spectroscopy UHFLI output range 1.5V Rect_wave_amp: 0.25 (we could also try to change this value) AWG HL in LabView: +-2m Sampling freq: 14.0625E+6 ShotRepFreq: 27.46582E+3 RO_LO_P: 5.0 dBm Averages: 5k DC Voltage 1: Coil voltage: set from -6.6V to -7.4V with step size 50mV f_LO: 6.2 GHz to 6.8 GHz in 2MHz steps (60 pts)	**Coil sweep** 
211029/1008 Coil sweep UHFLI AWG sequence: spectroscopy UHFLI output range 1.5V Rect_wave_amp: 1 AWG HL in LabView: +-0.125m Sampling freq: 14.0625E+6 ShotRepFreq: 27.46582E+3 RO_LO_P: 5.0 dBm Averages: 5k DC Voltage 1: Coil voltage: set from -6.6V to -7.4V with step size 50mV	**Coil sweep** 

f_LO: 6.2 GHz to 6.8 GHz in 2MHz steps (60 pts)	
211029/1009 Coil sweep UHFLI AWG sequence: spectroscopy UHFLI output range 1.5V Rect_wave_amp: 1 AWG HL in LabView: +-0.075m Sampling freq: 14.0625E+6 ShotRepFreq: 27.46582E+3 RO_LO_P: 5.0 dBm Averages: 5k DC Voltage 1: Coil voltage: set from -6.6V to -7.4V with step size 50mV f_LO: 6.2 GHz to 6.8 GHz in 2MHz steps (60 pts)	**Coil sweep** 
211102/1005 Coil sweep UHFLI AWG sequence: spectroscopy UHFLI output range 1.5V Rect_wave_amp: 1 AWG HL in LabView: +-1.5m Sampling freq: 14.0625E+6 ShotRepFreq: 27.46582E+3 RO_LO_P: 5.0 dBm Averages: 5k DC Voltage 1: Coil voltage: set from -6.6V to -7.4V with step size 50mV f_LO: 6.2 GHz to 6.8 GHz in 2MHz steps (60 pts)	**Coil sweep** 

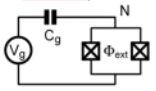
Tuning Transmon Qubits with Applied Magnetic Flux



Measured qubit/resonator freq. (*,*)
Fit to full Hamiltonian (-,-)

Changing Qubit Transition Frequency:

- Make qubits with superconducting quantum interference device (SQUID) loop
  M. Tinkham, Introduction to Superconductivity, McGraw-Hill



$$E_J = E_{J,\max} \cos\left(\pi \frac{\phi_{\text{ext}}}{\phi_0}\right)$$

- Apply global magnetic field using off-chip coil
- Apply "local" magnetic field using on-chip flux line

Reminder: Resonator and Qubit Spectroscopy:

- Probe resonator
- Drive qubit
- When drive matches the qubit transition, change in transmission of resonator probe observed.