Coil sweep

Monday, October 25, 2021 2:26 P

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:

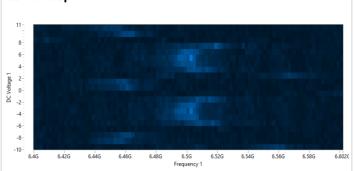
Coil voltage: set from -10V to 10V with

step size 1V

f LO: 6.4 GHz to 6.6 GHz in 2MHz steps

(60 pts)





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

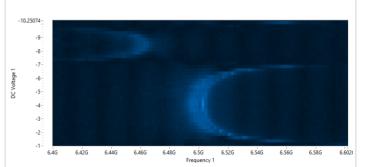
(60 pts)

211025/1011

Coil sweep

UHFLI AWG sequence:

Coil sweep





-7.2 DC \chioffage spectroscopy -7.4 **UHFLI** output range 1.5V -7.6 Rect_wave_amp: 1 -7.8 6.5G 6.52G 6.54G 6.56G 6.58G AWG HL in LabView: +-1m Sampling freq: 1.7578125E+6 -6.6 -6.8 -7 -7.2 -7.4 RO_LO_P: 5.0 dBm Averages: 10k DC Voltage 1: Coil voltage: set from -8V to -6V with 十 净 卿 step size 100mV 8.88 | ₹1× | 8.88 Frequency 1 f_LO: 6.4 GHz to 6.6 GHz in 2MHz steps Visible Items (60 pts) Cursors: Snap To E-x- Cursor 1 Attributes Bring to Center Go to Cursor Free Single-Plot Create Cursor Multi-Plot Delete Cursor 211026/1014 Coil sweep Coil sweep **UHFLI AWG sequence:** -7.3 -7.2 spectroscopy -7.1 -7-UHFLI output range 1.5V -6.9 Rect_wave_amp: 1 -6.8 -6.7 AWG HL in LabView: +-1m Sampling freq: 14.0625E+6 ShotRepFreq: 27.46582E+3 RO LO P: 5.0 dBm -7 -6.9 -6.8 Averages: 5k DC Voltage 1: Coil voltage: set from -6.6V to -7.4V with step size 50mV irsors: 6.578G -7.05 64.1u Cursor 2 f_LO: 6.2 GHz to 6.8 GHz in 2MHz steps 6 2226 7.05 (60 pts) Х γ ursors: Cursor 2 6.332G -7.05 161u Approx of g: 2g = 6.578 - 6.332 = 0.246

GHz 211025/1015 Coil sweep Coil sweep **UHFLI AWG sequence:** spectroscopy 0.00018 UHFLI output range 1.5V 0.00012 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) 211026/1016 Coil sweep Coil sweep -7.45 -7.4 **UHFLI AWG sequence:** spectroscopy -7.3 -7.2 -7.1 UHFLI output range 1.5V -7-Rect_wave_amp: 1 -6.9 -6.8 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) 211027/1005 Coil sweep Coil sweep **UHFLI AWG sequence:** -7.45 -7.4 spectroscopy -7.3 -7.1 UHFLI output range 1.5V -7-Rect_wave_amp: 1

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)

211027/1008 Coil sweep

spectroscopy

UHFLI output range 1.5V Rect_wave_amp: 1

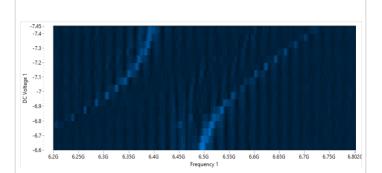
UHFLI AWG sequence:

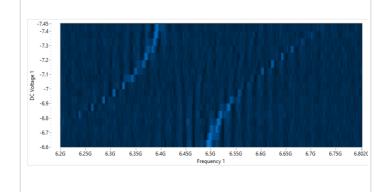
AWG HL in LabView: +-0.25m

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)

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

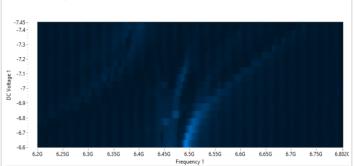
Averages: 5k

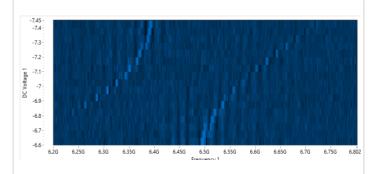
DC Voltage 1:

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)

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:

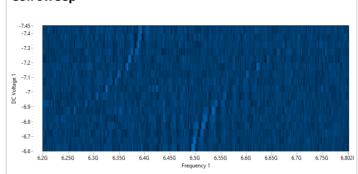
Coil voltage: set from -6.6V to -7.4V with

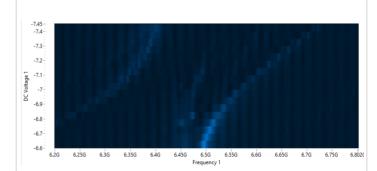
step size 50mV

f_LO: 6.2 GHz to 6.8 GHz in 2MHz steps

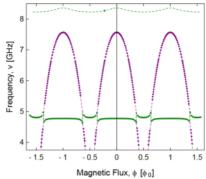
(60 pts)

Coil sweep





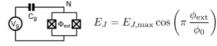
Tuning Transmon Qubits with Applied Magnetic Flux



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

Changing Qubit Transition Frequency:

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



- 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.

A. Wallraff, Quantum Device Lab | June 15, 2021 | 93