Closing of the induced gap in a hybrid superconductor-semiconductor nanowire

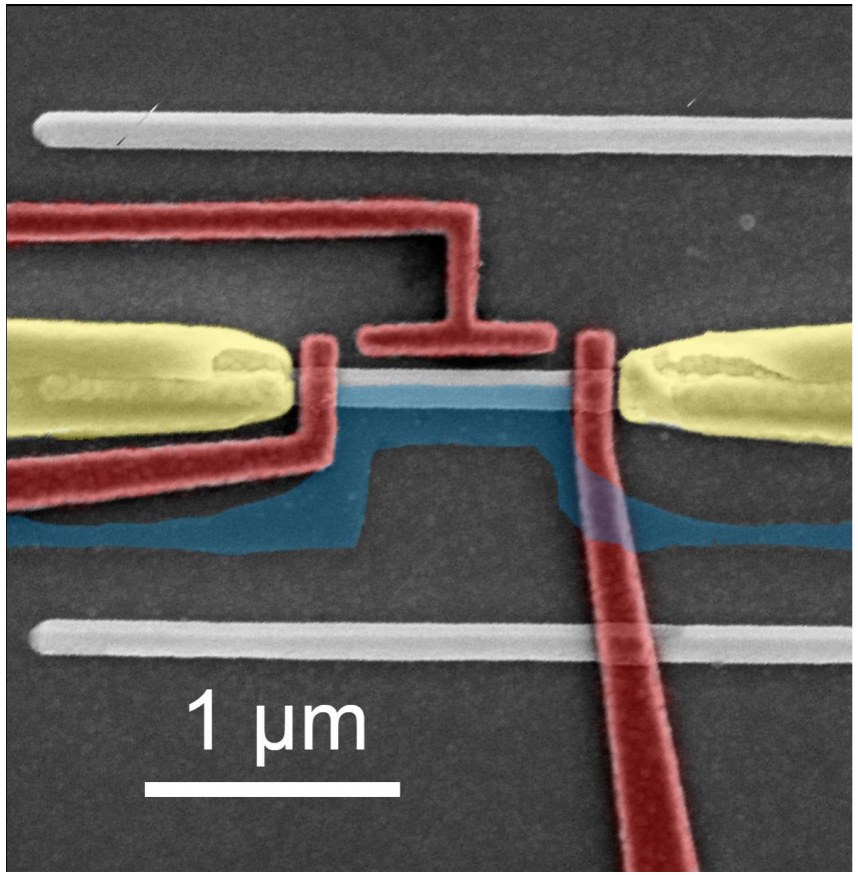
Extended Data

09.03.2021

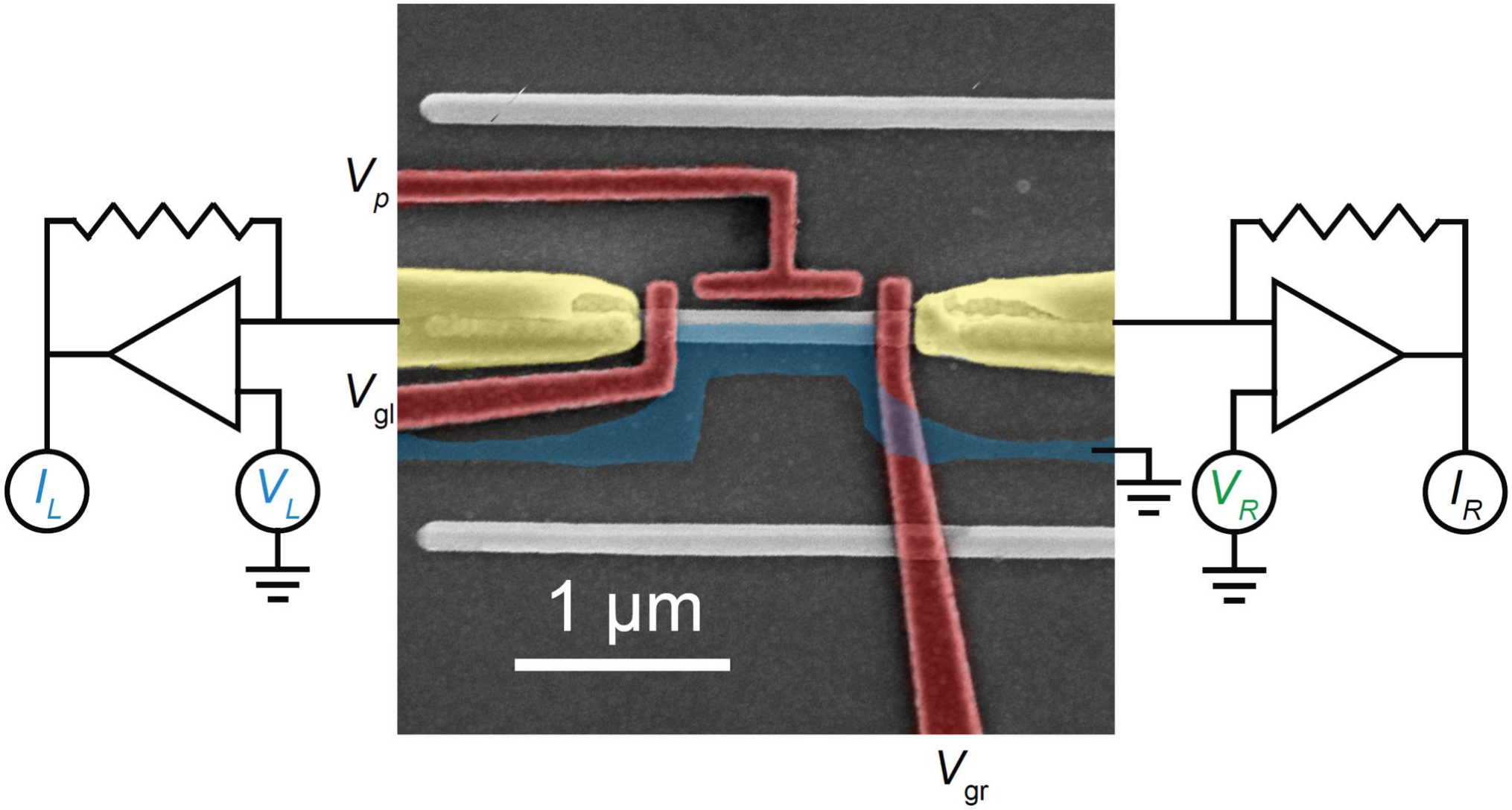
1um correlation device

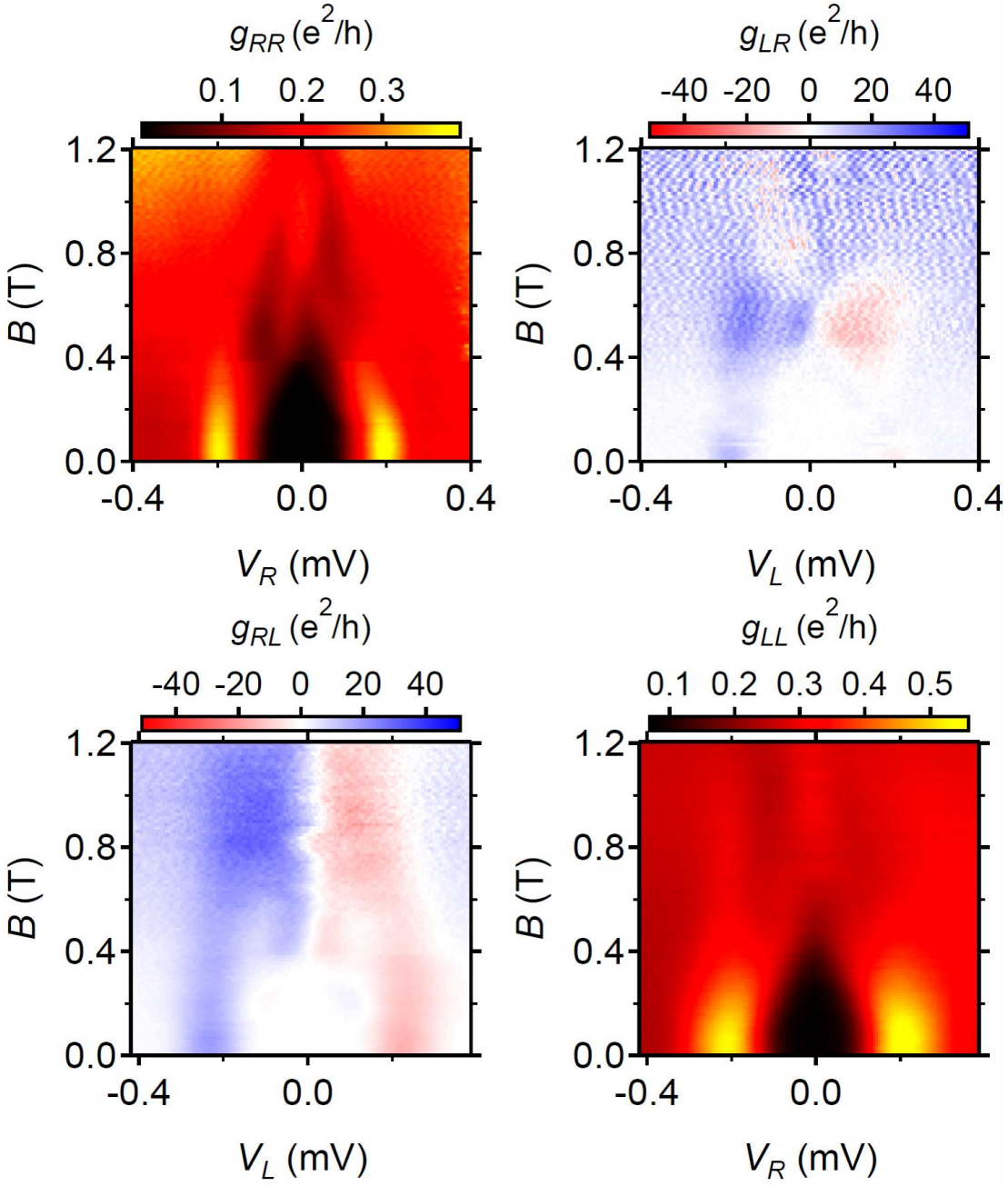
M071918Gg1FE1

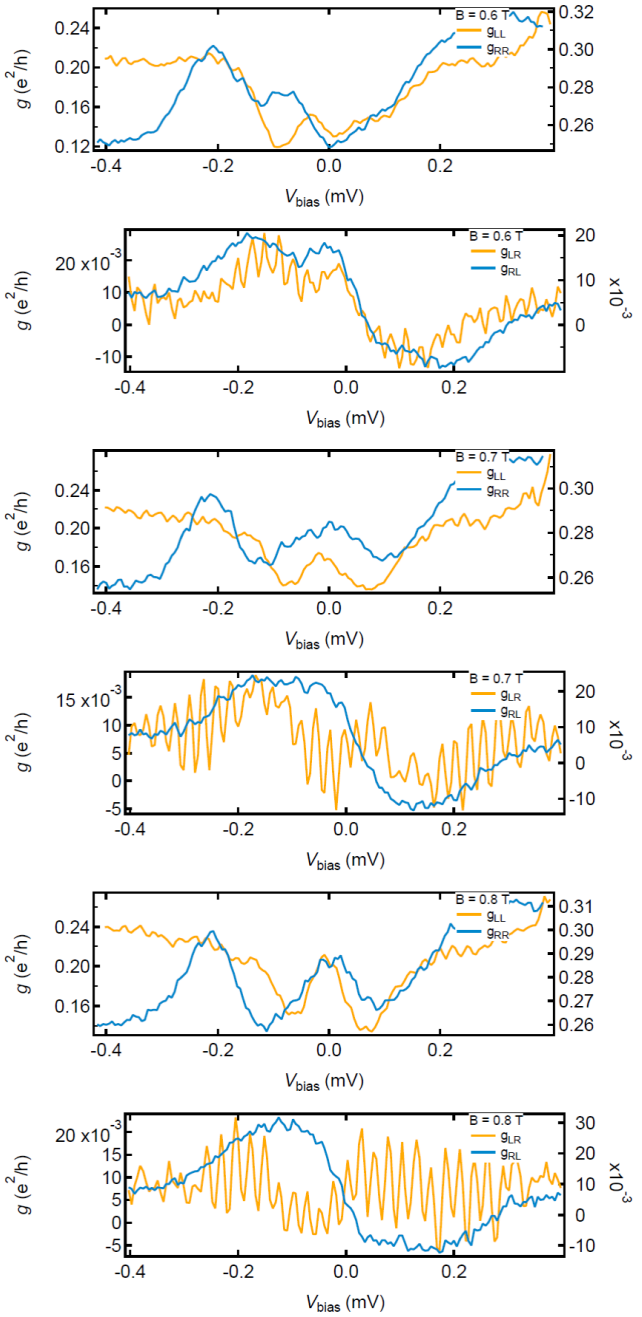
Device1 - Extended data



Setup







Noise at high field is from coupling of vibrations.

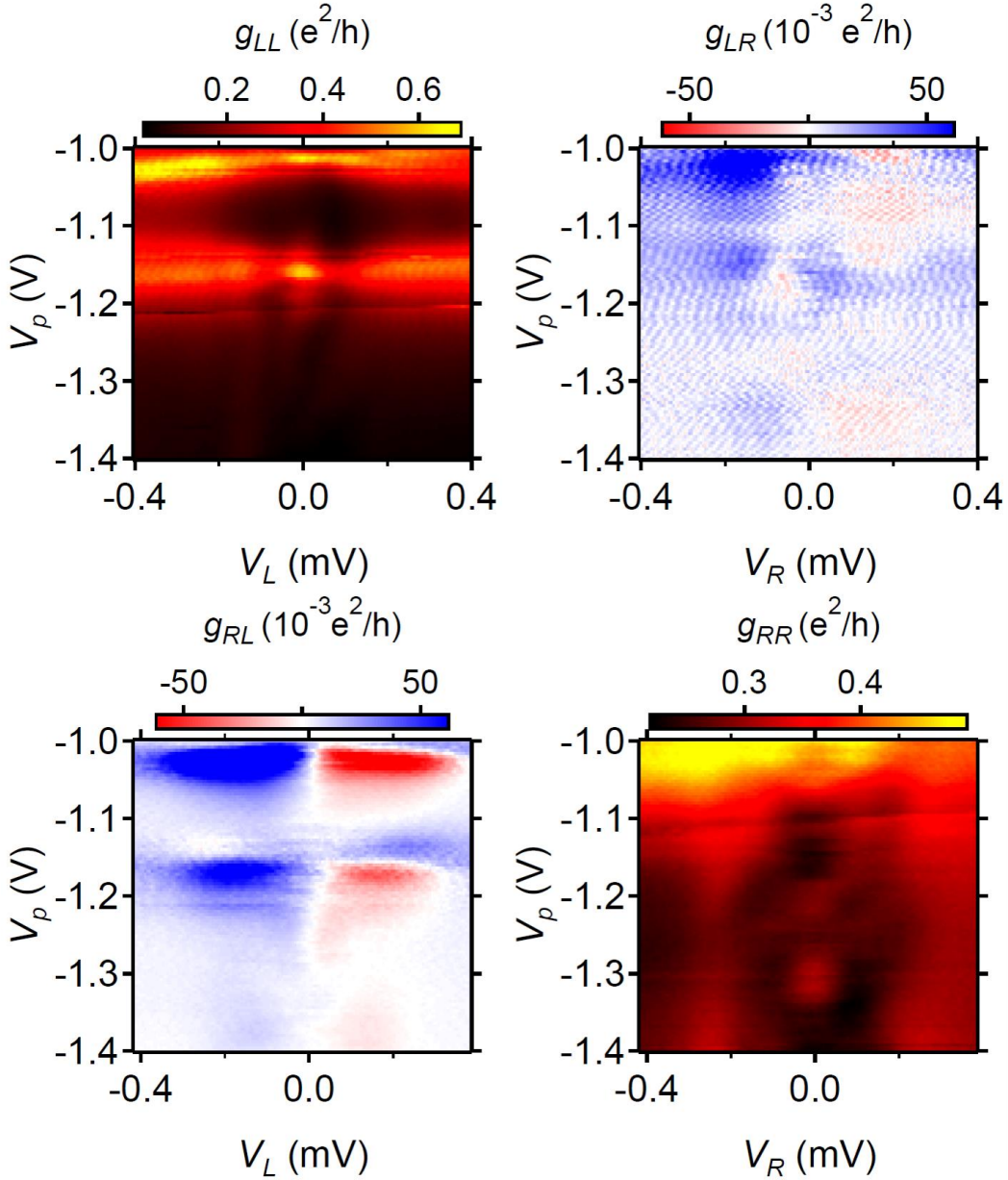
Observe gap closing in nonlocal conductance. ZBPs at both ends, but no gap re-opening in grl.

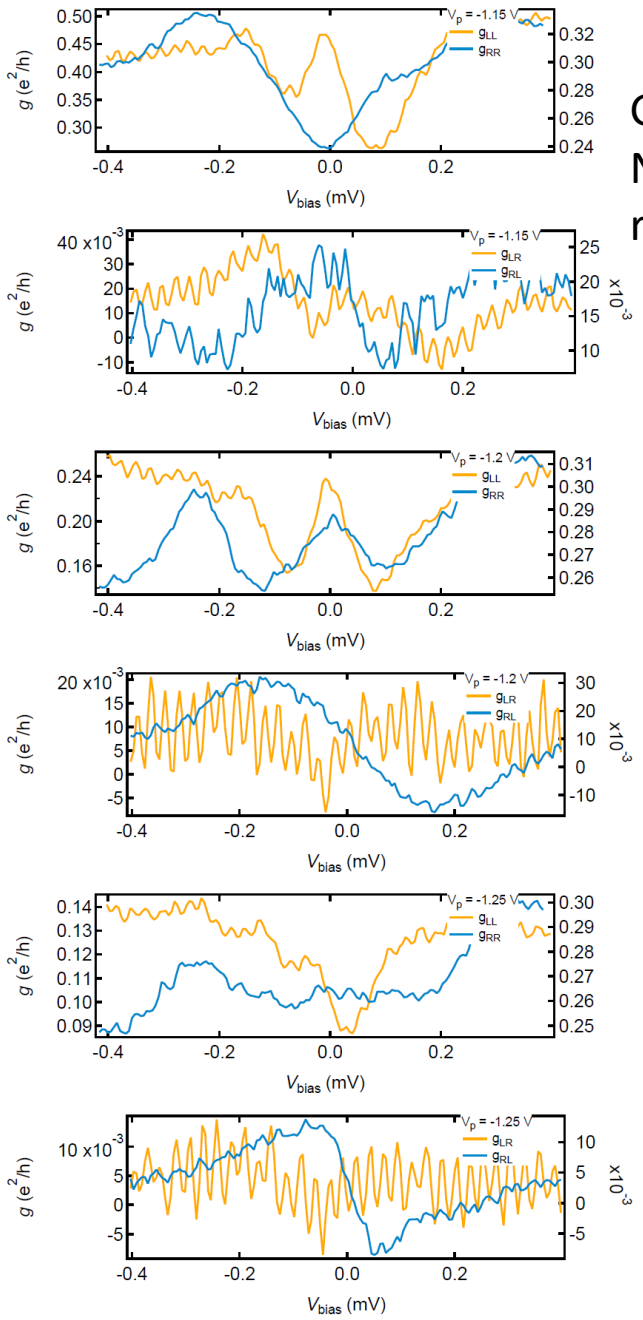
Data # 1335

Vp = -1.2

Vgl = -0.695

Vgr = -0.605





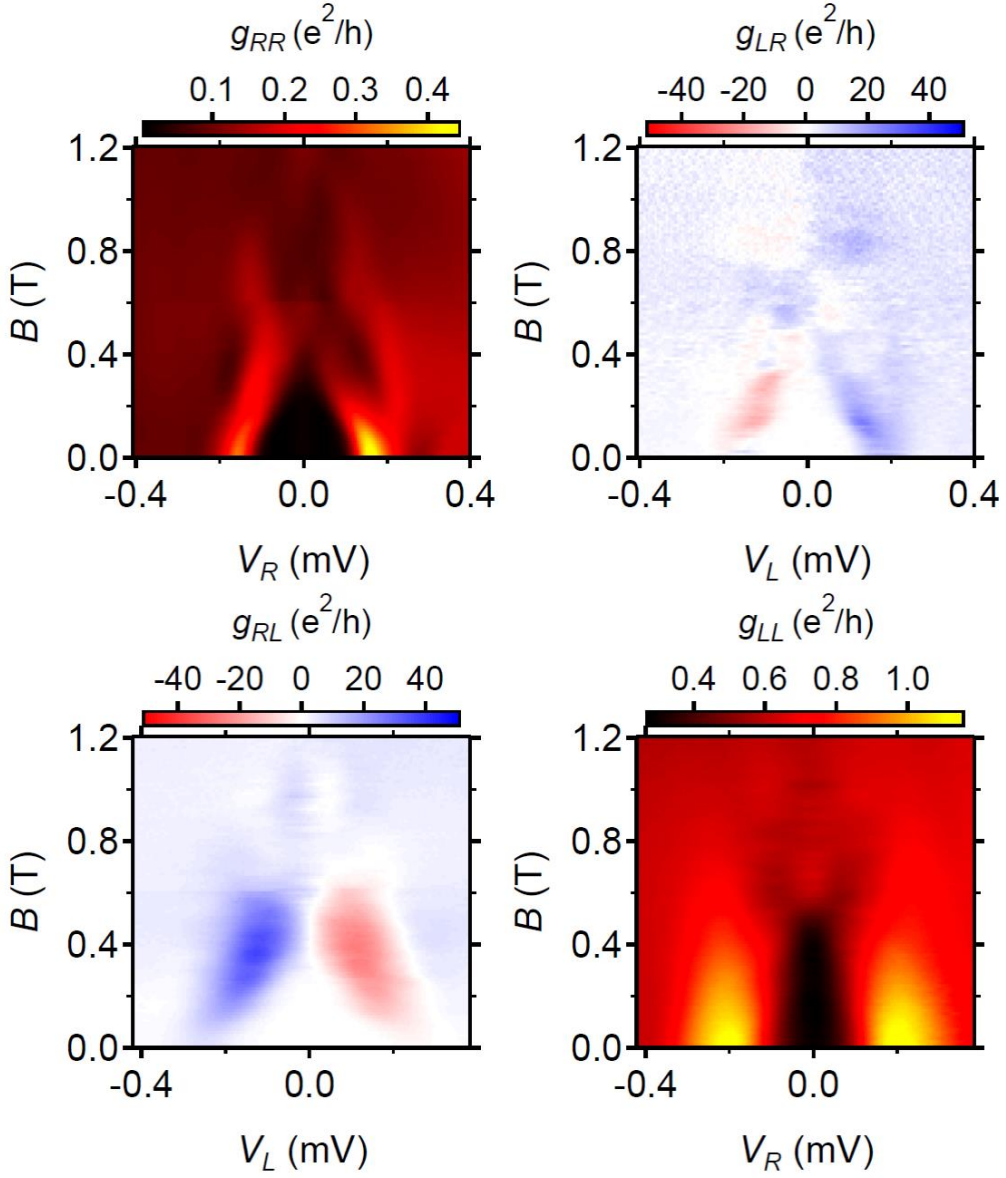
Gate dependence:
No clear correlations or gap re-opening.

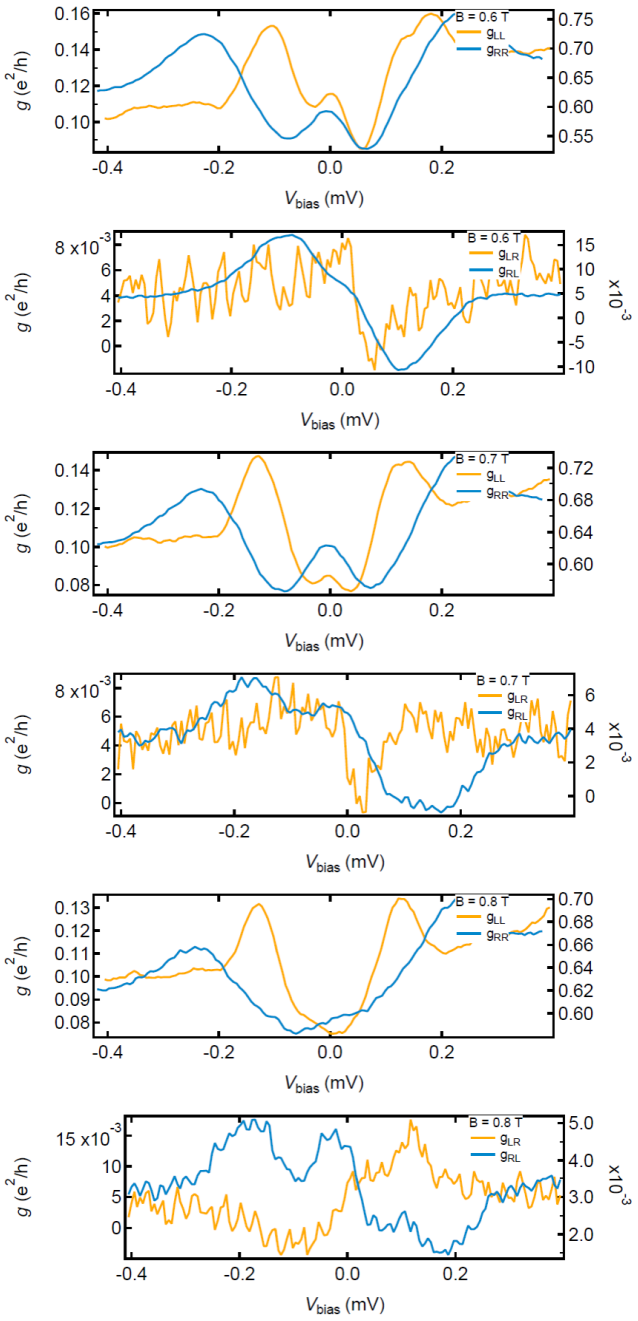
Data # 1537

B = 0.7T

Vgl = -0.695V

Vgr = -0.605V





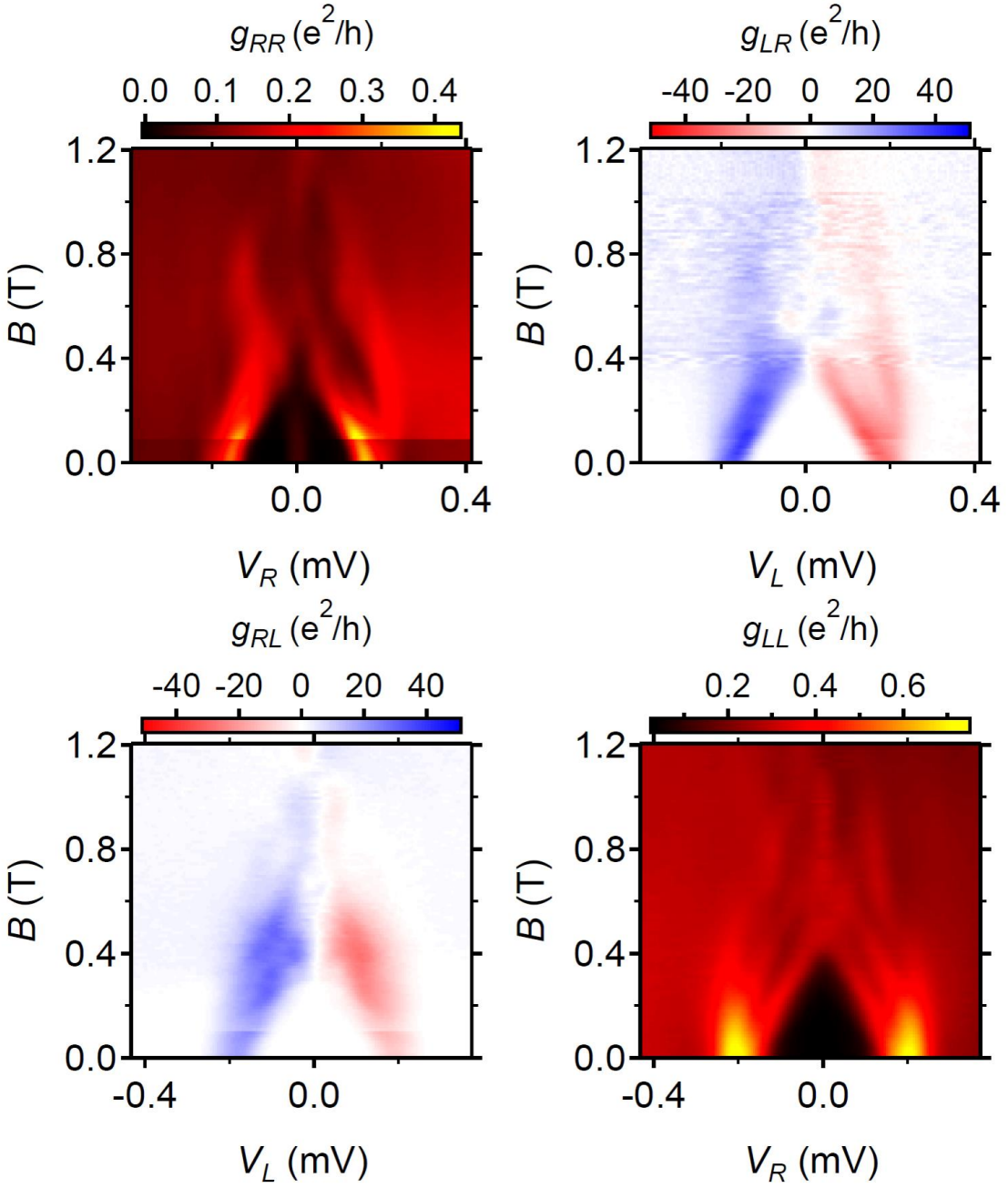
Another example.

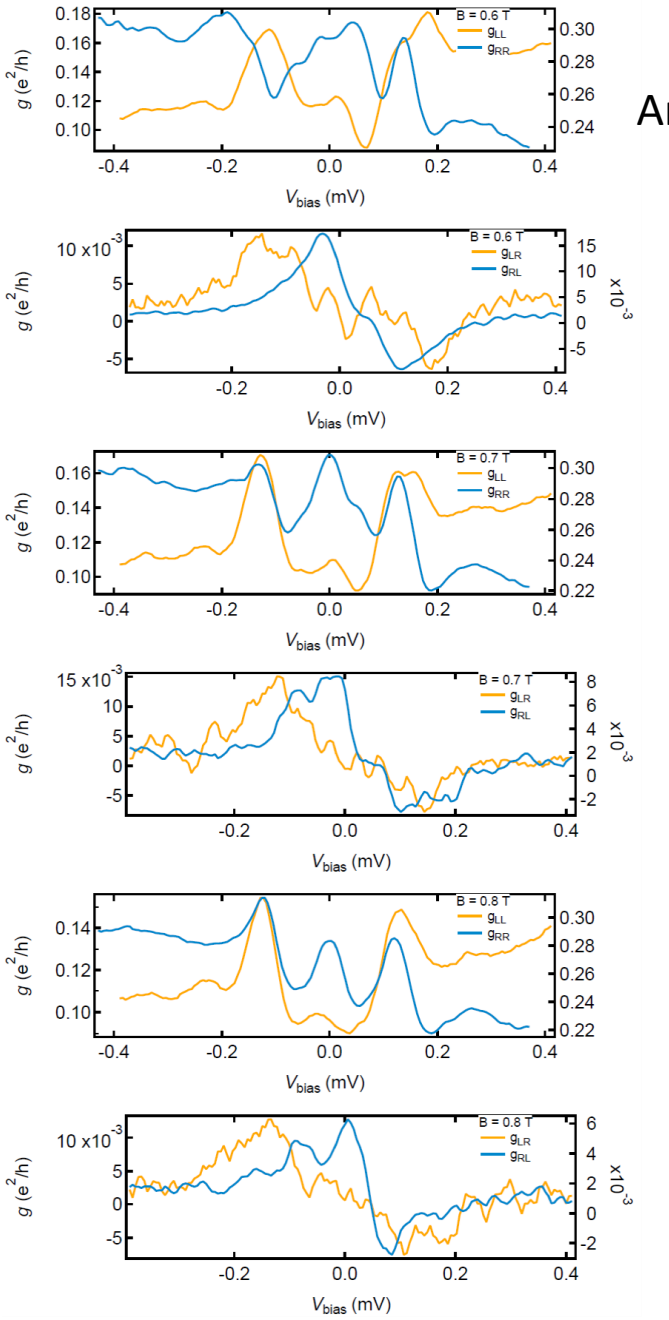
Data # 2803

Vp = -1.26

Vgl = -0.717

Vgr = -0.61V





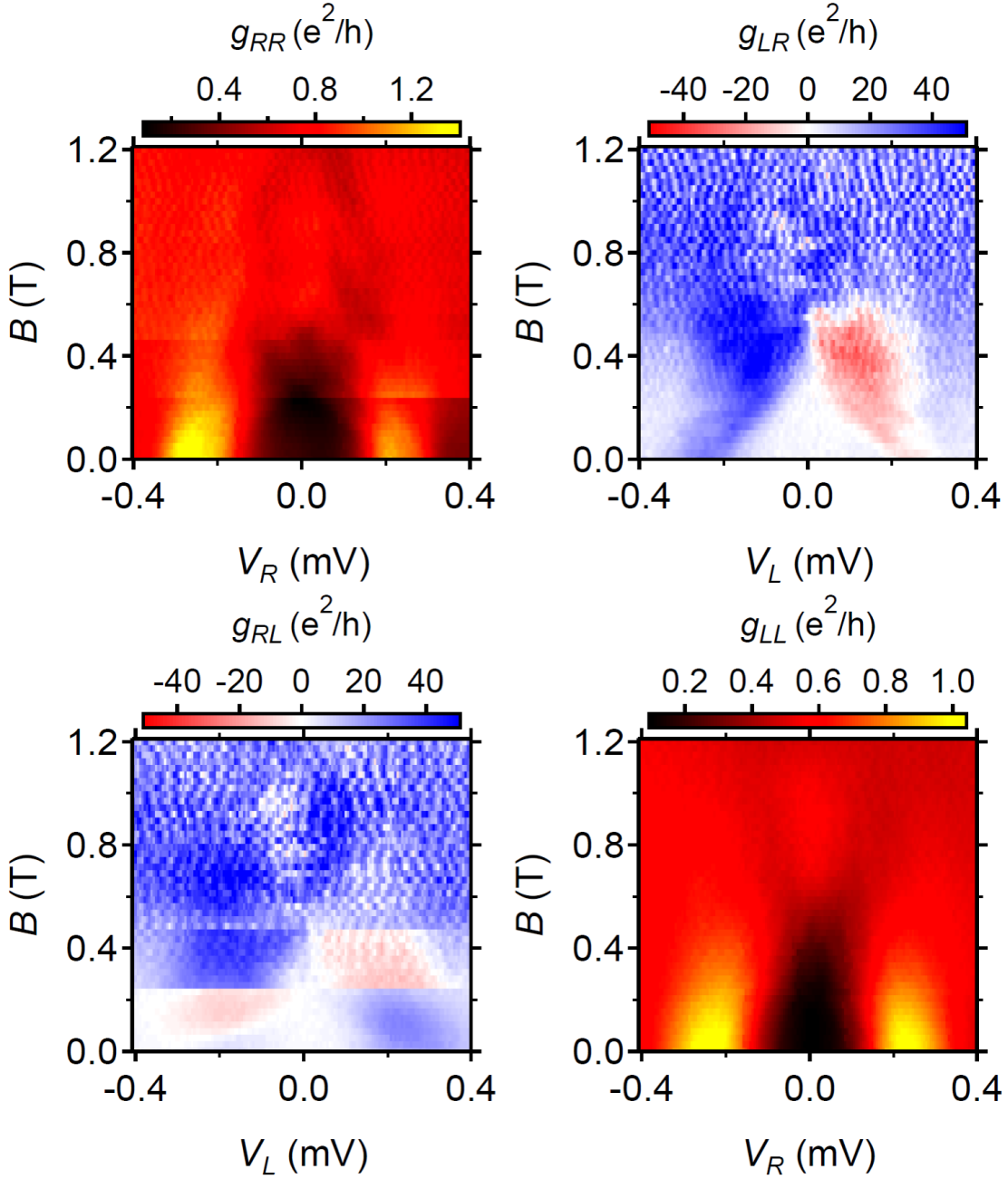
Another example

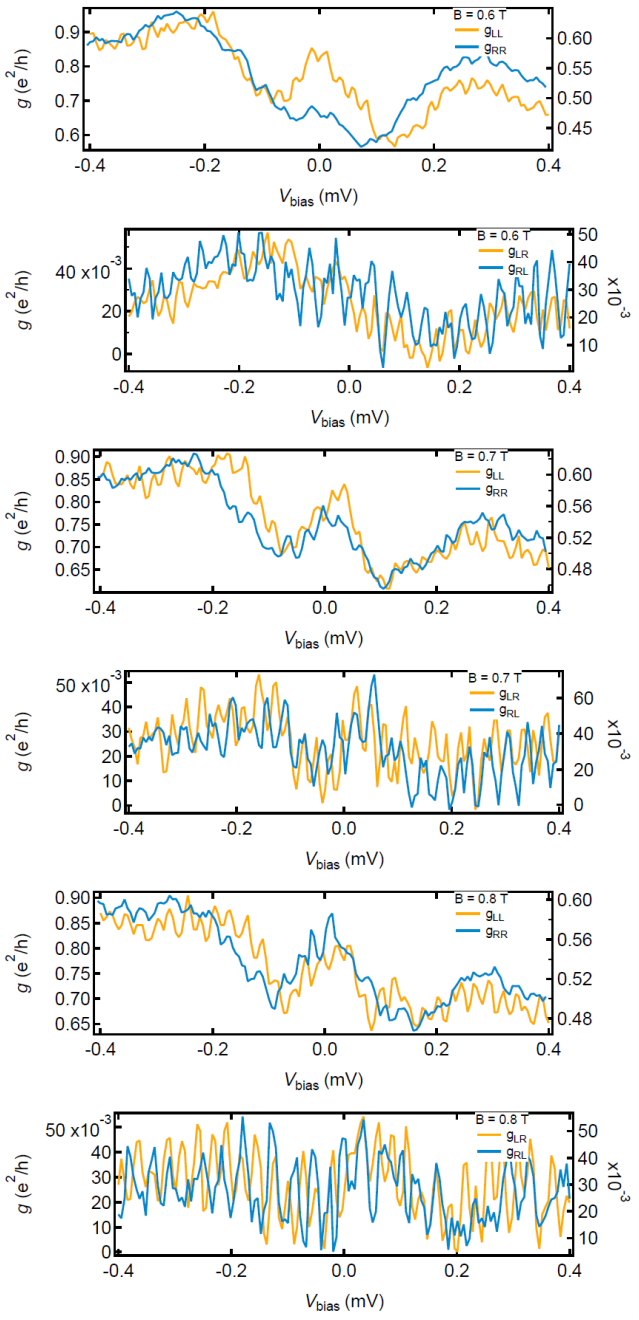
Data # 3238

Vp = -1.24

Vgl = -0.717 V

Vgr = -0.619 V





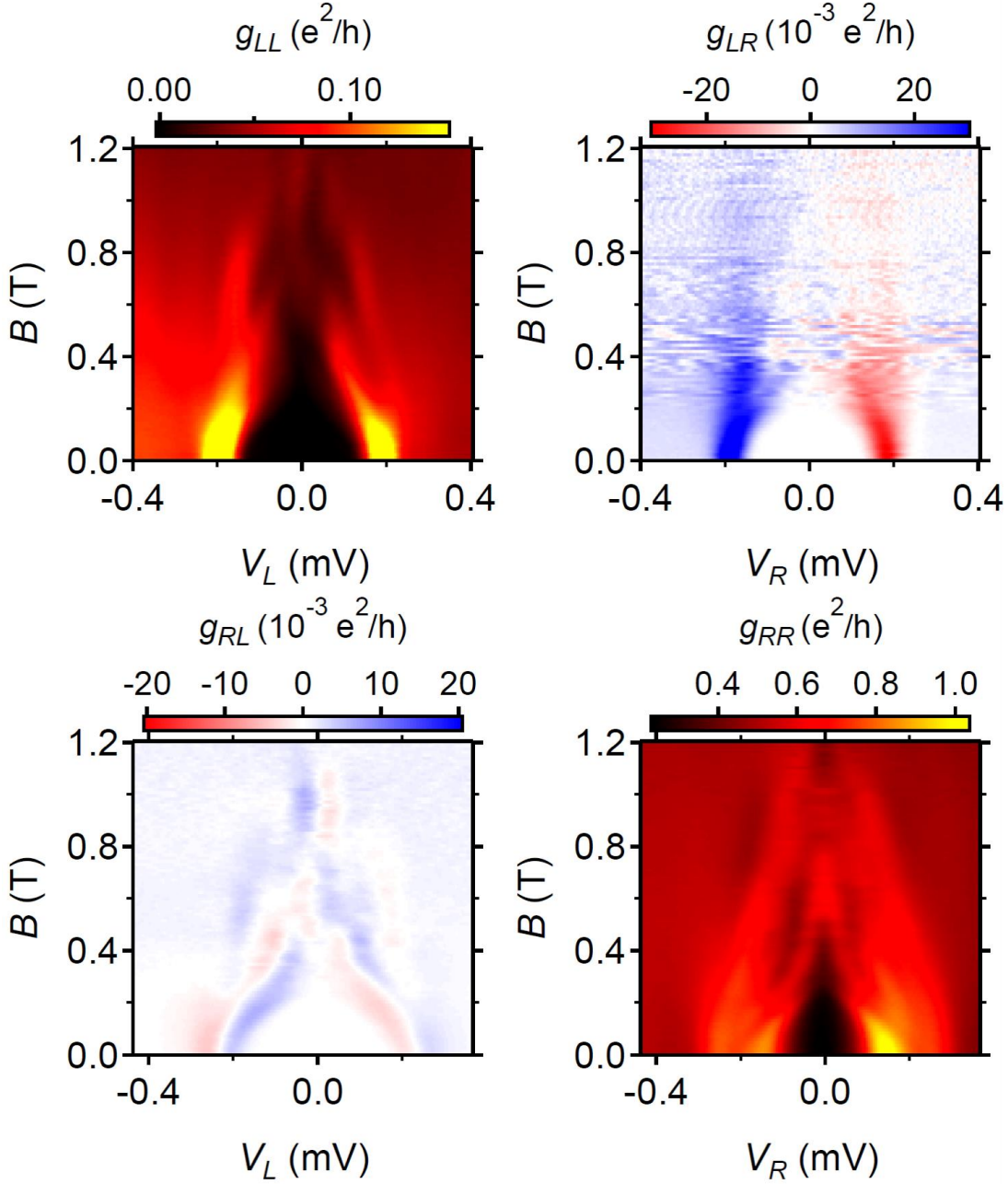
Another example.

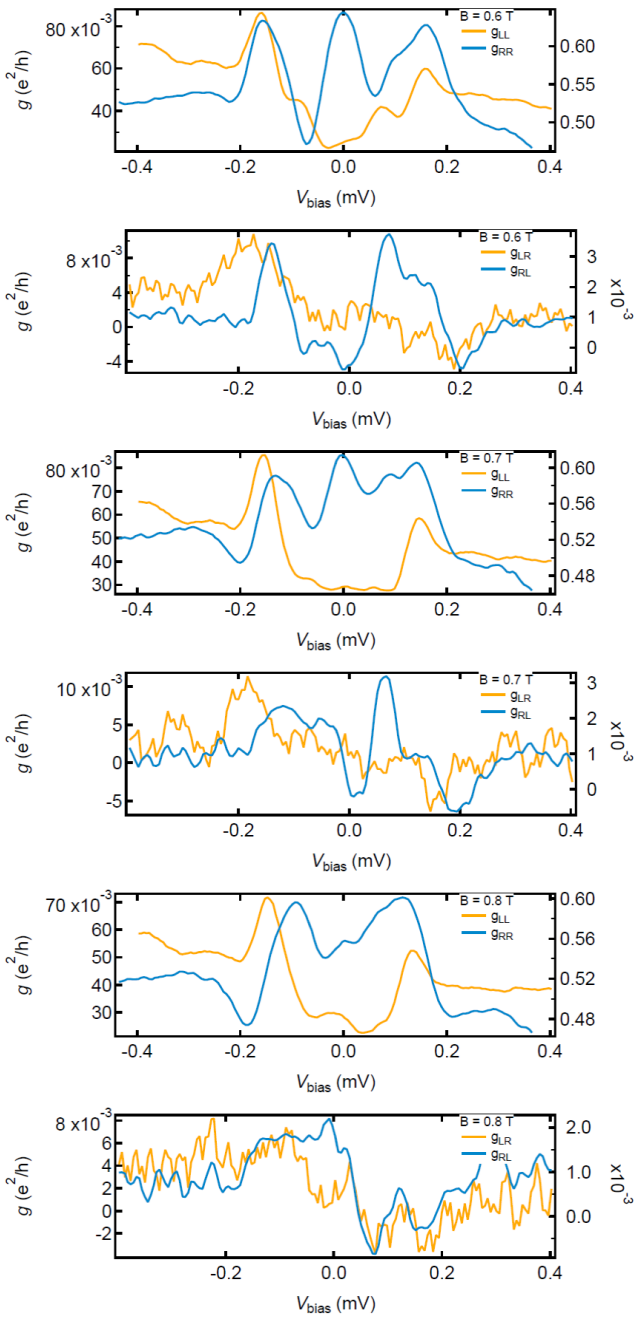
Data # 3870 (_2)

Vp = -1.43 V

Vgl = -0.68 V

Vgr = -0.61 V





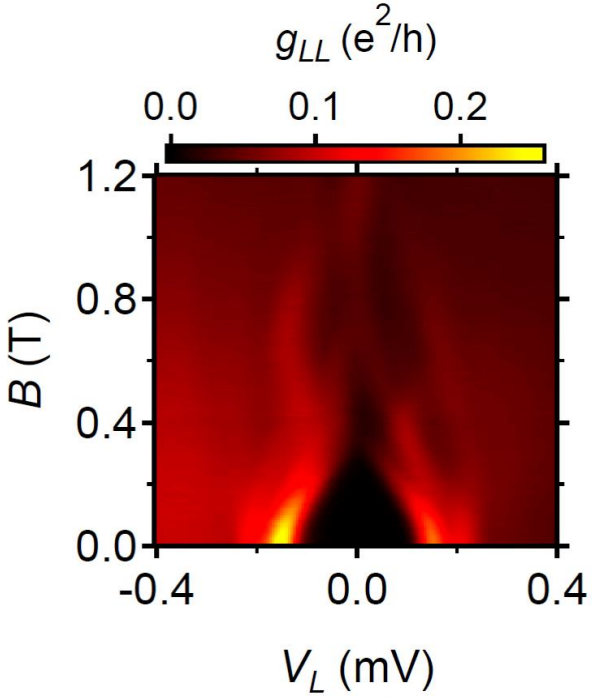
Another example.

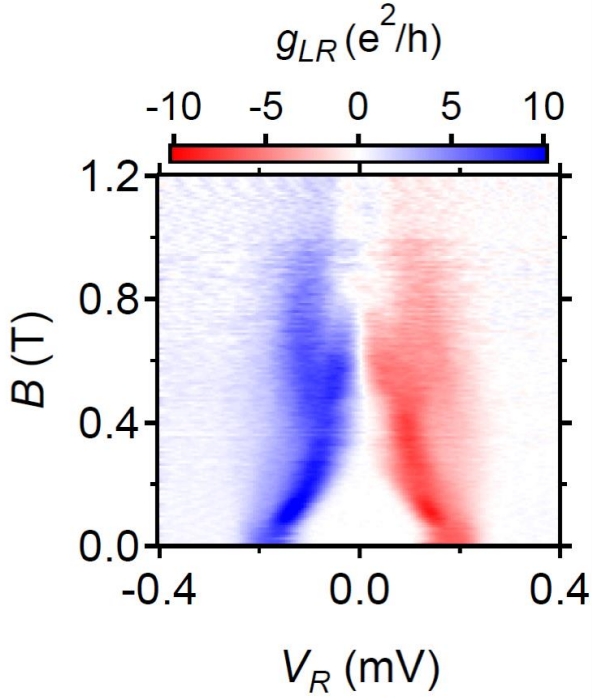
Data # 4308

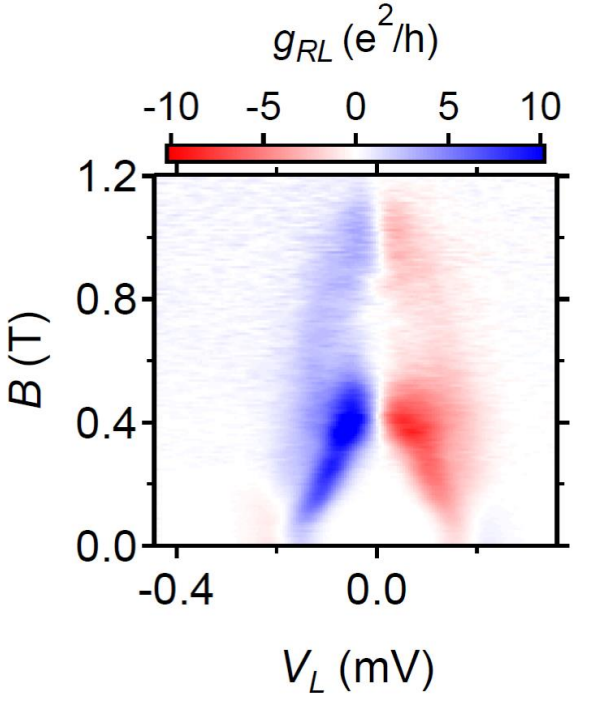
Vp = -1.4

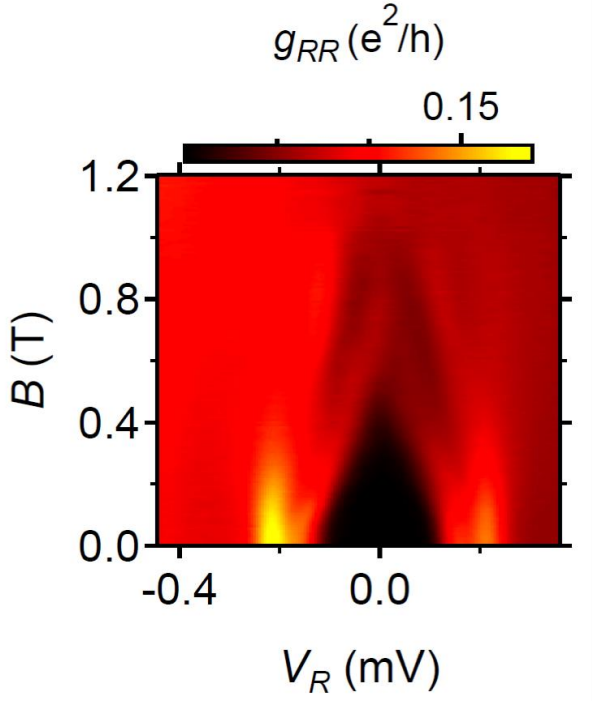
Vgl = -0.701

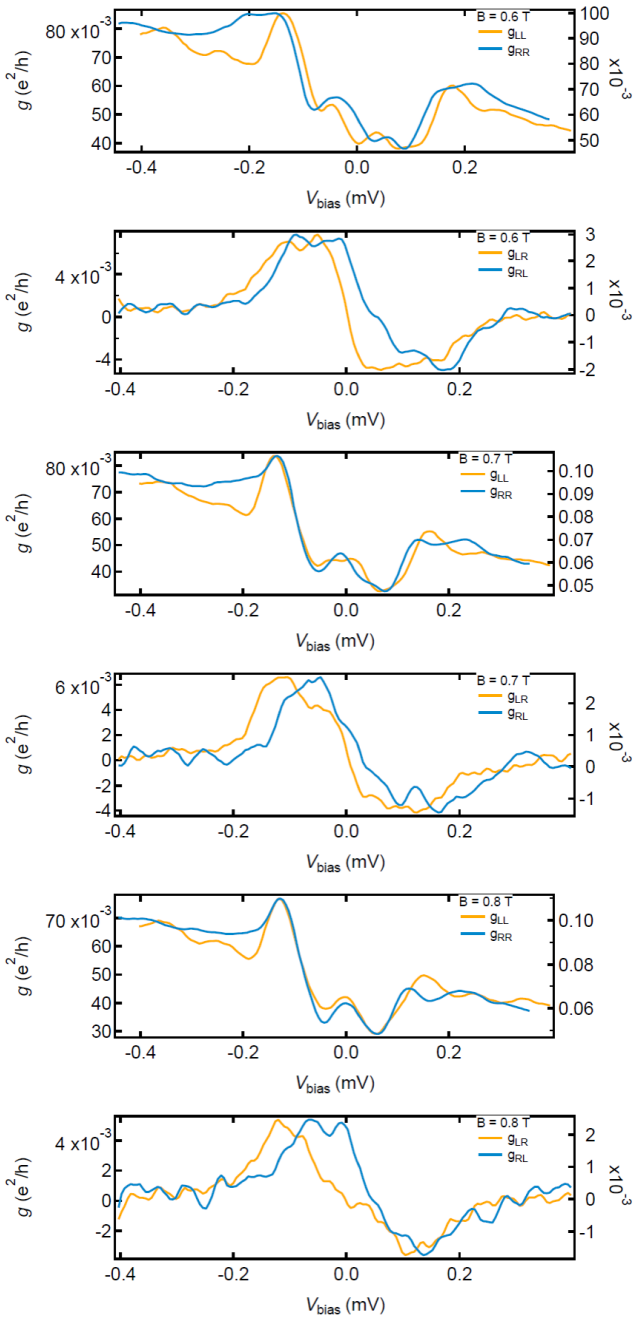
Vgr = -0.619











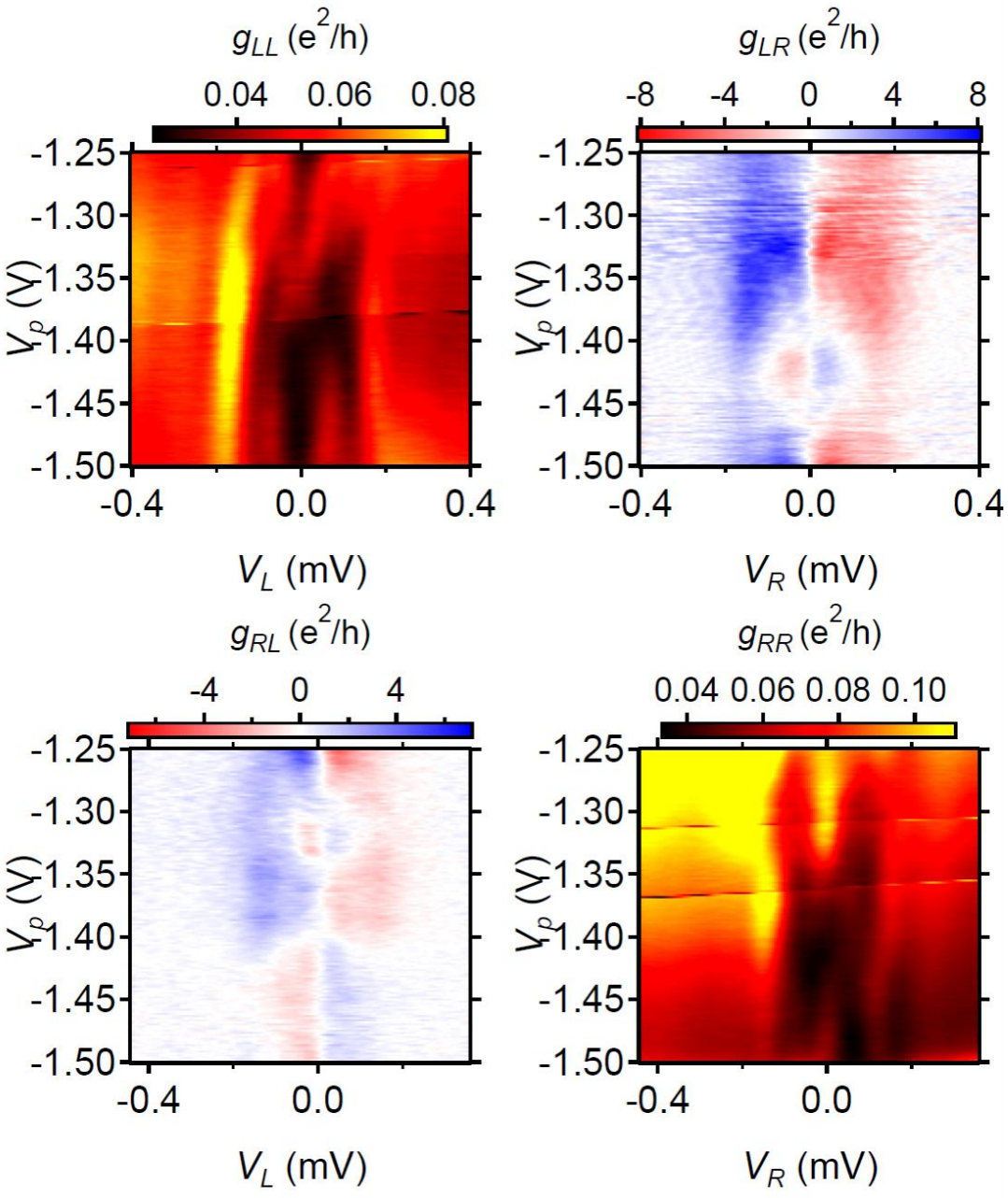
Another example.
(data from Fig.2 main text is a zoom-in of this)

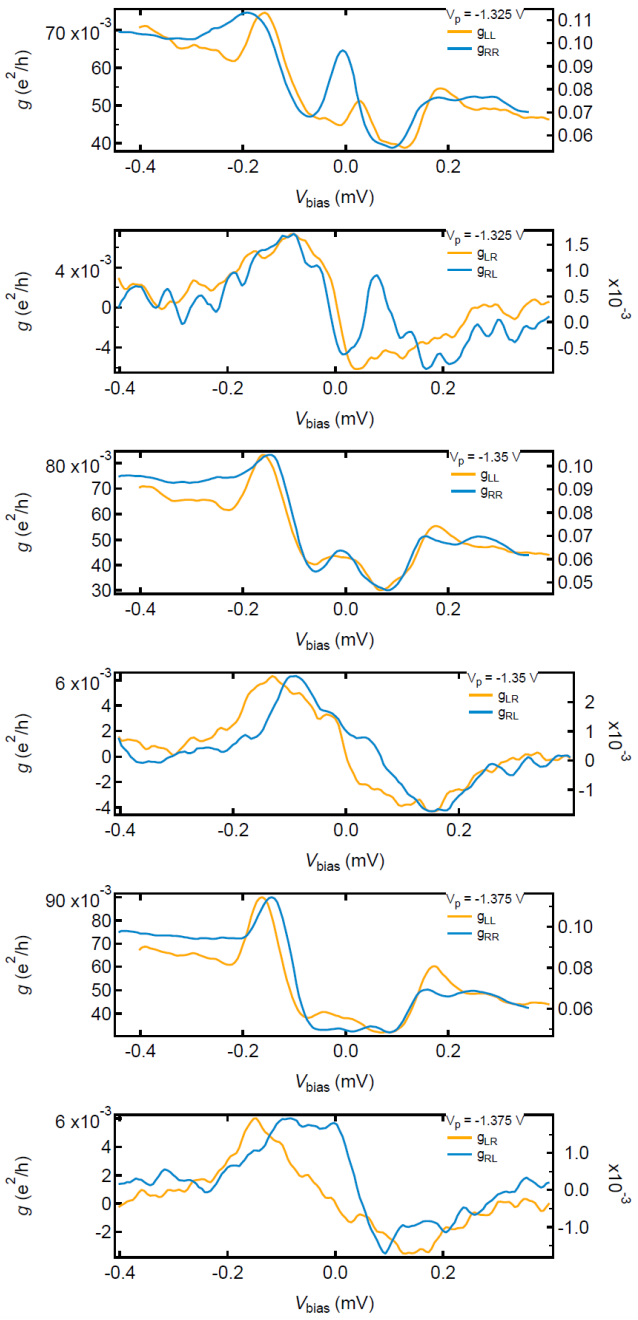
Data # 5111

Vp = -1.35V

Vgl = -0.701V

Vgr = -0.626 V





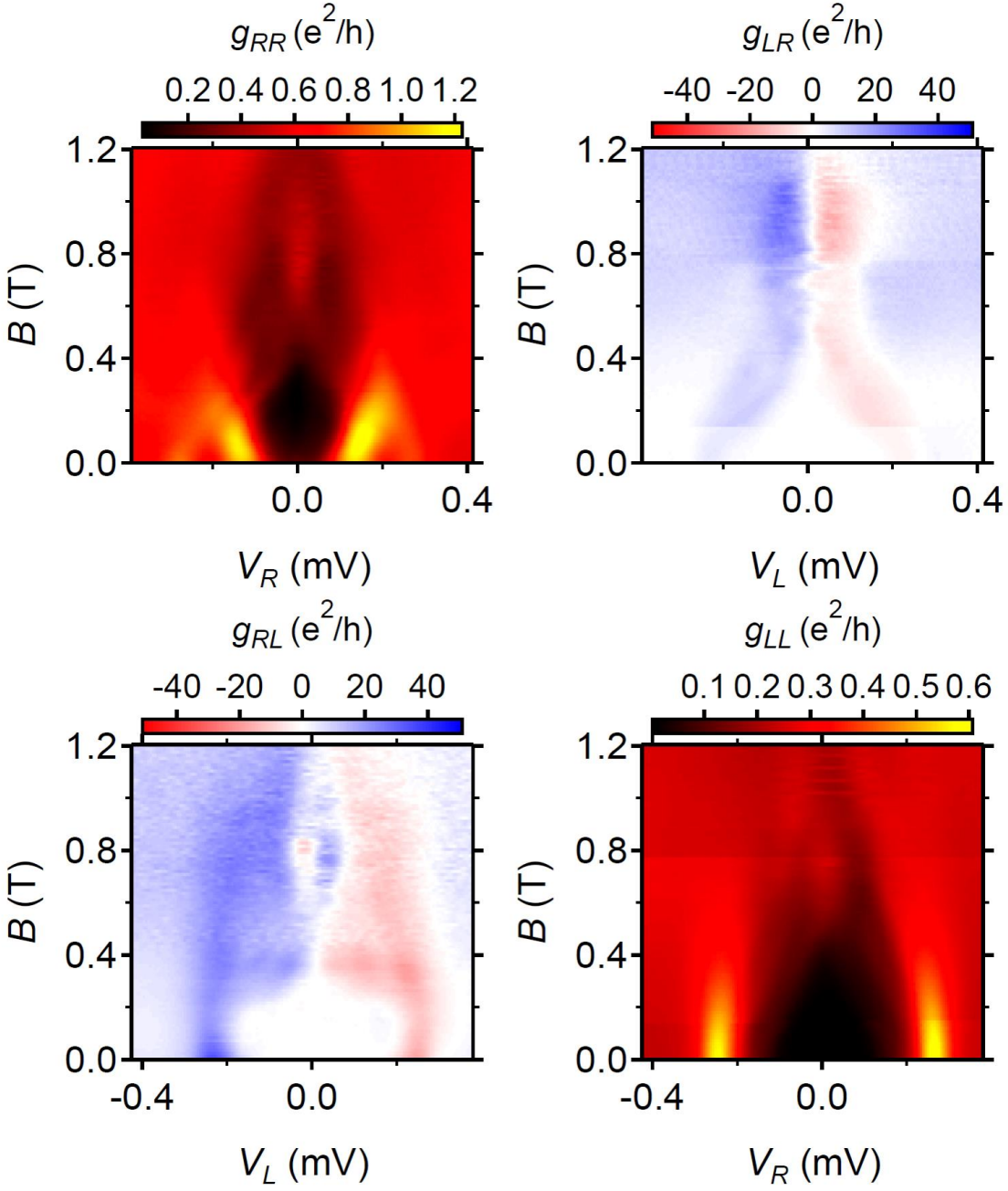
Another example
(data from Fig 3. main text is a zoom-in of this)

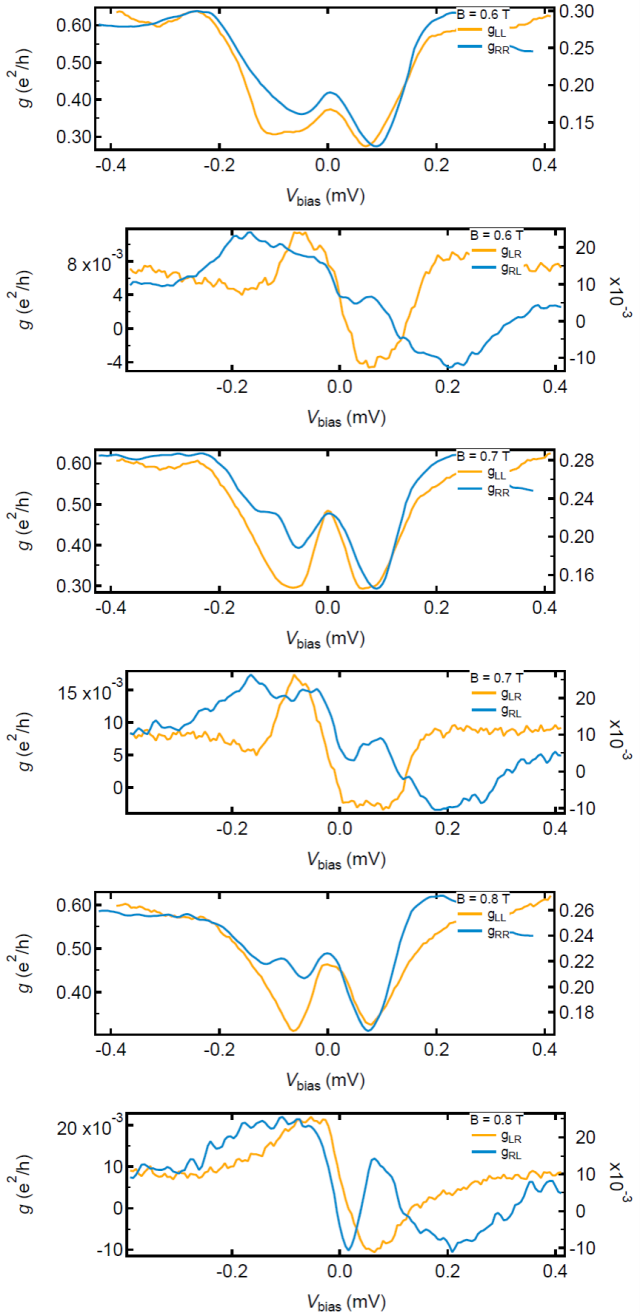
Data # 4787

B = 0.7 T

Vgl = -0.701 V

Vgr = -0.626 V





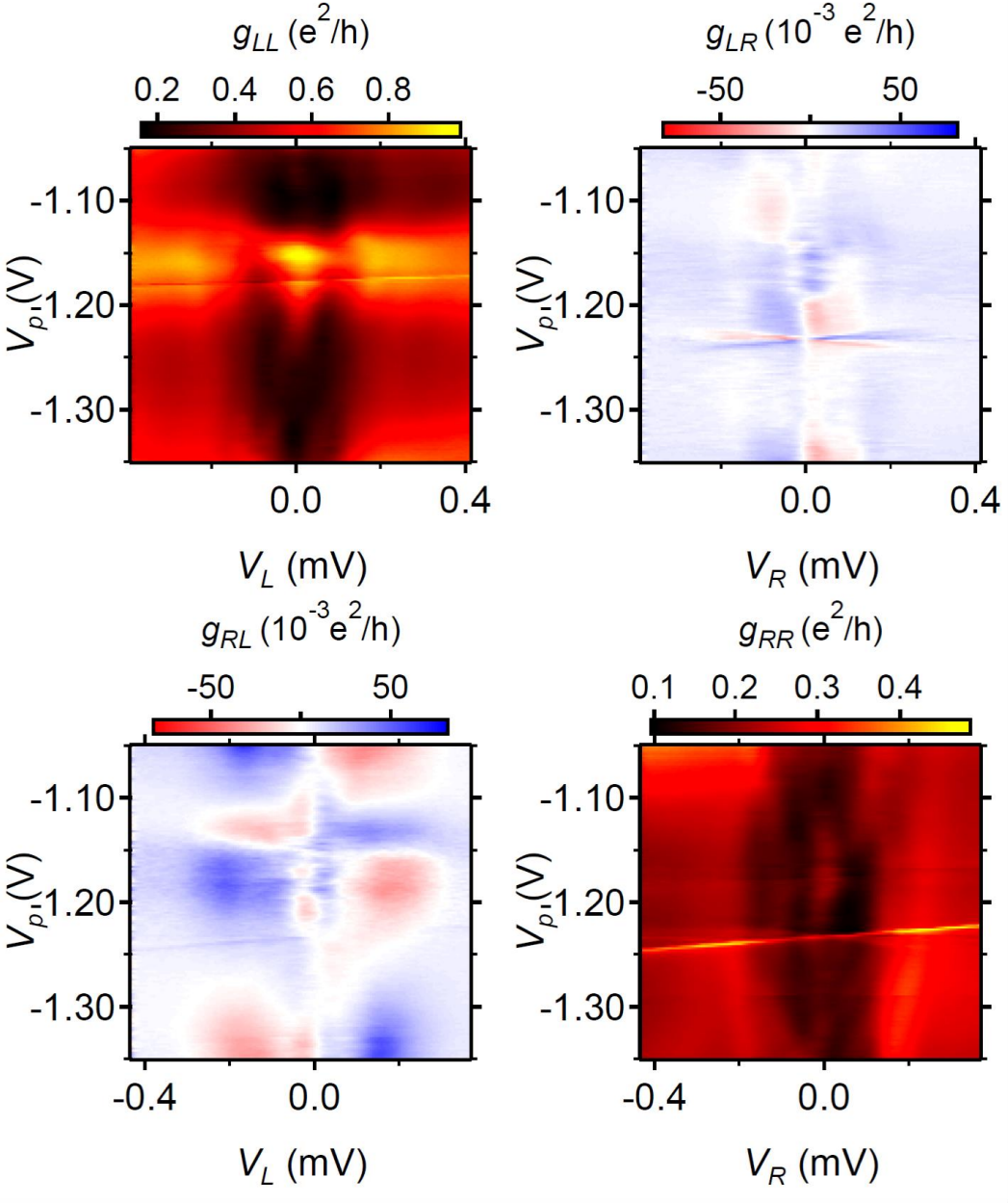
Another example.
(data from Fig.4 main text is a zoom-in of this)

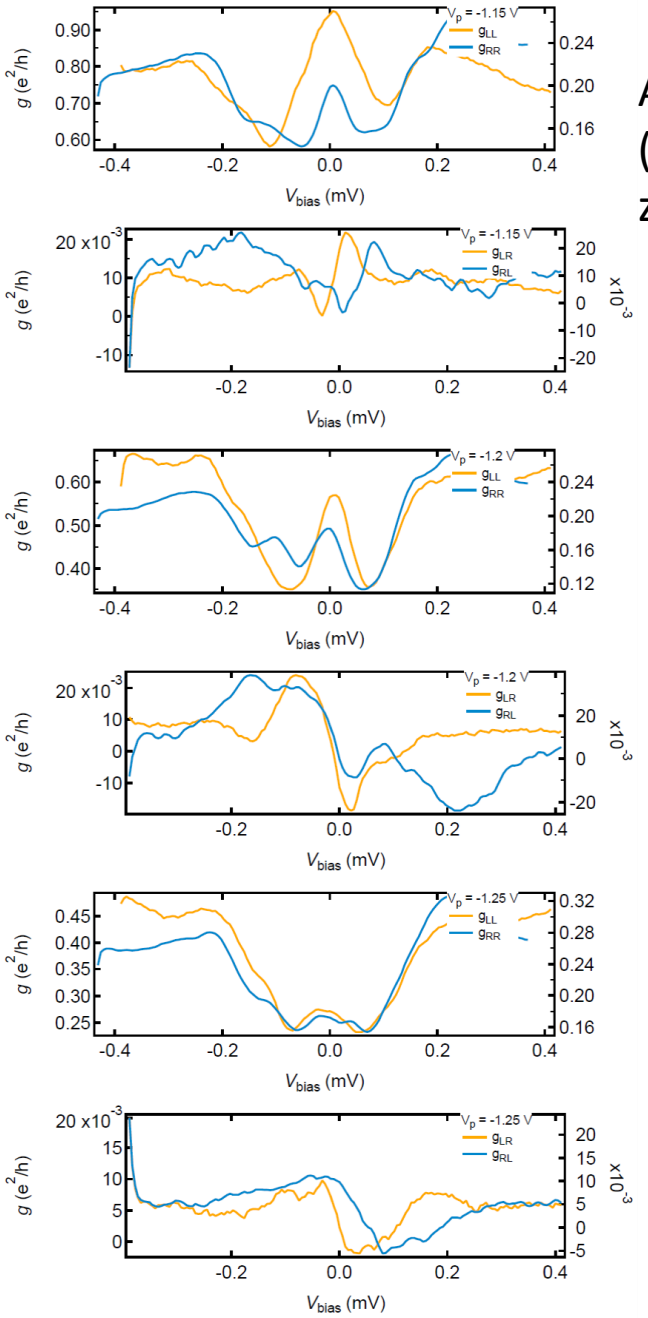
Data #16438

Vp = -1.2 V

Vgl = -0.696 V

Vgr = -0.84 V





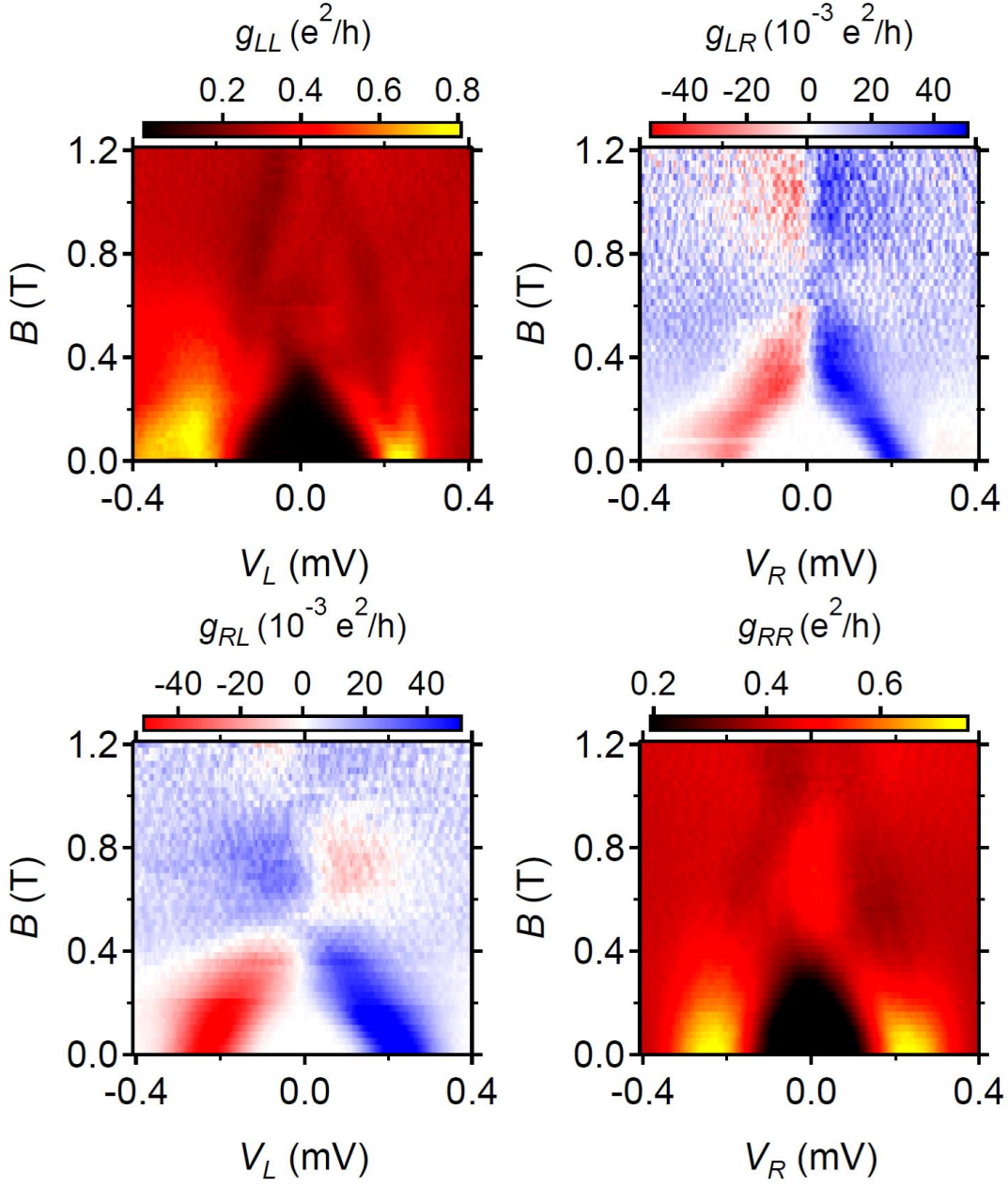
Another example
(data from Fig.4 main text is a zoom-in of this)

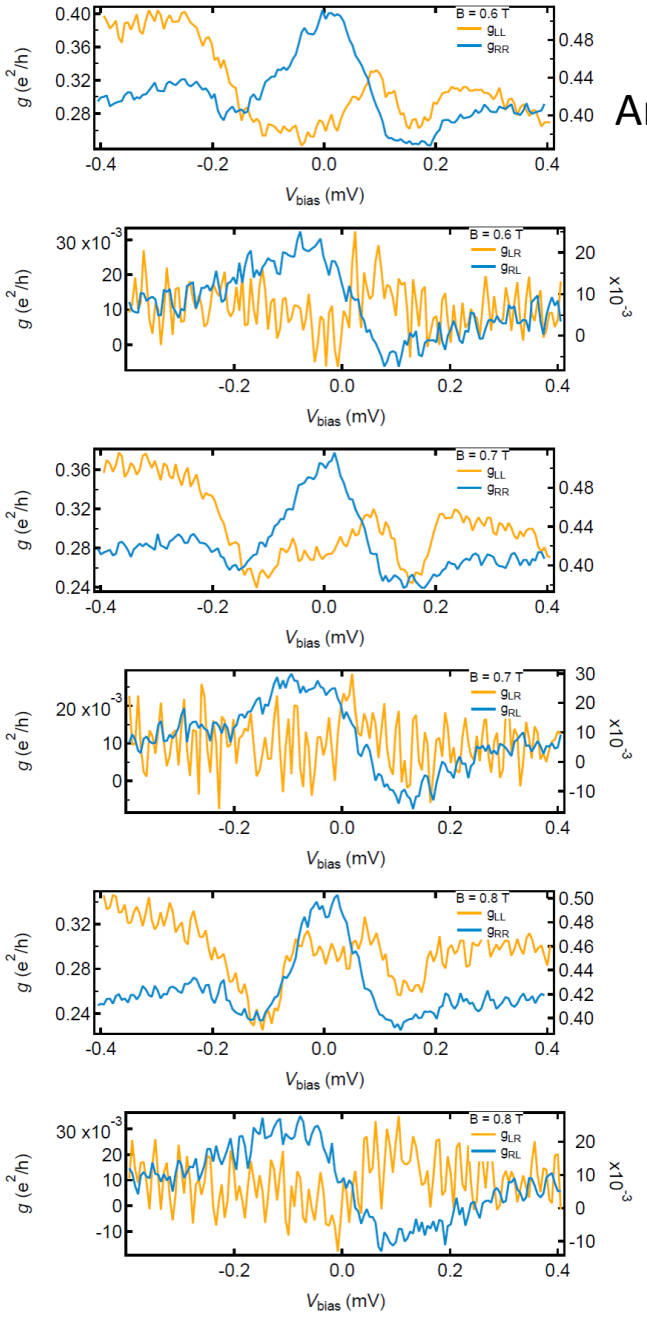
Data #1

B = 0.7 T

Vgl = -0.696 V

Vgr = -0.84 V





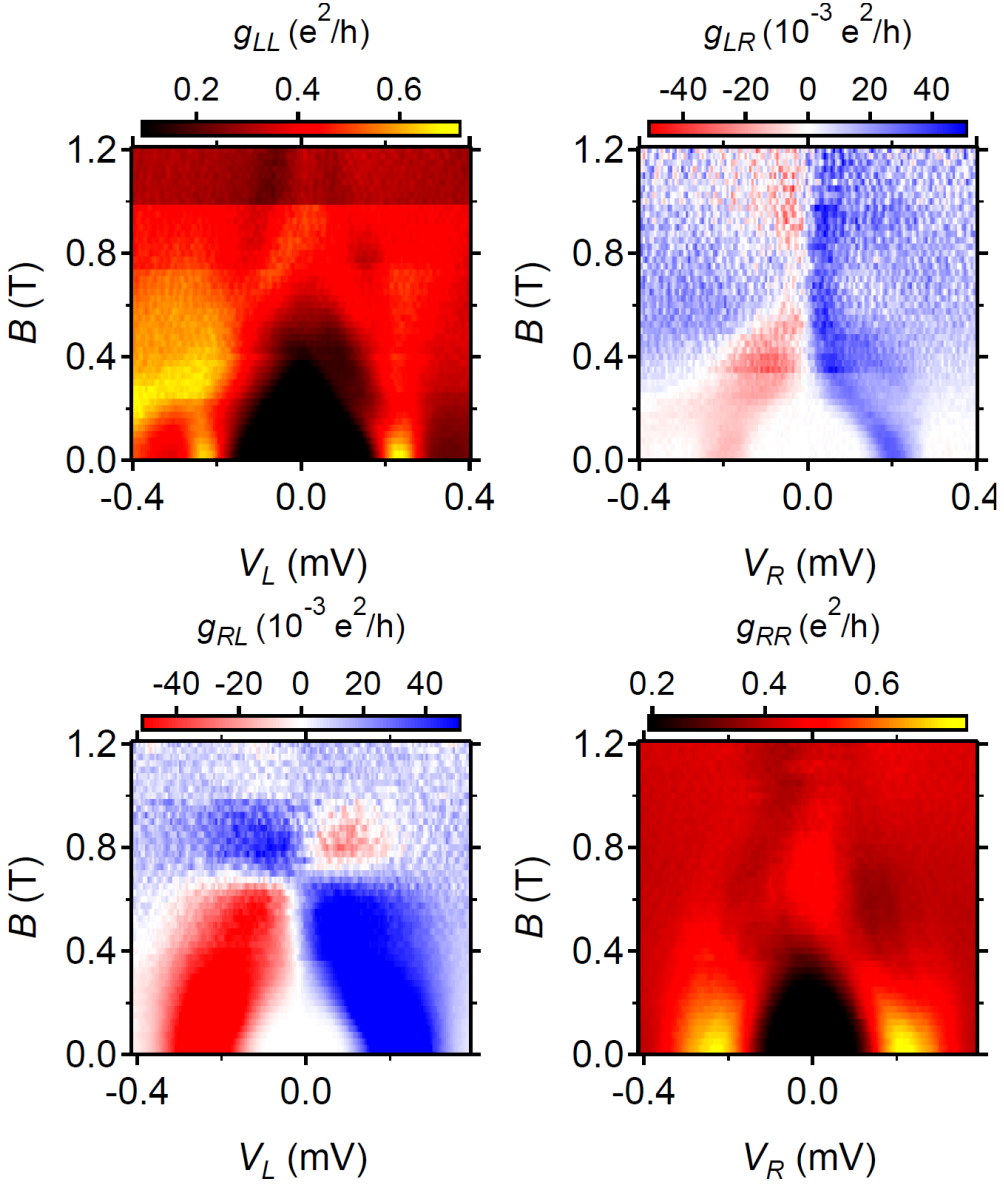
Another example.

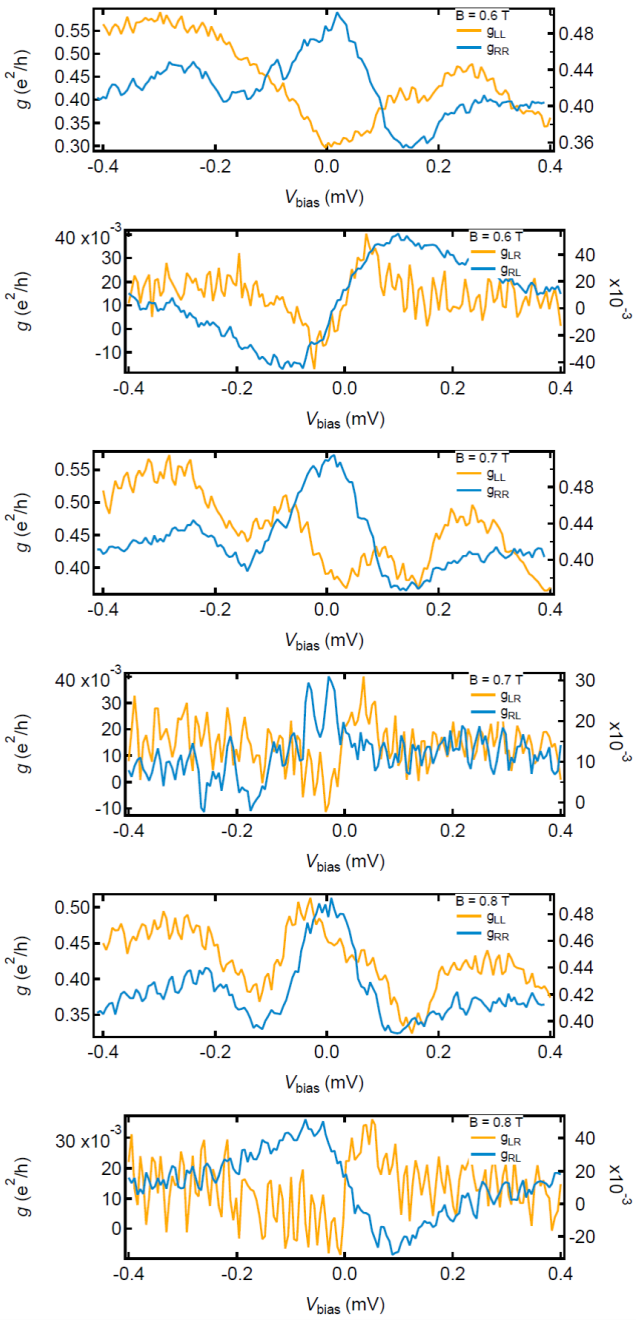
Data #4400

Vp = -0.7 V

Vgl = -0.649 V

Vgr = -0.5925 V





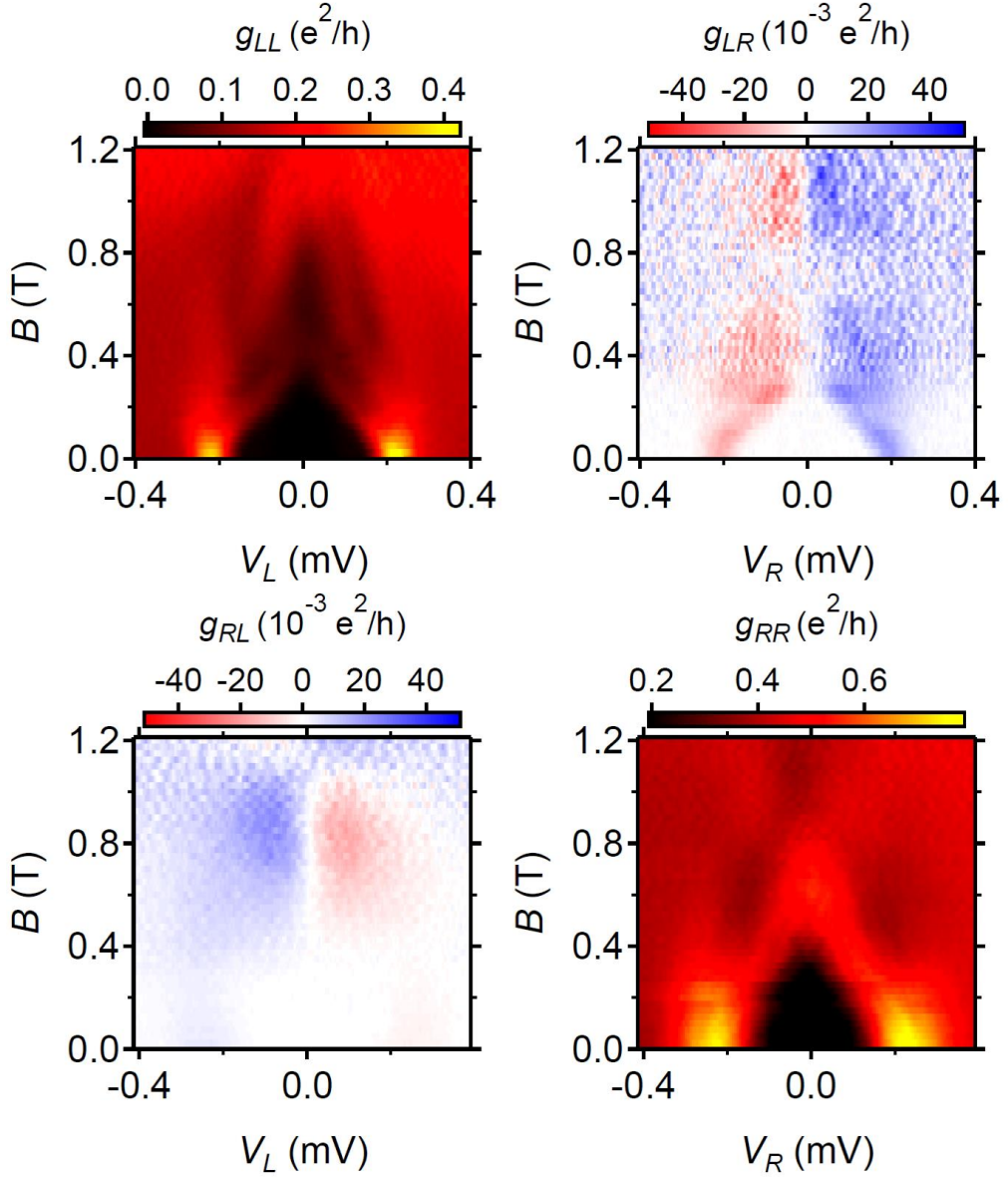
Another example.

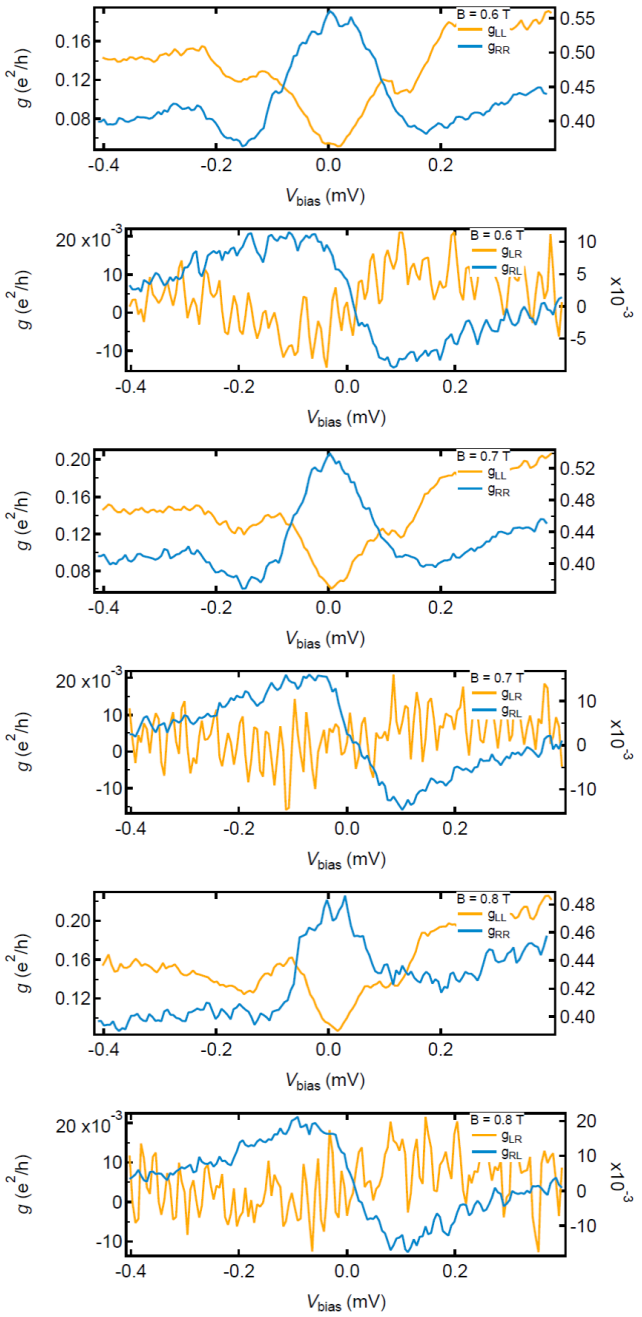
Data #4496

Vp = -0.7 V

Vgl = -0.649 V

Vgr = -0.5925 V





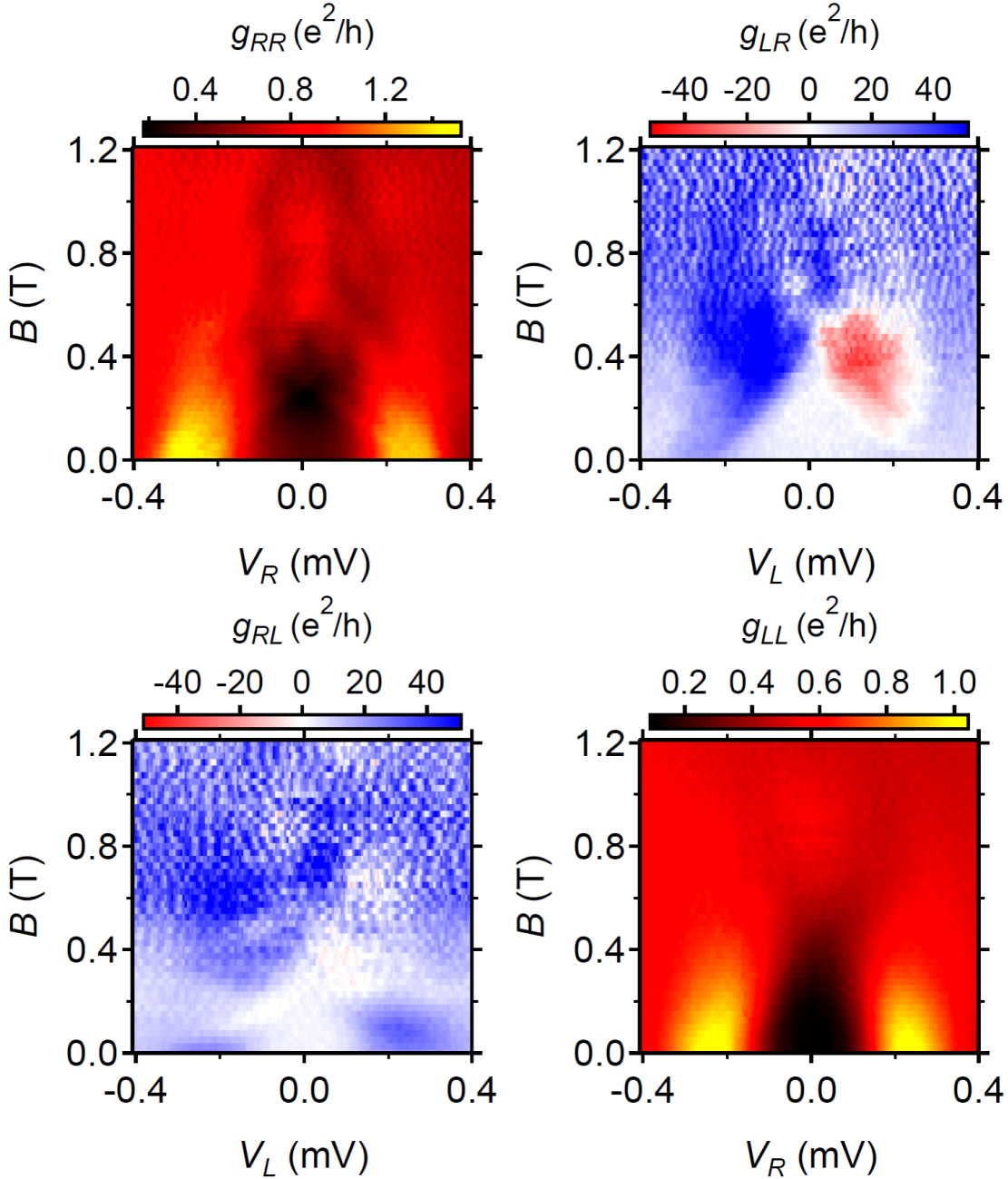
Another example.

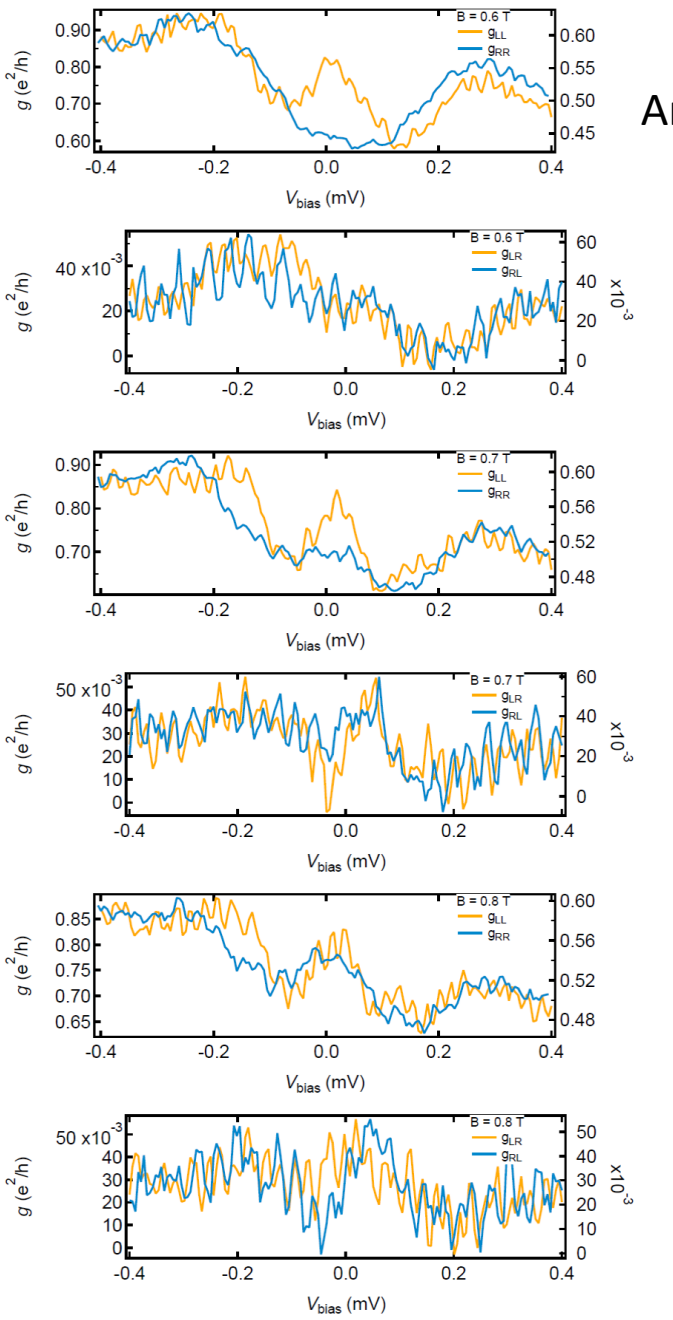
Data #4224

Vp = -0.7 V

Vgl = -0.697 V

Vgr = -0.597 V





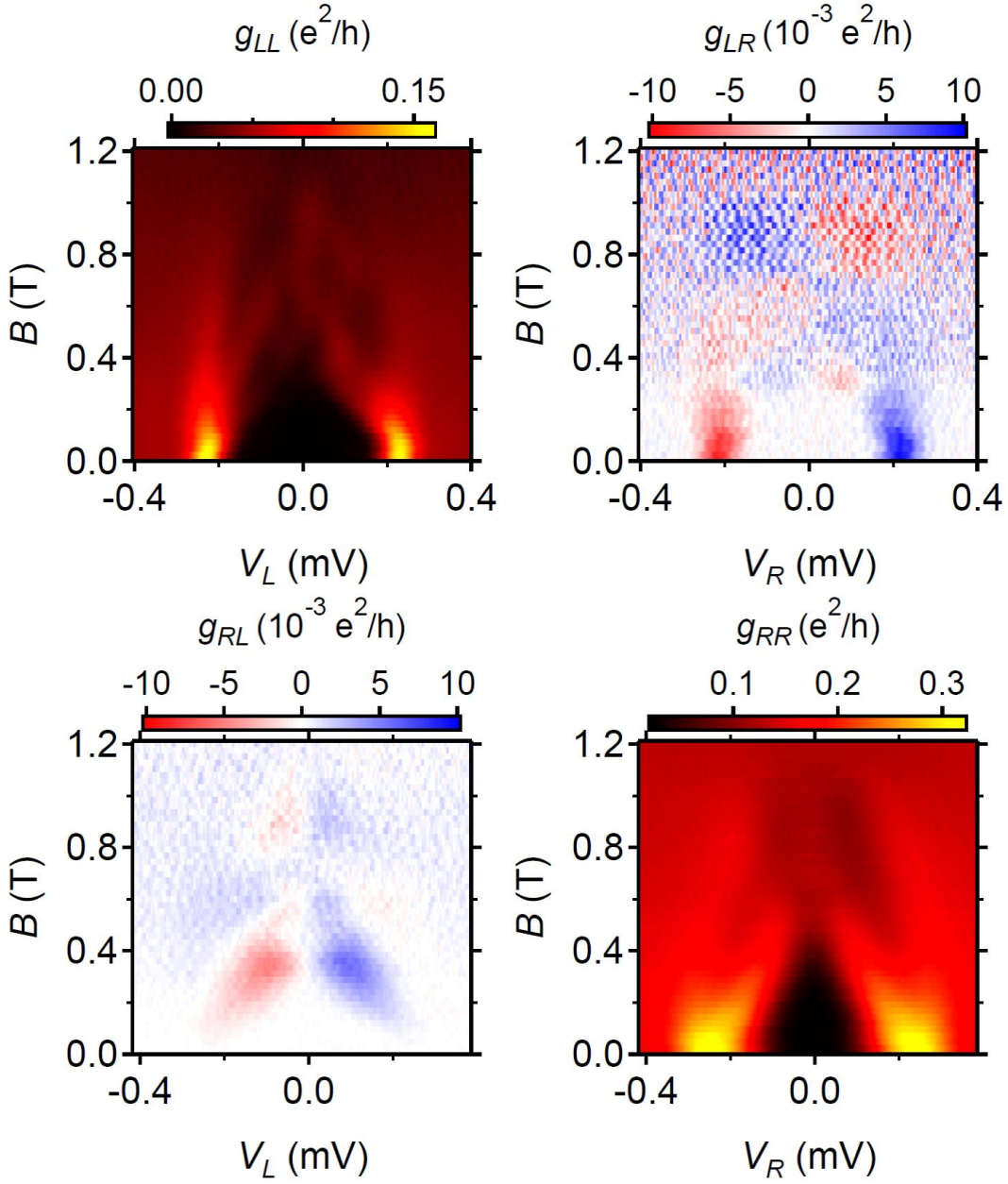
Another example.

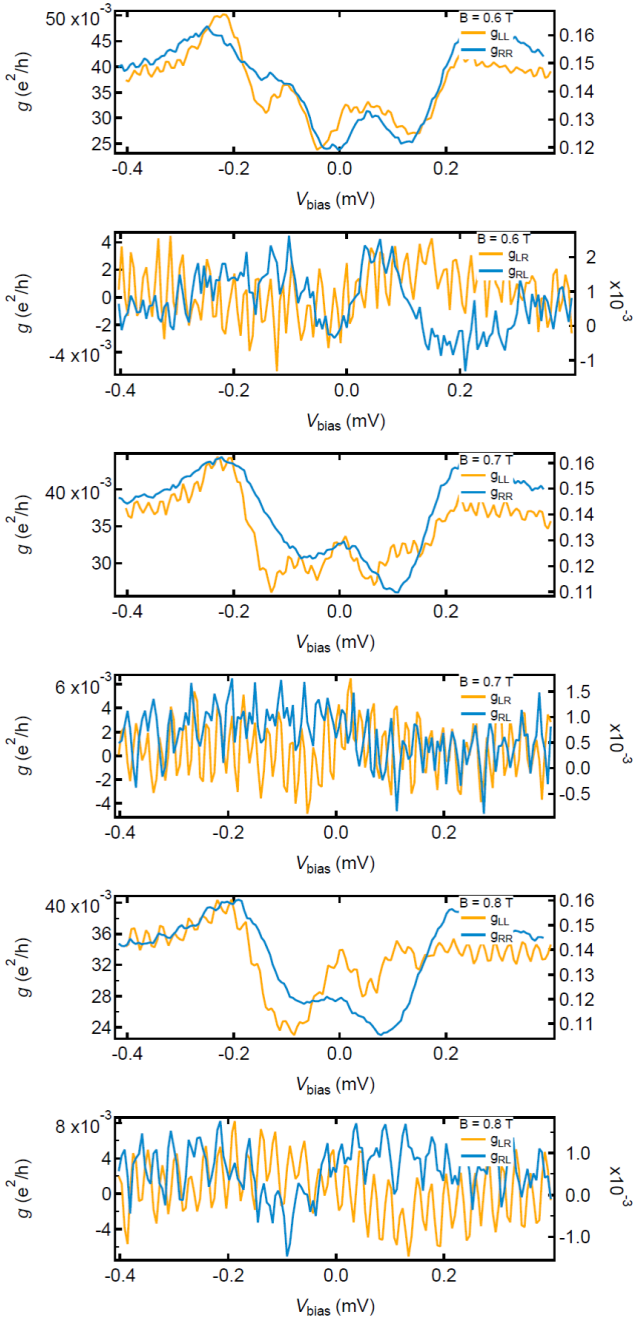
Data # 3968

Vp = -1.43 V

Vgl = -0.68 V

Vgr = -0.609 V





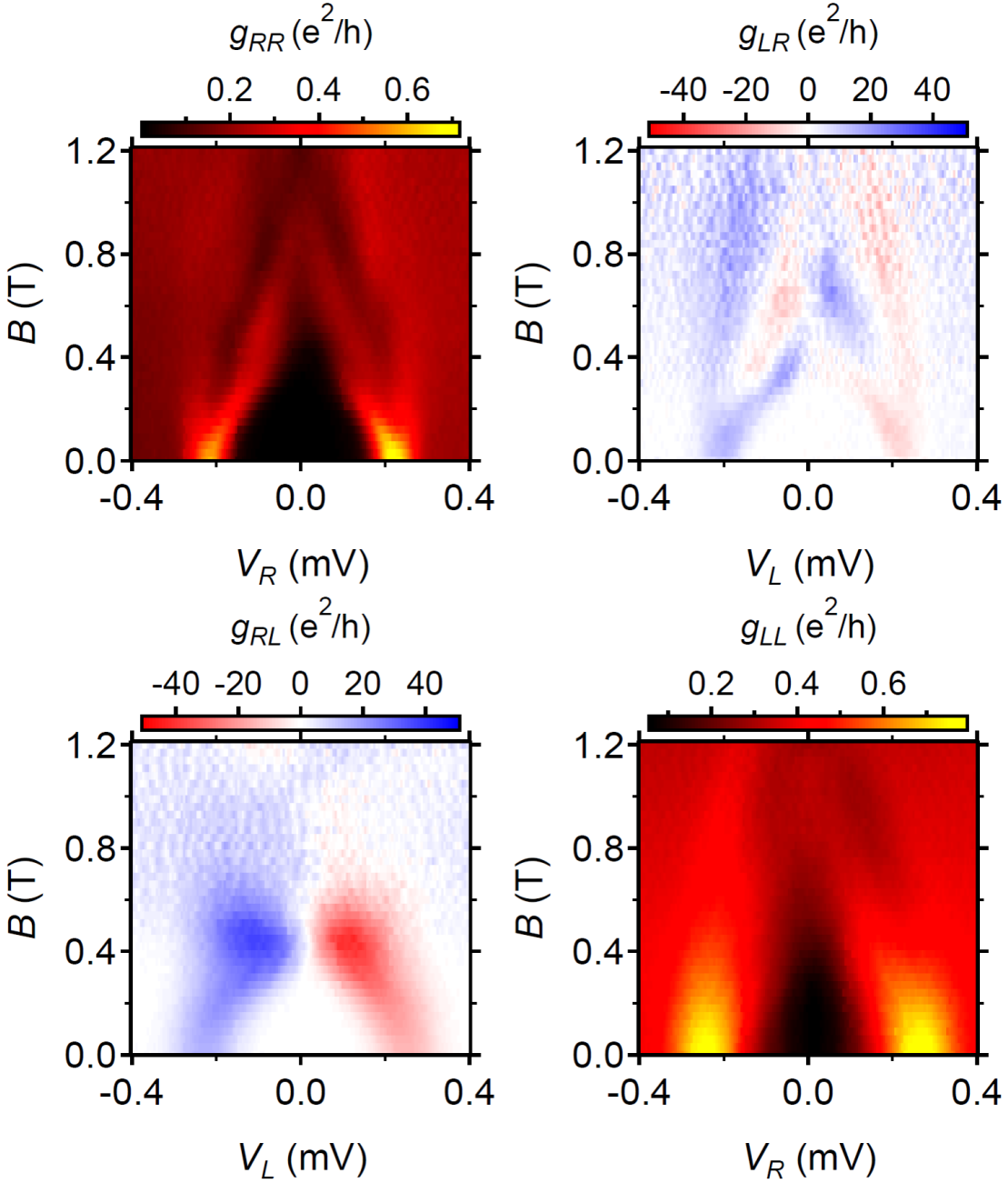
Another example.

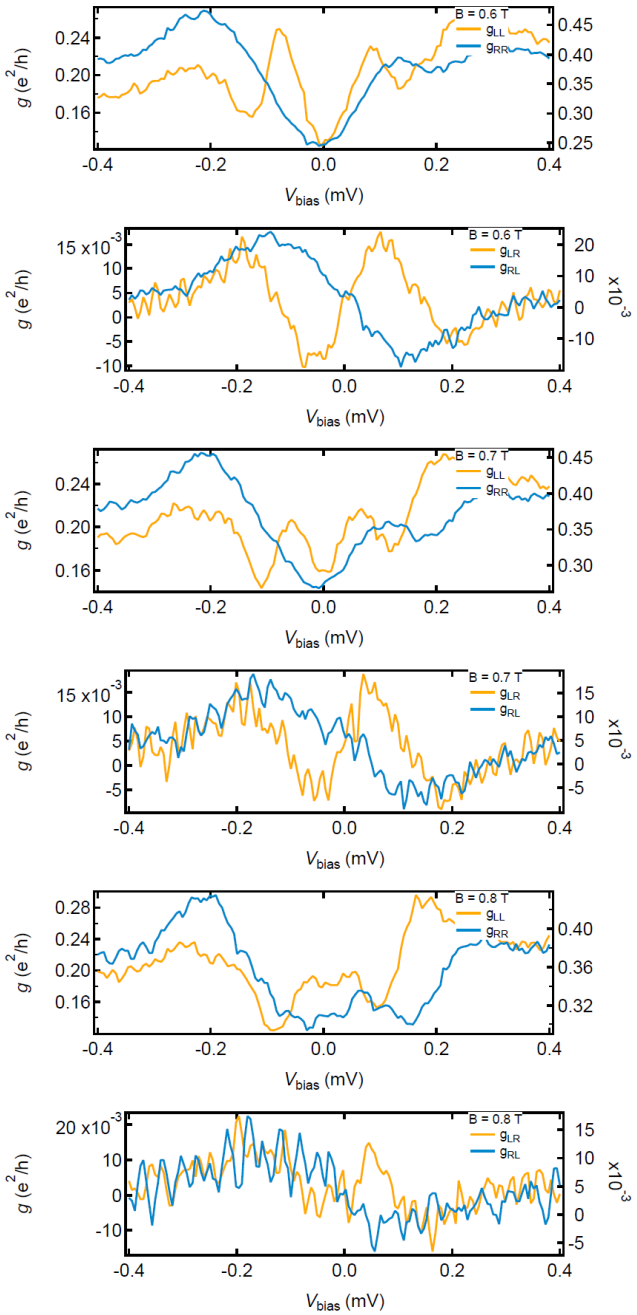
Data # 435

Vp = -1.35V

Vgl = -0.6905 V

Vgr = -0.596 V





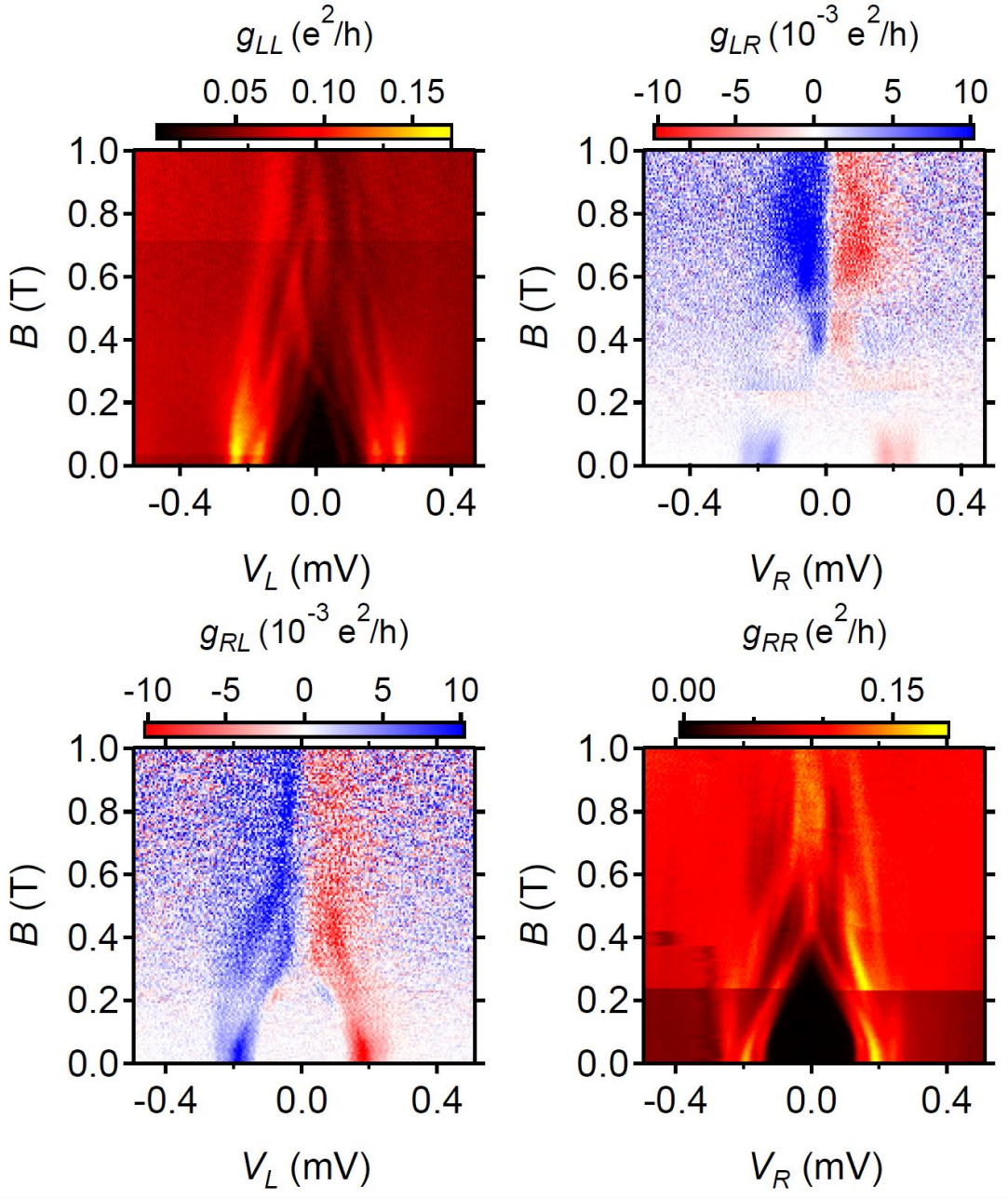
Another example.

Data #3582

Vp = -1.9 V

Vgl = -0.68 V

Vgr = -0.595 V



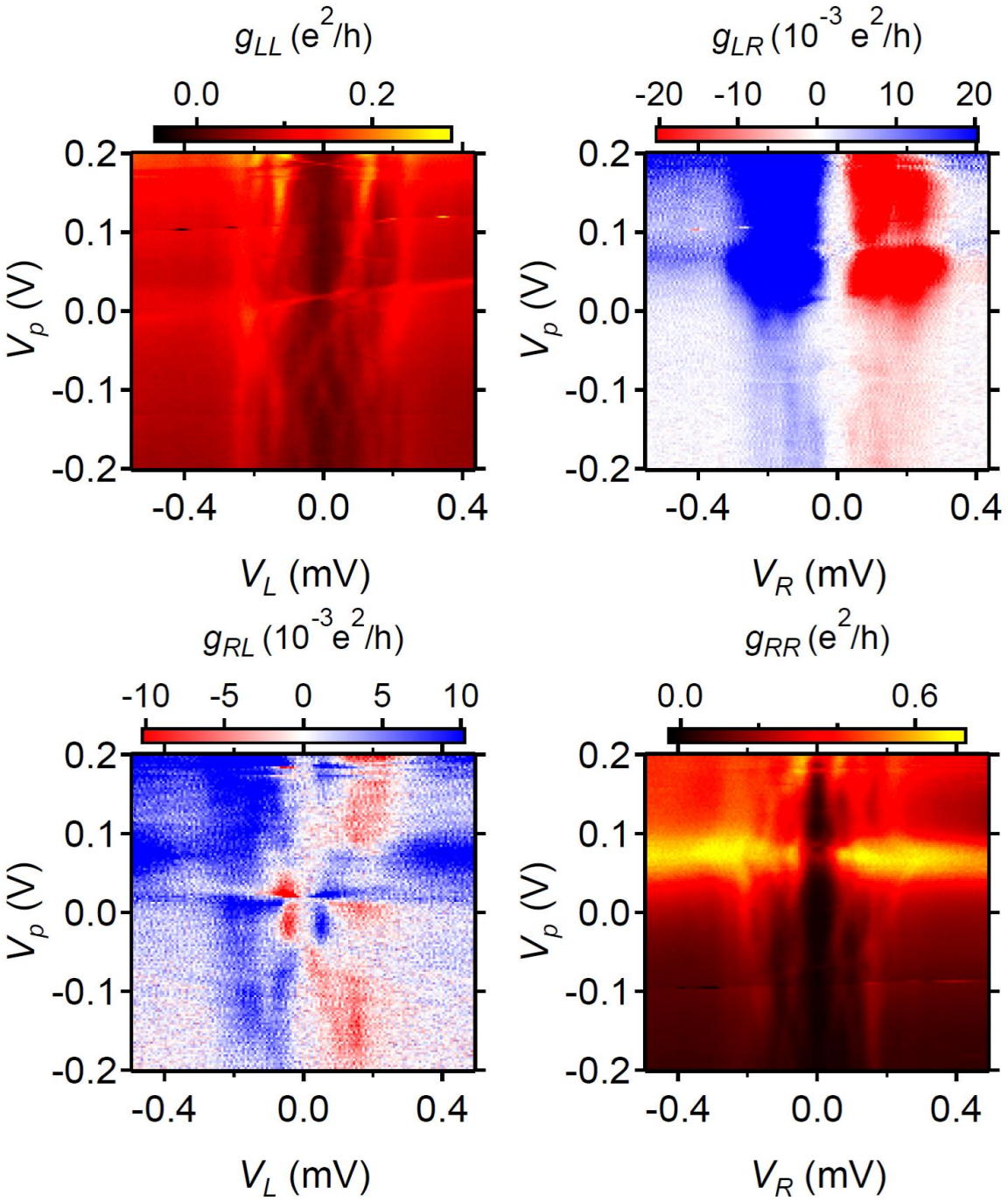
Another example.

Data #1406

Vp = -0.08 V

Vgl = -0.62 V

Vgr = -0.6795 V



Gate dependence.

Data #1706

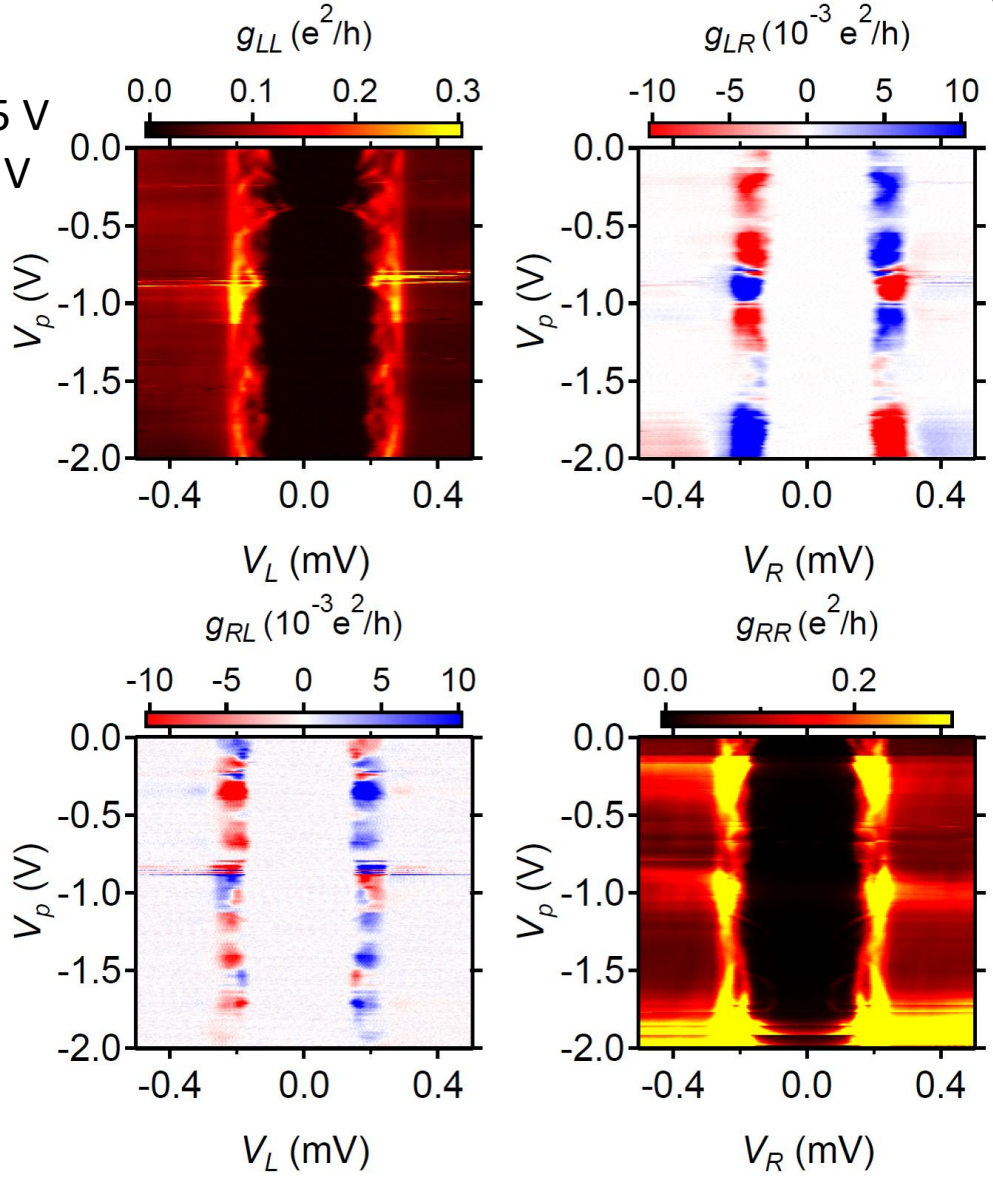
B = 0.3 T

Vgl = -0.62 V

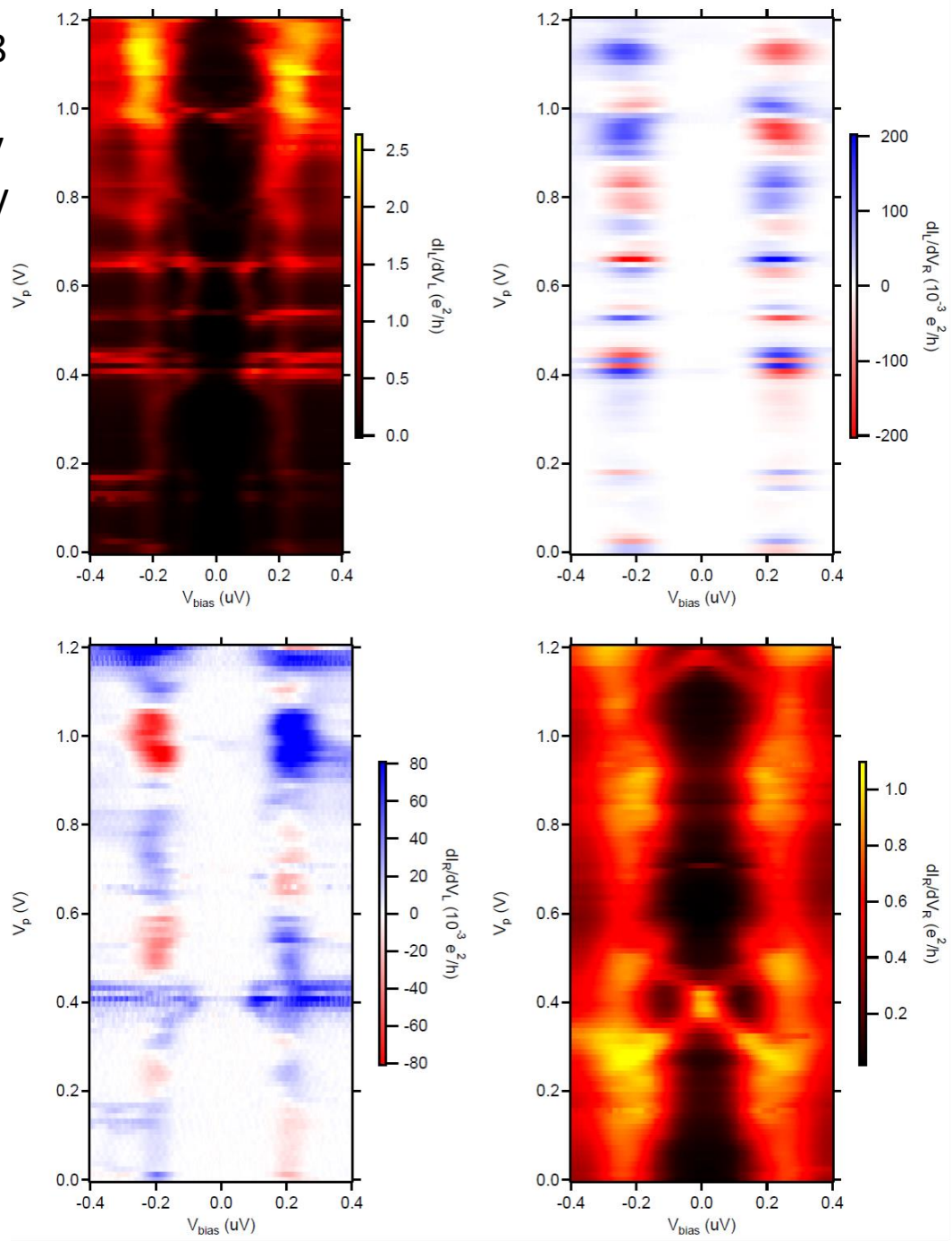
Vgr = -0.6795 V

Low field data

Data #315
B= 0T
Vgl = -0.615 V
Vgr = -0.66 V



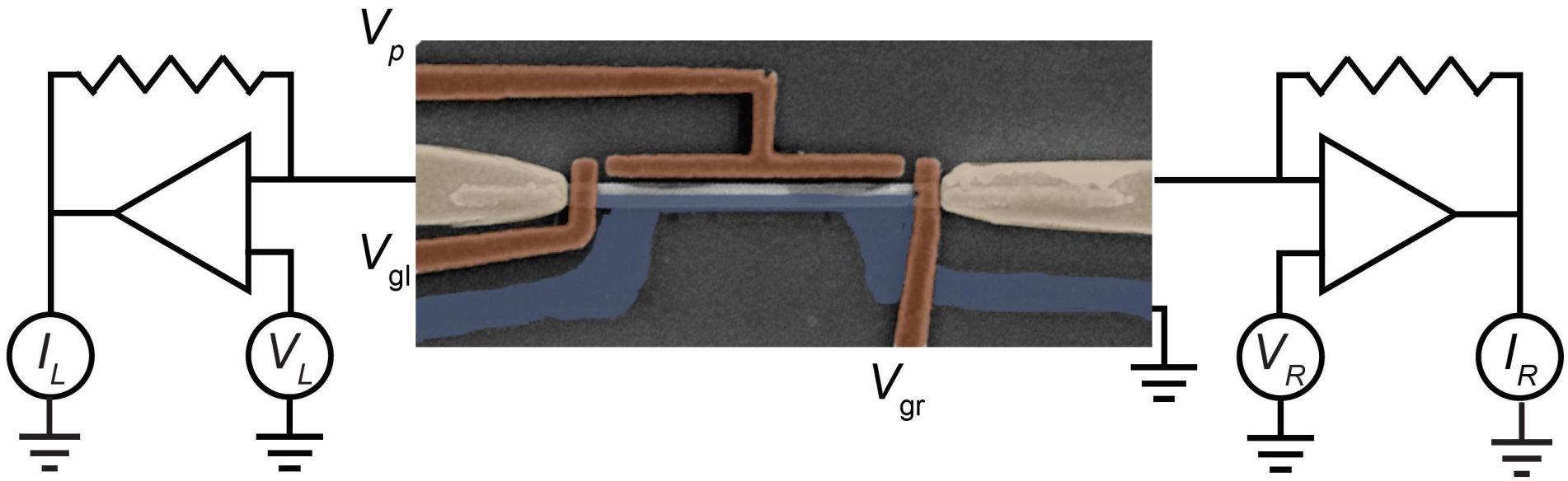
Data #4818
B= 0T
Vgl = -0.7 V
Vgr = -0.6 V



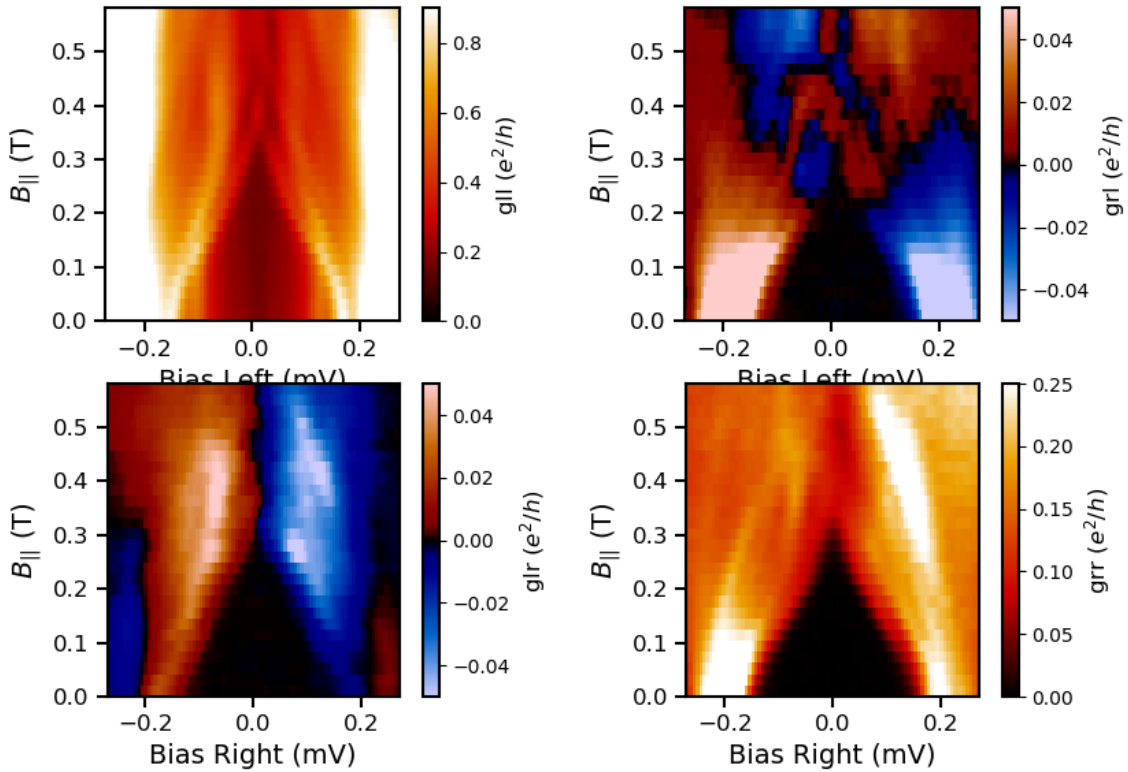
2um correlation device

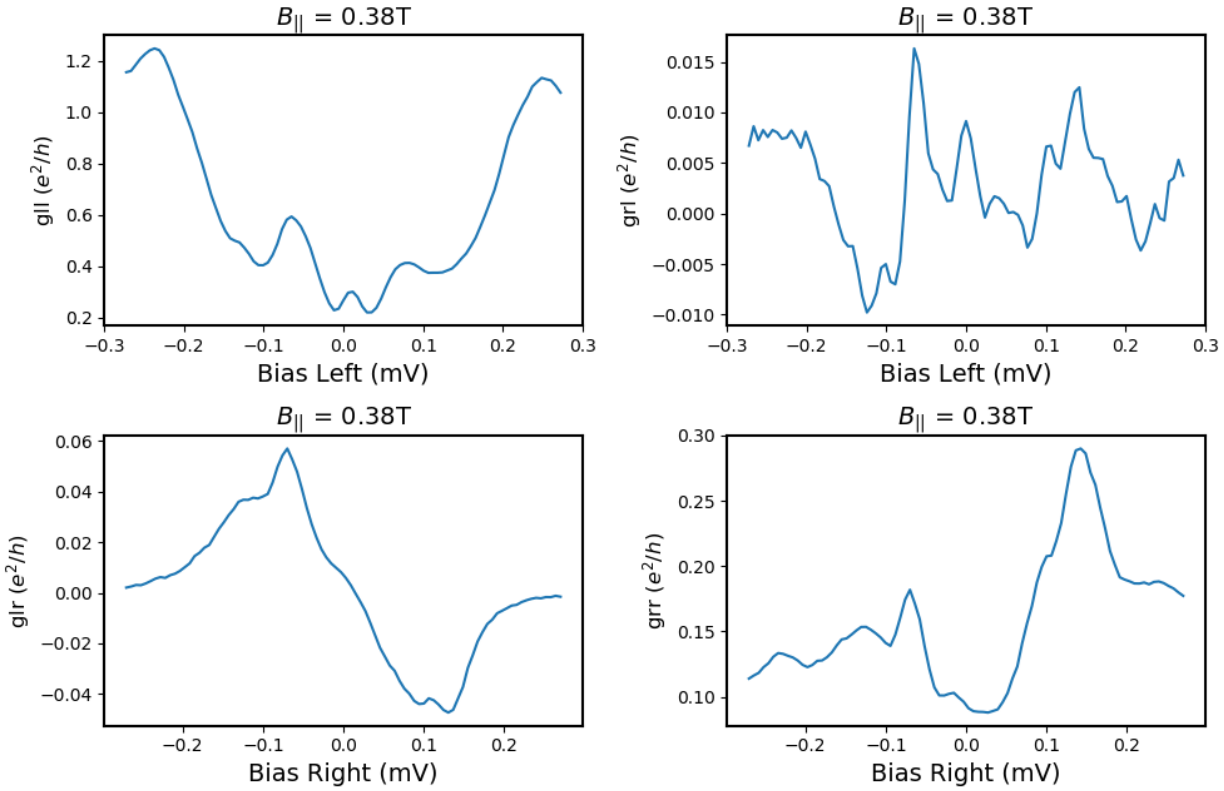
M071918Gg2FE2

Device 2 - Extended data



Dataset 1
318

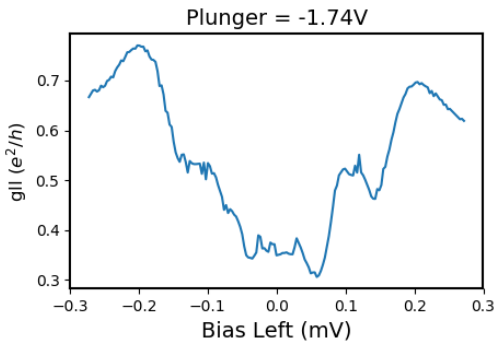


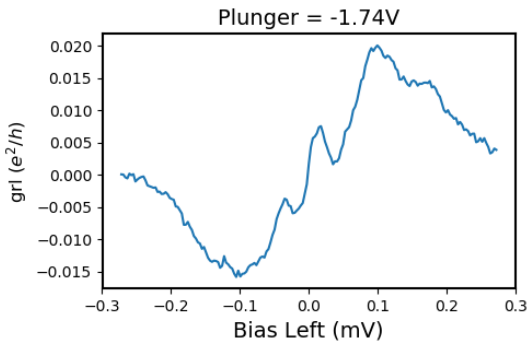


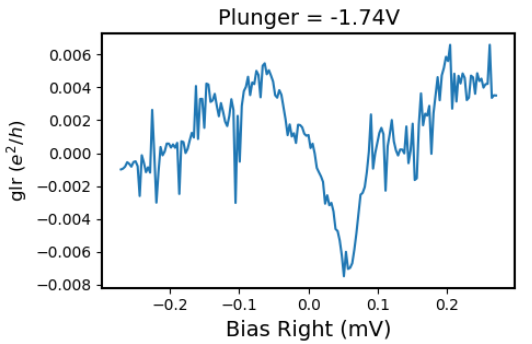
Parameters from 318
Left Barrier = -0.8085V
Right Barrier = -0.8662V
Plunger = -1.7475 V

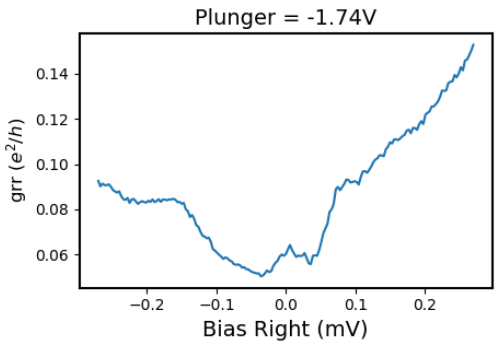
Dataset 1
308

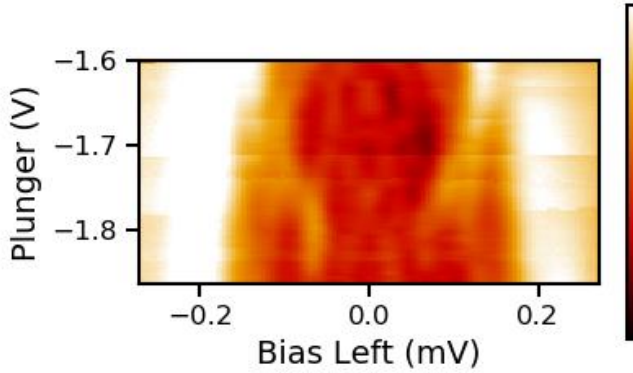
Parameters from 318
Left Barrier = -0.8085 V
Right Barrier = -0.8662 V
Field = 0.7 T

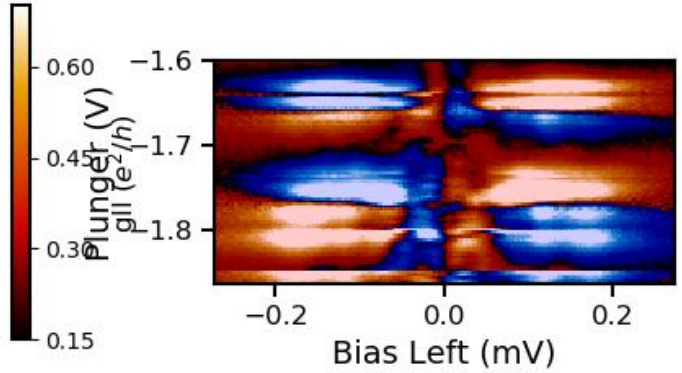


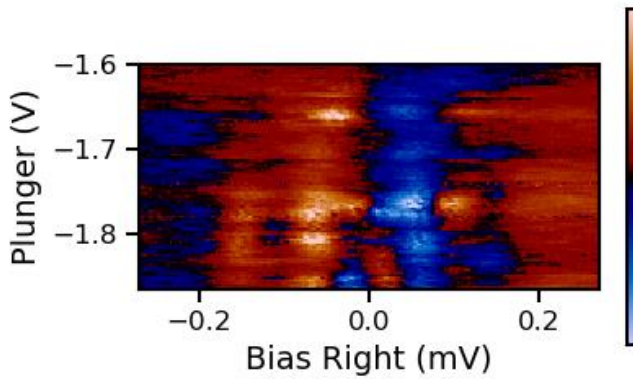


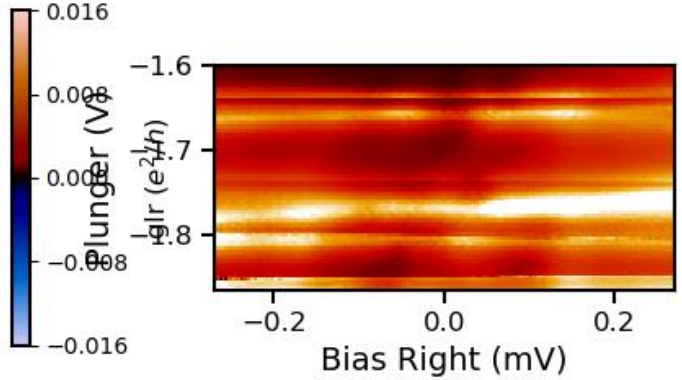


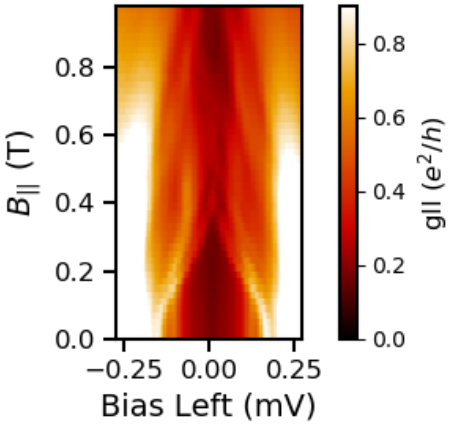


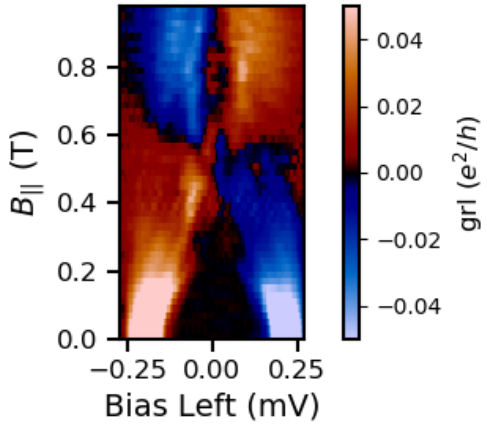


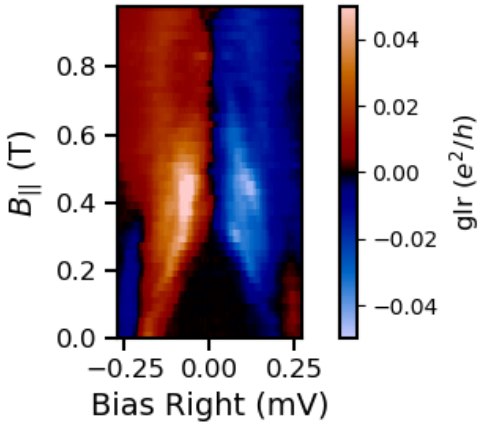


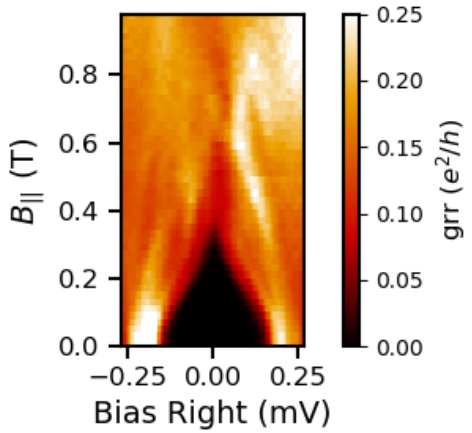






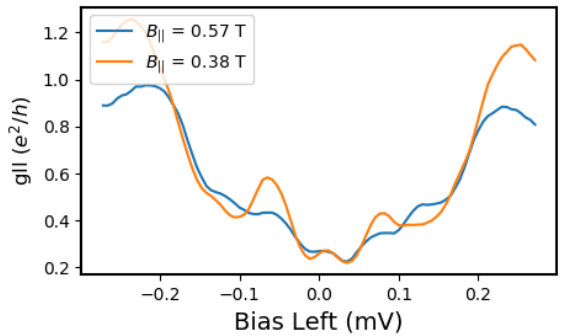


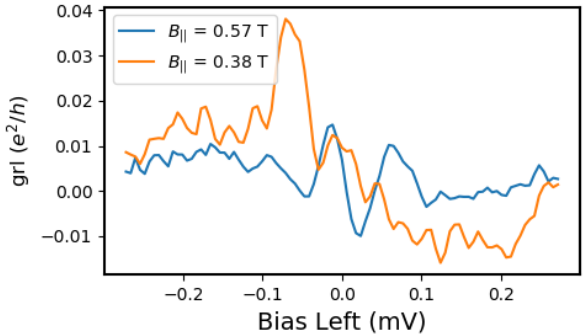


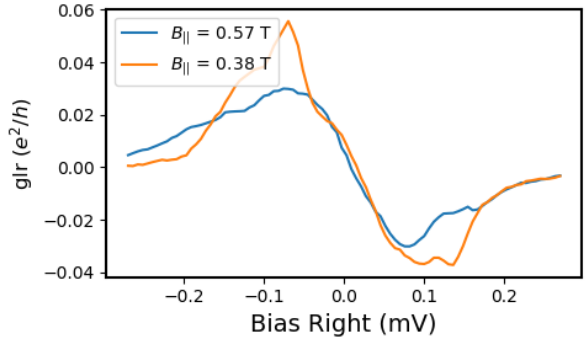


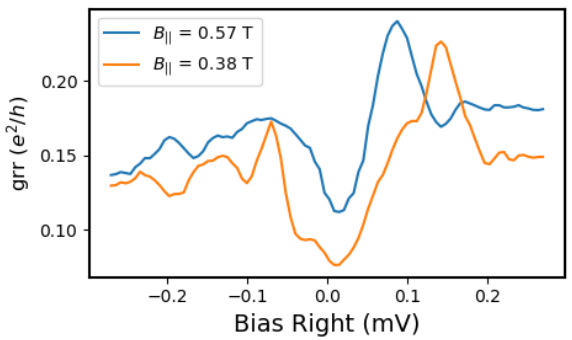
Dataset 1
319

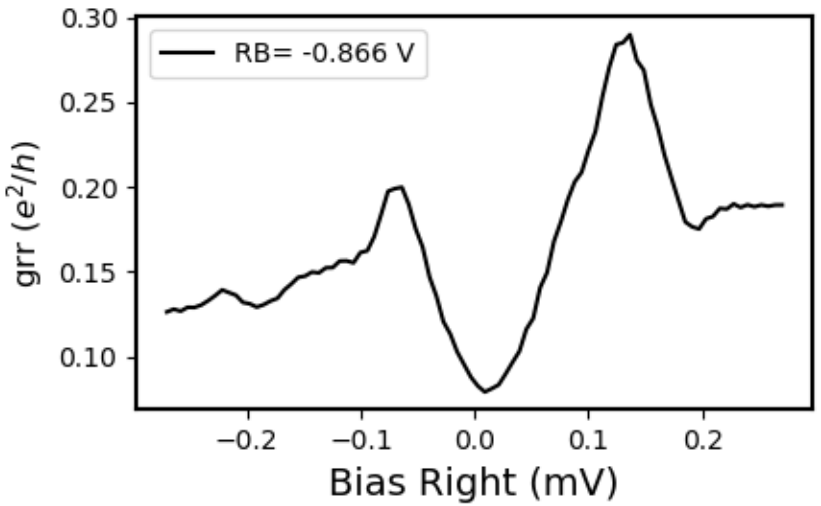
Parameters from 318
Left Barrier = -0.8085V
Right Barrier = -0.8662V
Plunger = -1.7475 V

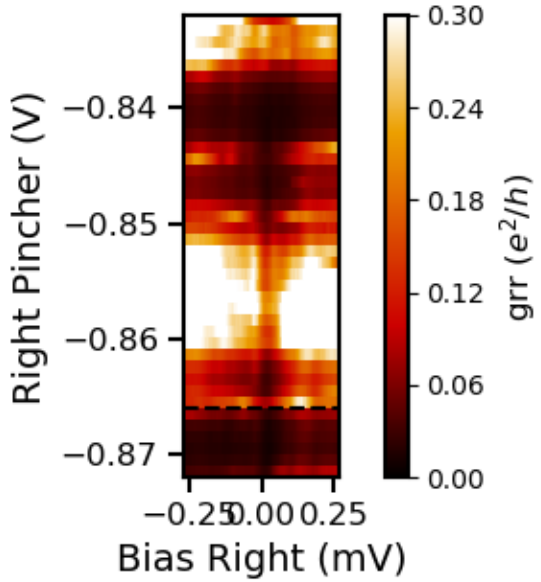






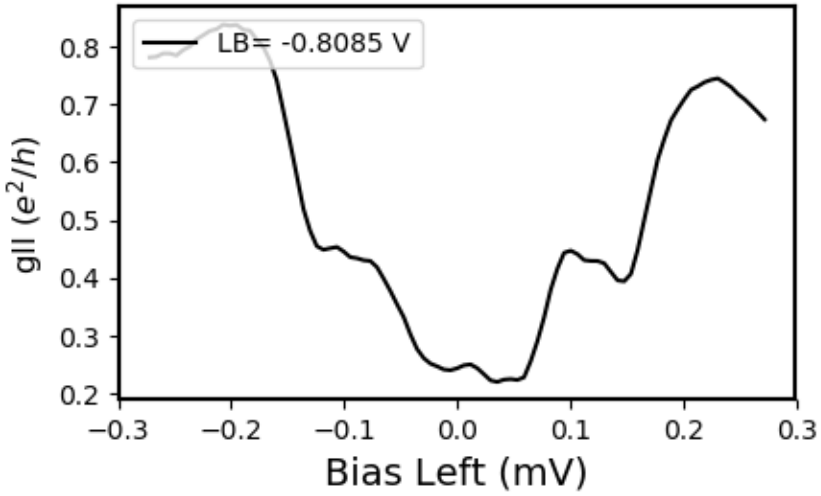


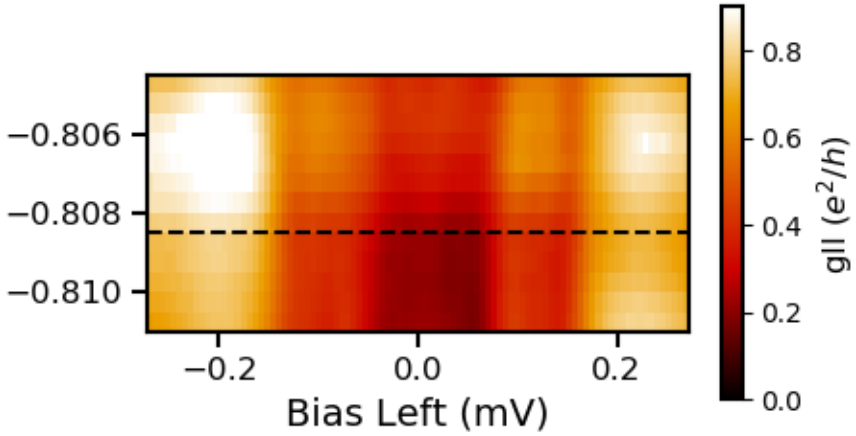




Dataset 1
Zoom In

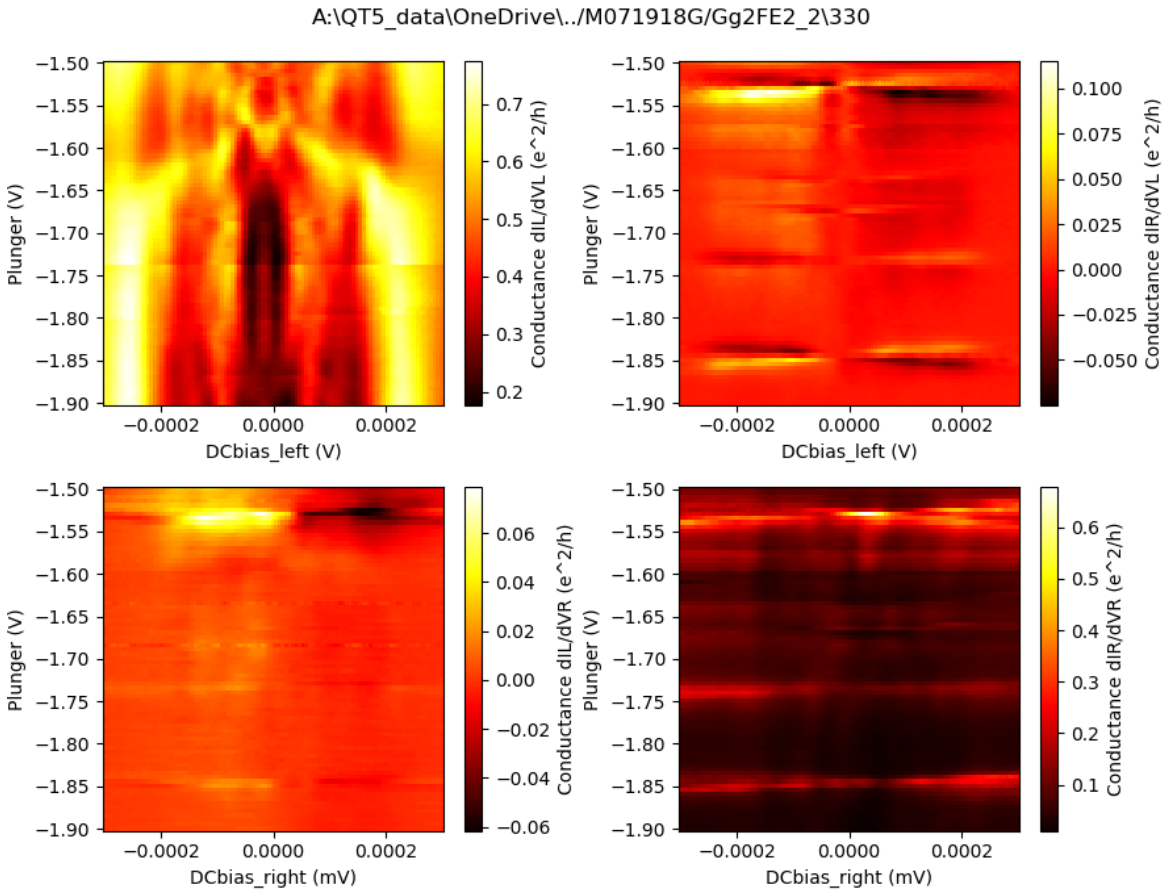
320
Pg = -1.74 V
Field = 0.42 T
Left barrier = -0.8085 V





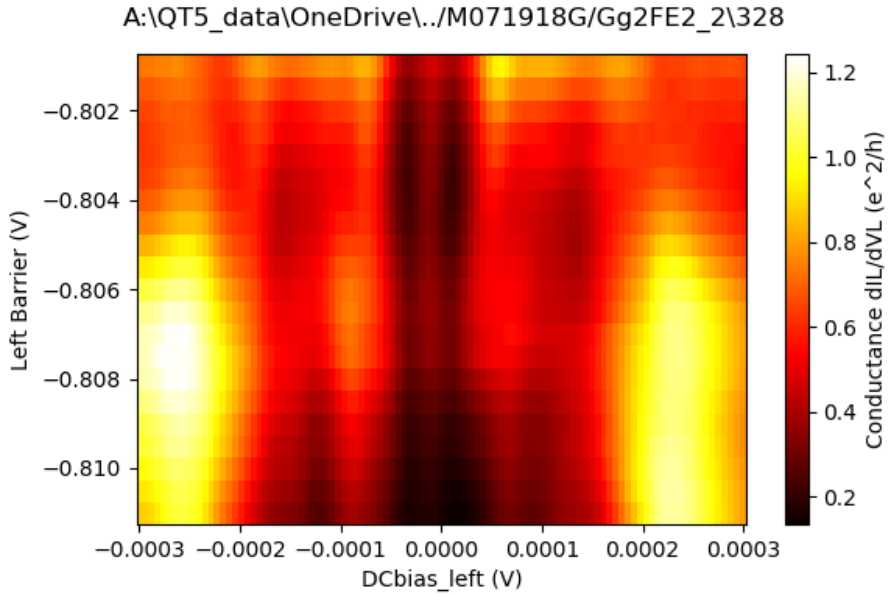
312
Pg = -1.75 V
Field = 0.7 T
Right barrier = =0.8662 V

Another plunger scan
#330
B = 0.42 T
Left barrier = -0.8035 V
Right barrier =-0.8352 V



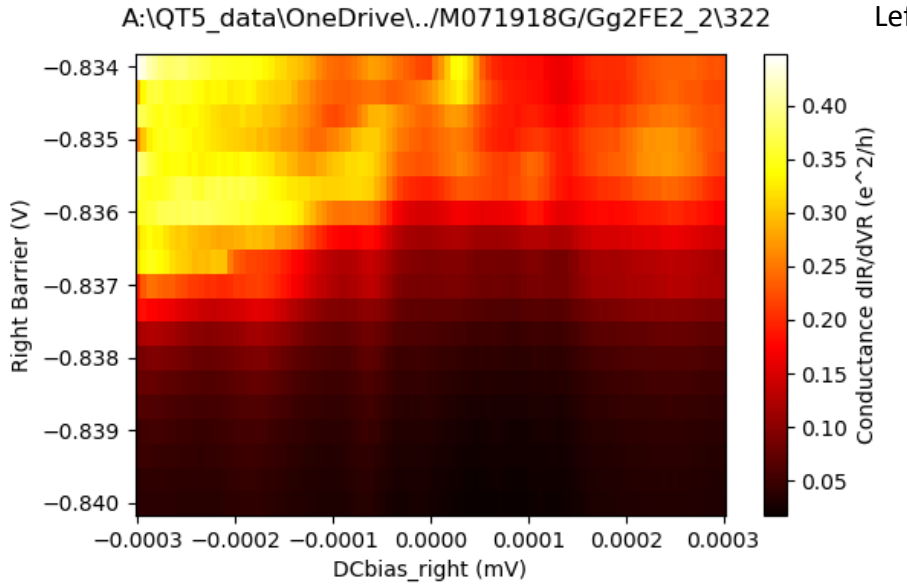
Left cutter

328
Pg = -1.74 V
Field = 0.42 T
Right barrier = -0.8352 V



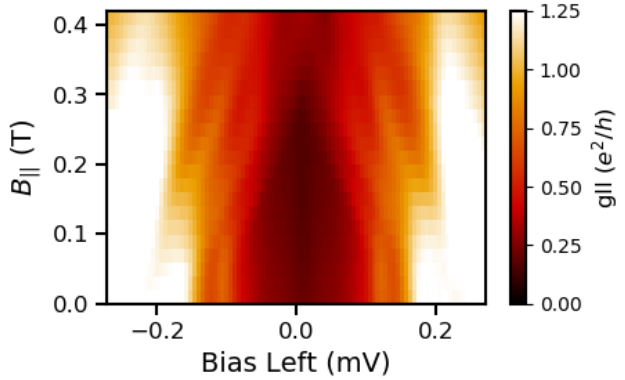
Right cutter

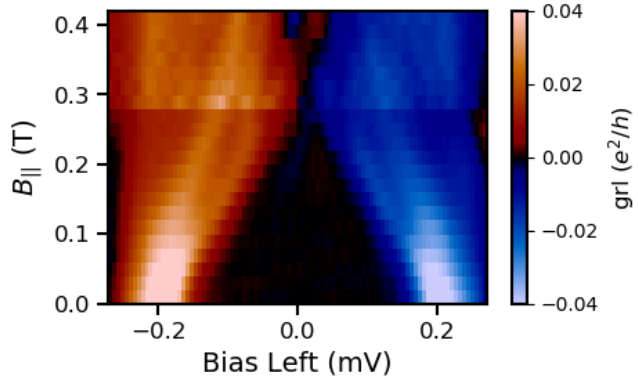
312
Pg = -1.75 V
Field = 0.7 T
Left barrier = =0.8085 V

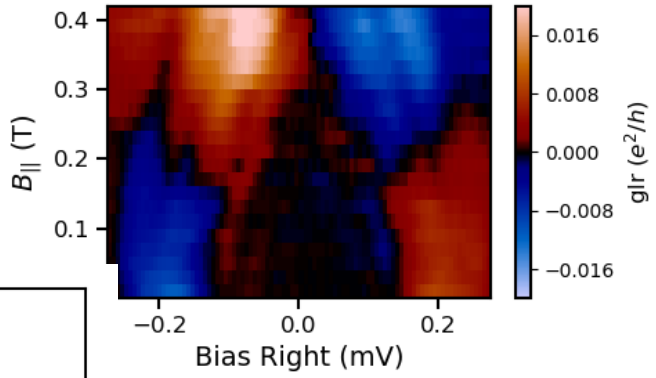


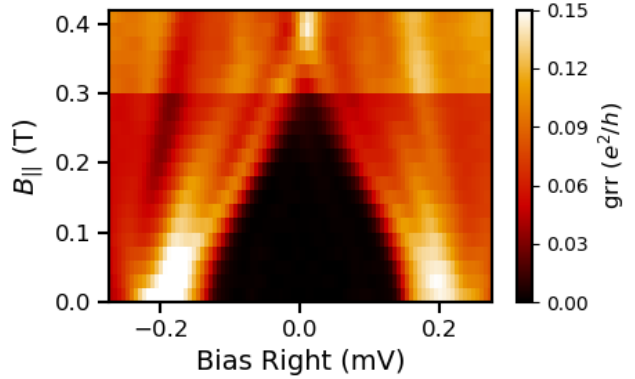
Dataset 2

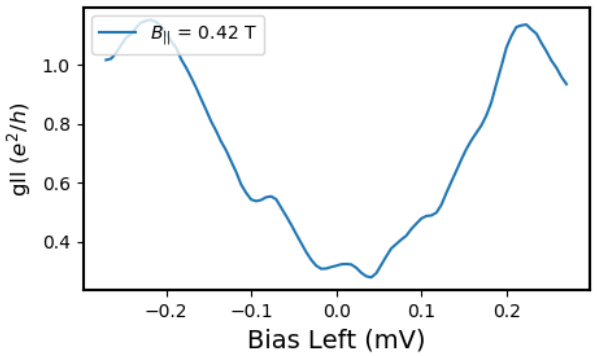
Left Barrier = -0.809 V
Right Barrier = -0.8352 V
Plunger = -1.58 V

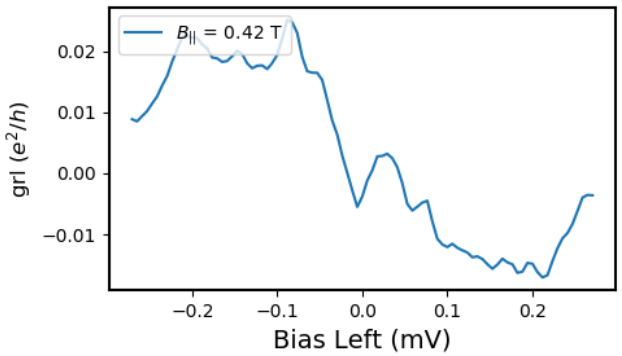


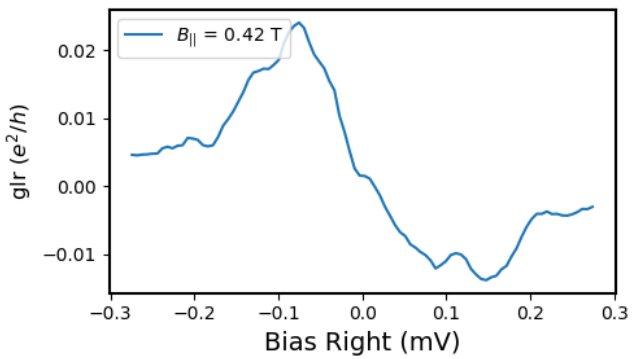


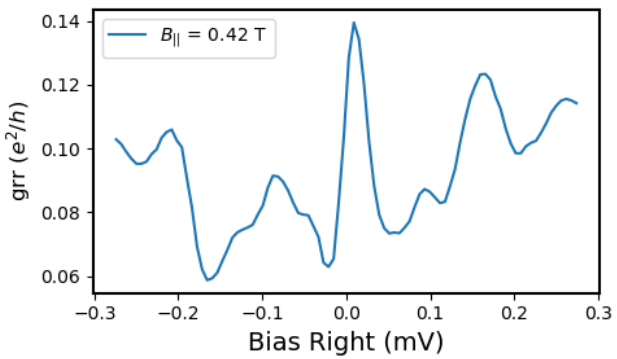












337

Extended field scan

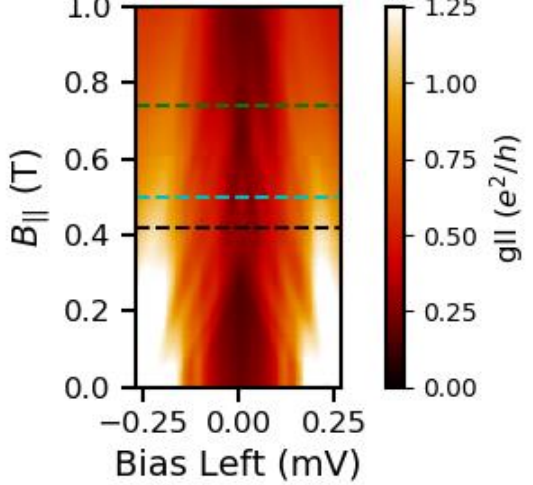
Dataset 2

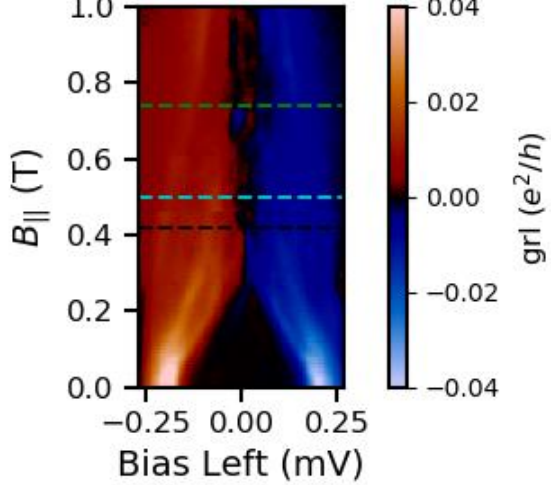
339

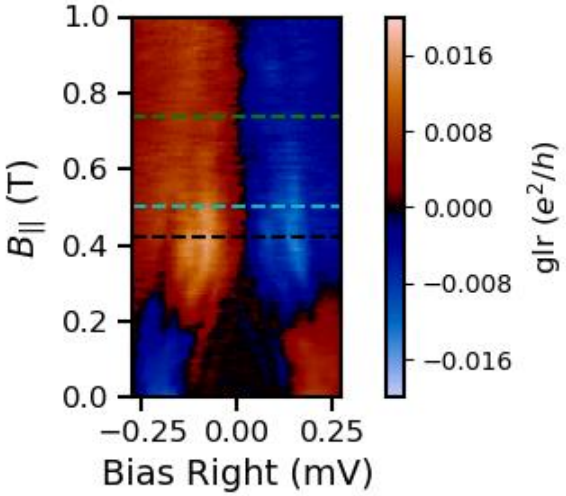
Left Barrier = -0.809 V

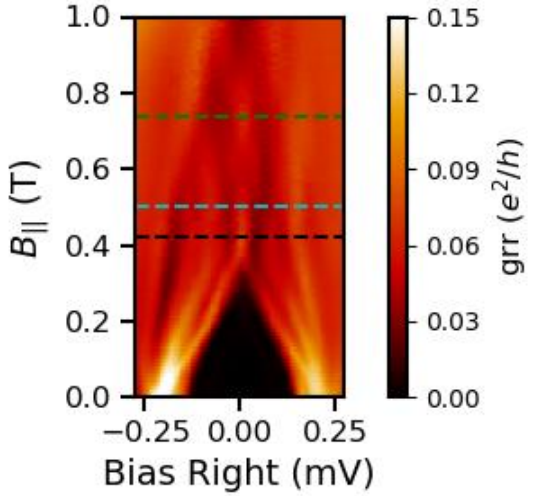
Right Barrier = -0.8352 V

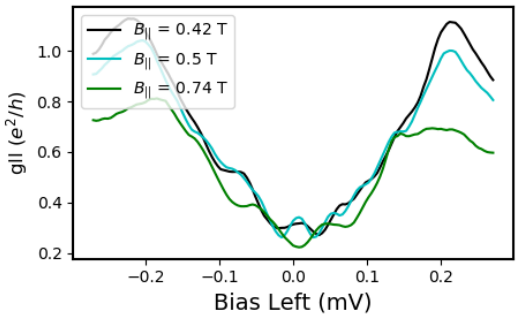
Plunger = -1.58 V

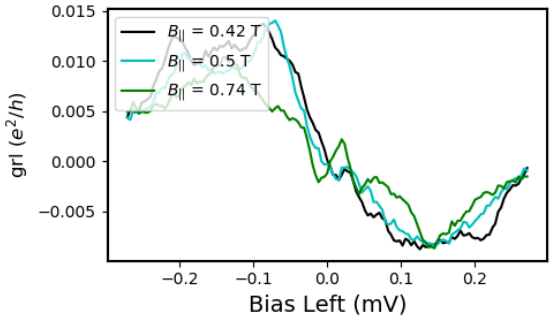


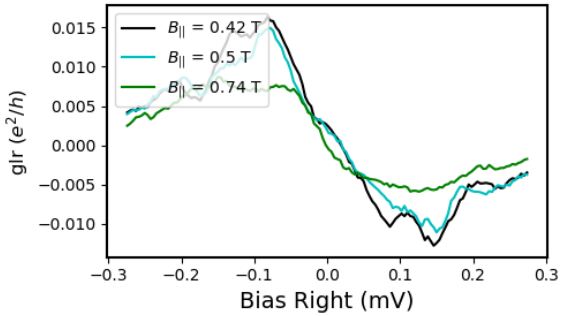


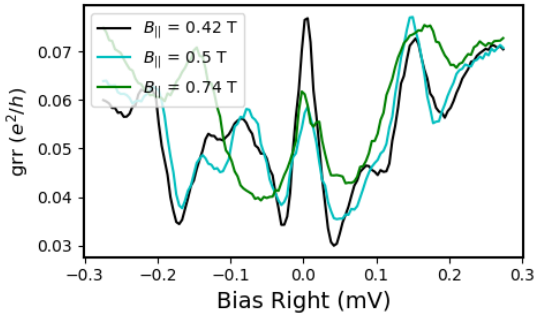




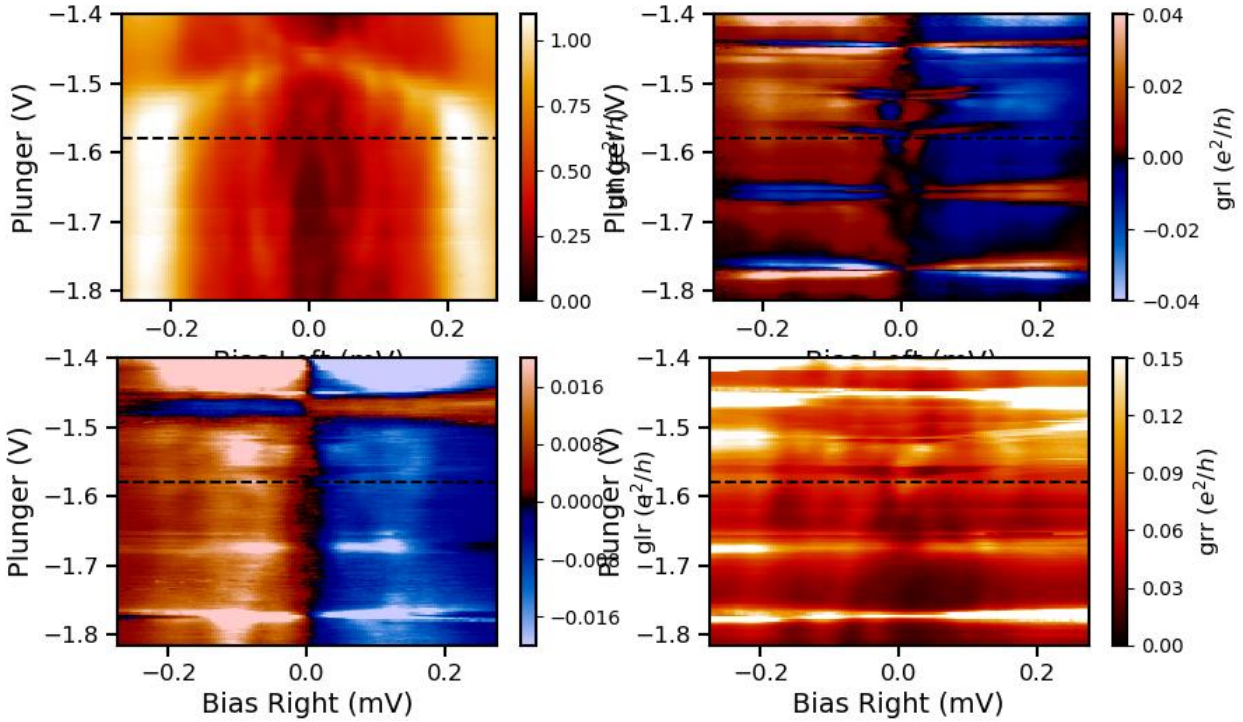


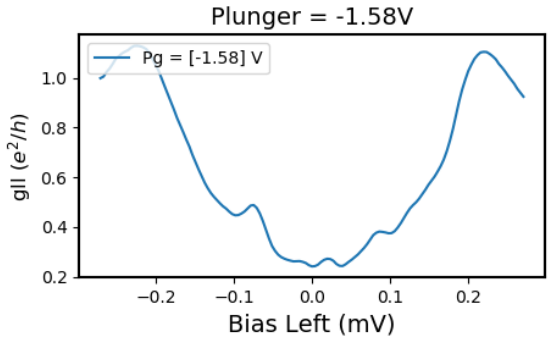


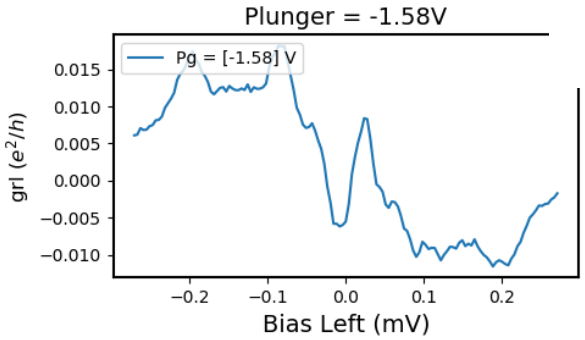


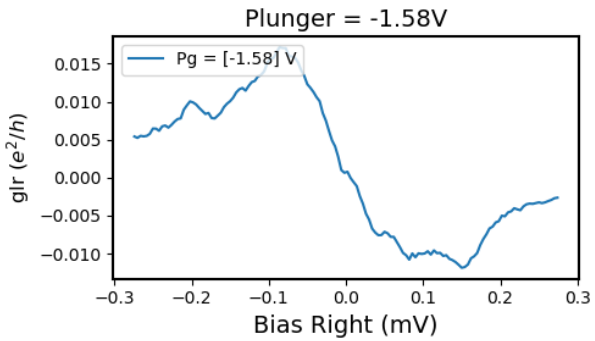


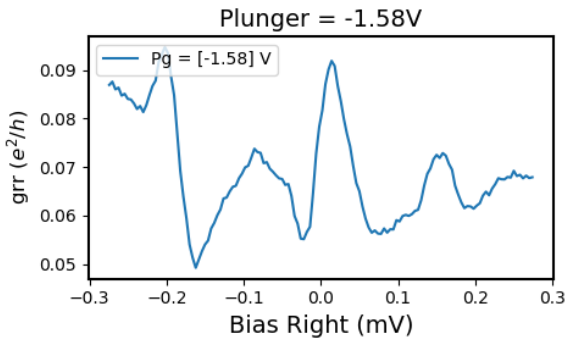
Dataset 2
340
Plunger Scan
Left Barrier = -0.809 V
Right Barrier = -0.8352 V
field = 0.42 T



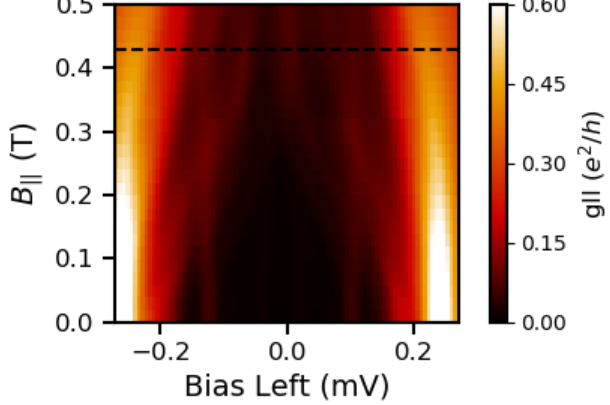


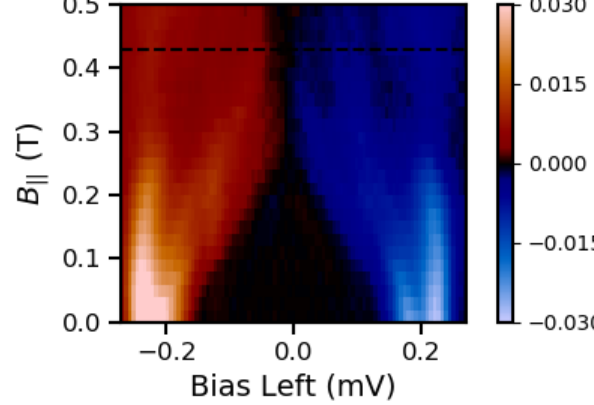


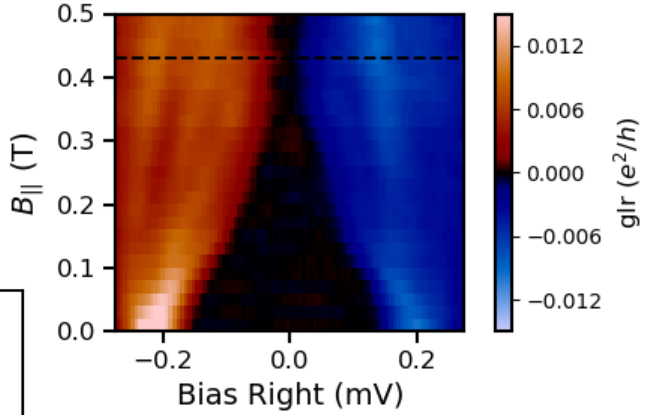


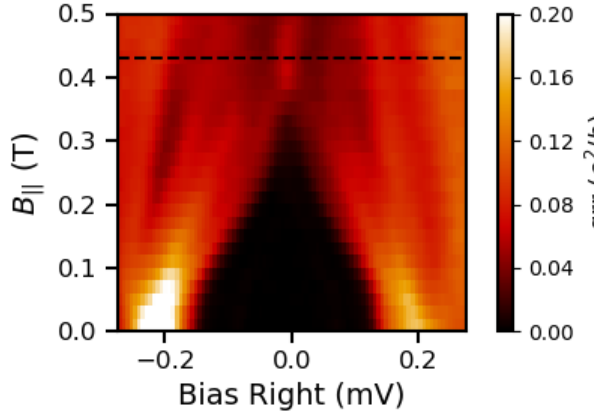


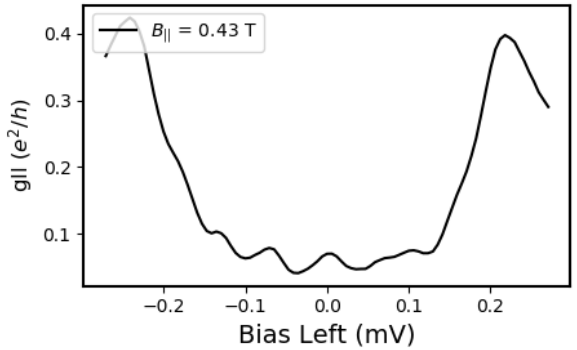
360
Dataset 3
Left Barrier = -0.817 V
Right Barrier = -0.8352 V
Plunger = -1.555 V

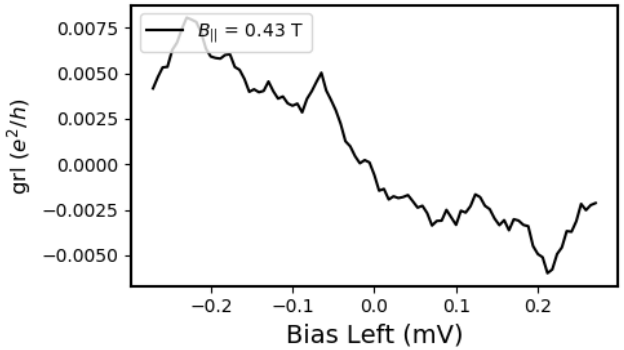


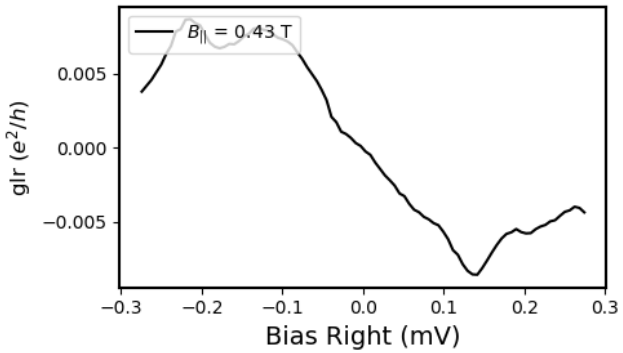


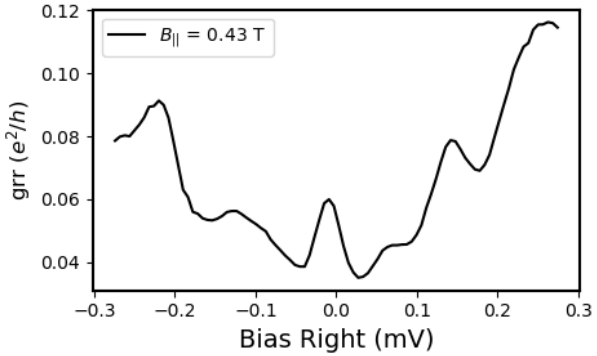






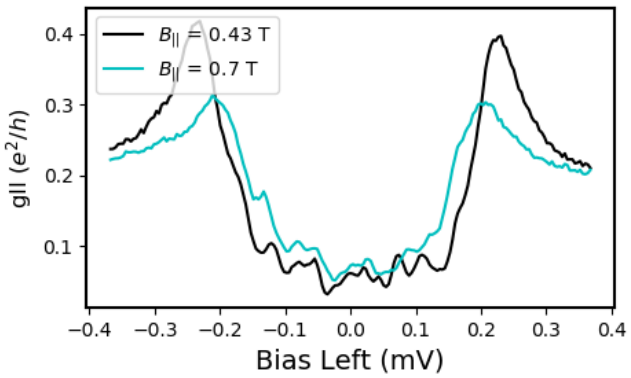


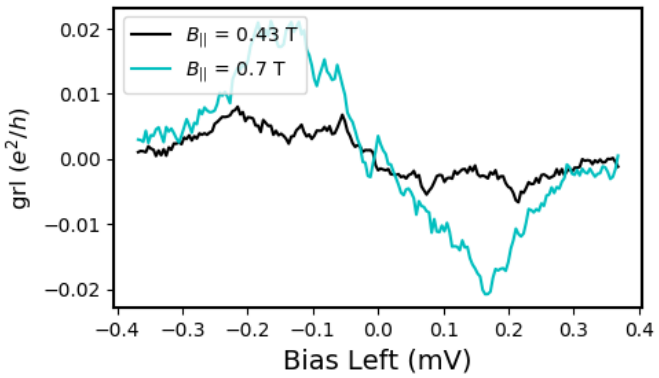


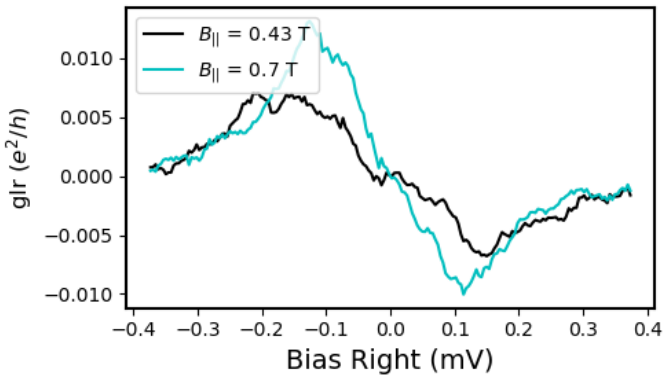


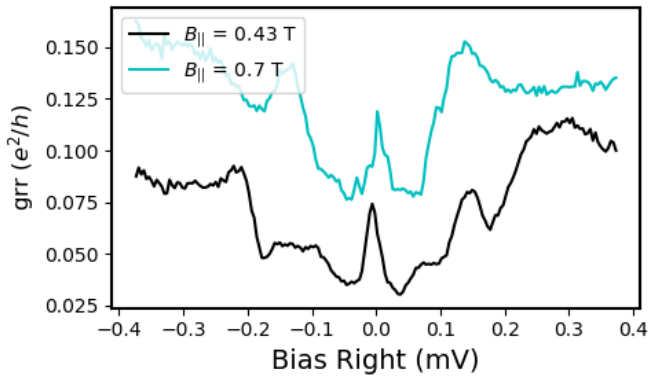
Dataset 3
Extended field scan
Left Barrier = -0.817 V
Right Barrier = -0.8352 V
Plunger = -1.555 V

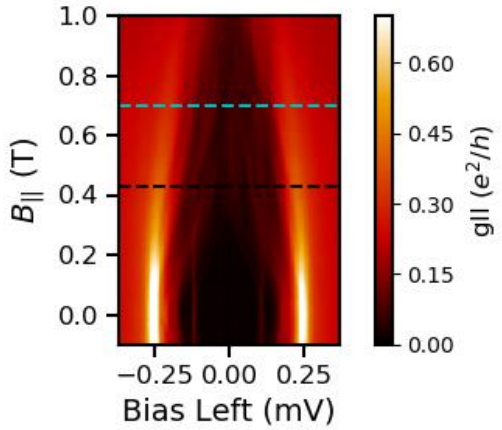
365

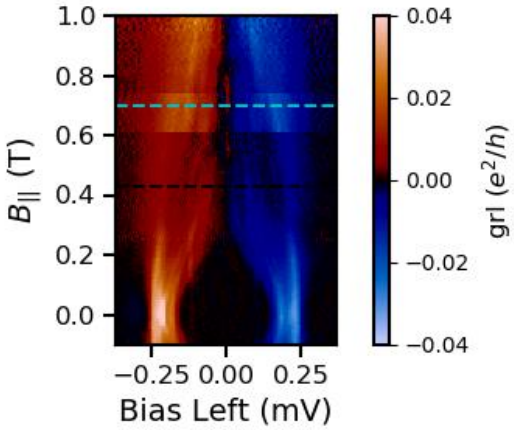


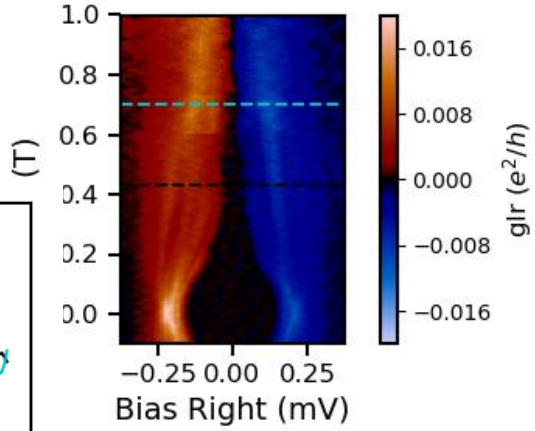


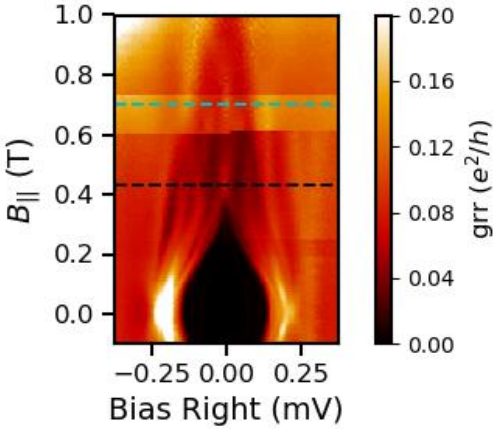




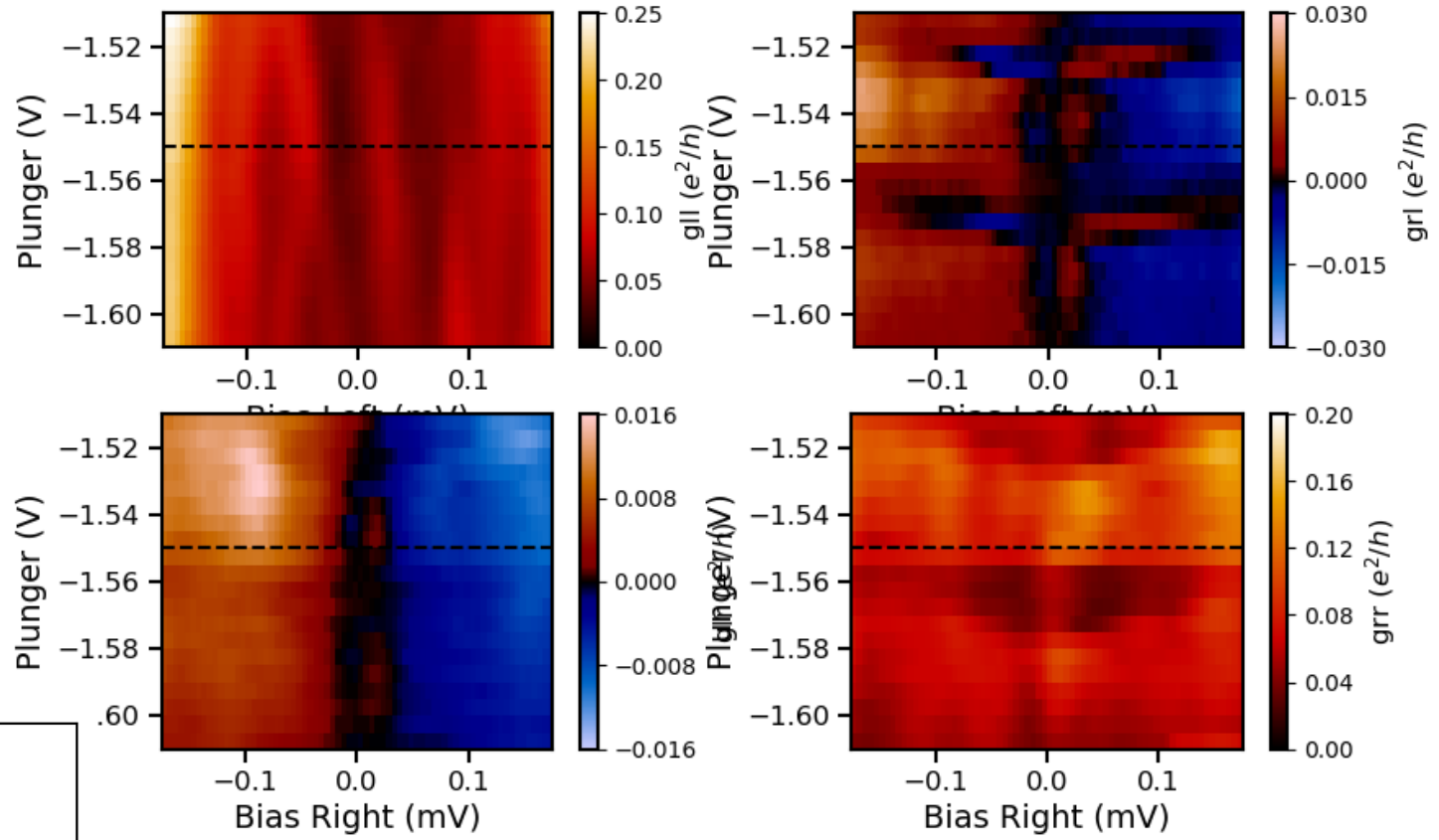


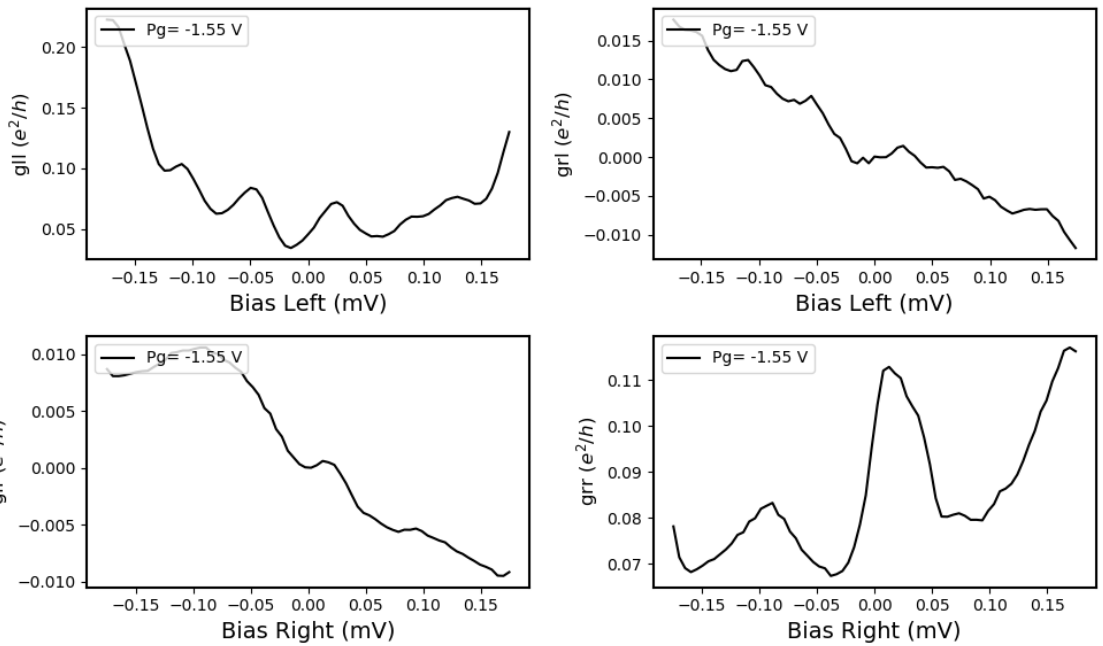






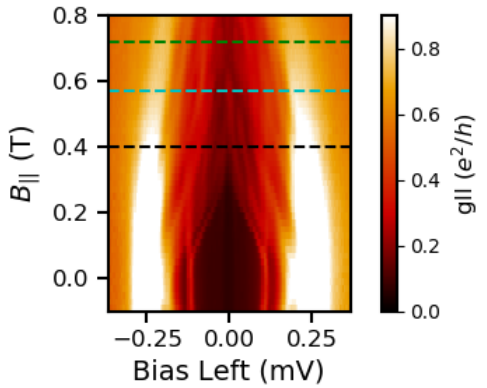
Dataset 3 – Plunger scan
Left Barrier = -0.817 V
Right Barrier = -0.8352 V
Field = 0.44T
#357

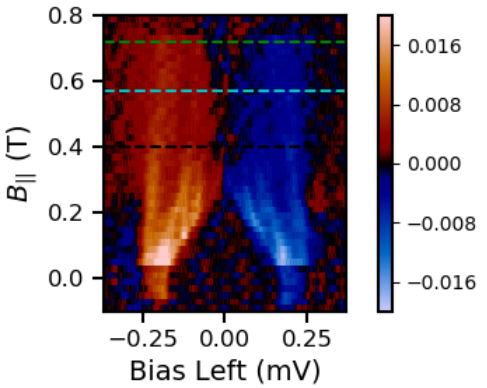


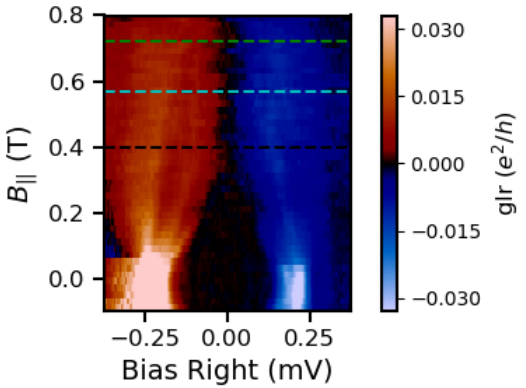


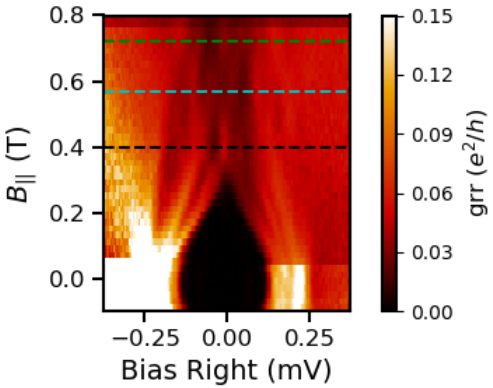
#431
Dataset4

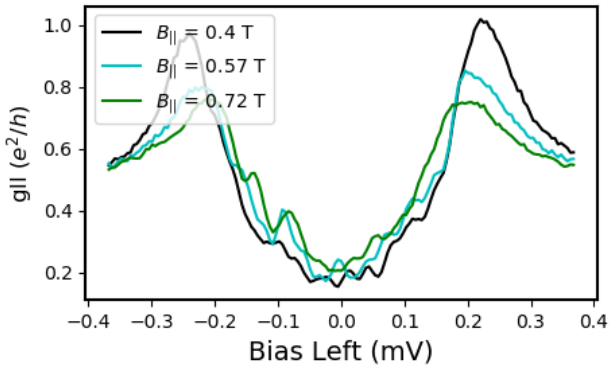
Left Barrier = -0.8125 V
Right Barrier = -0.842 V
Plunger = -1.58 V
Field = 0.76 T

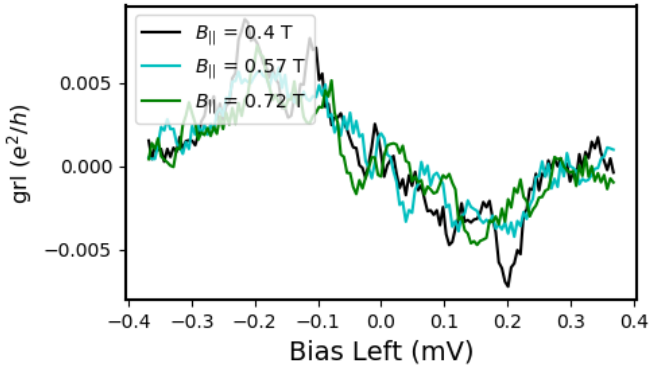


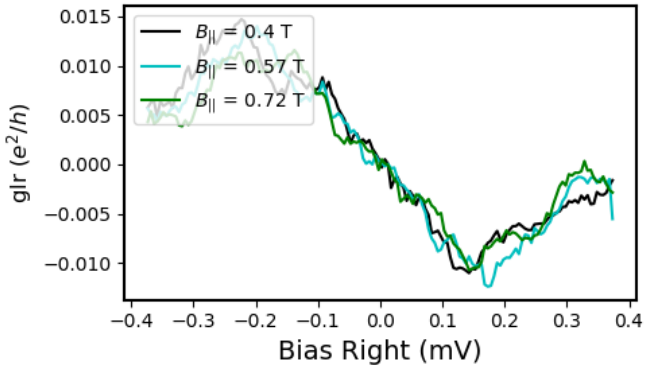


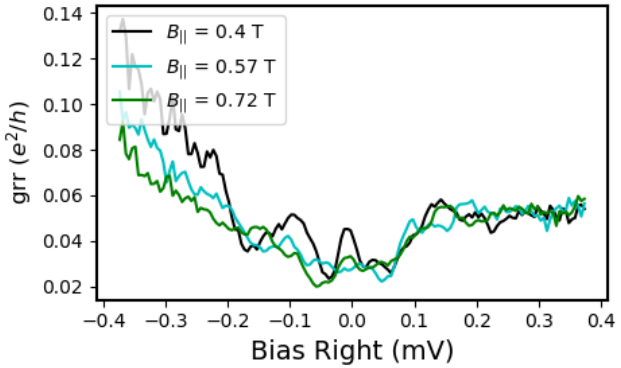








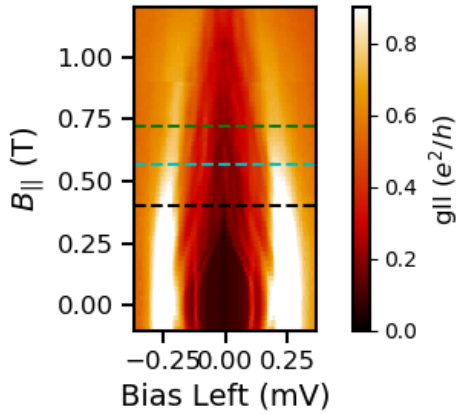


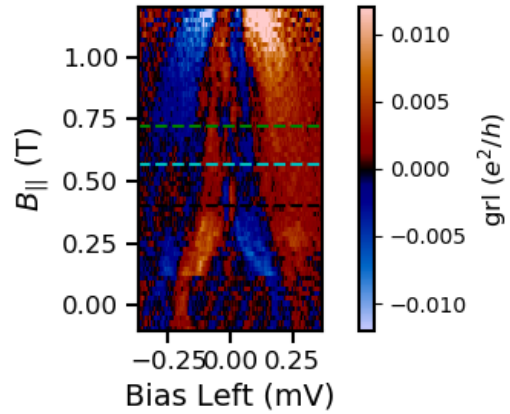


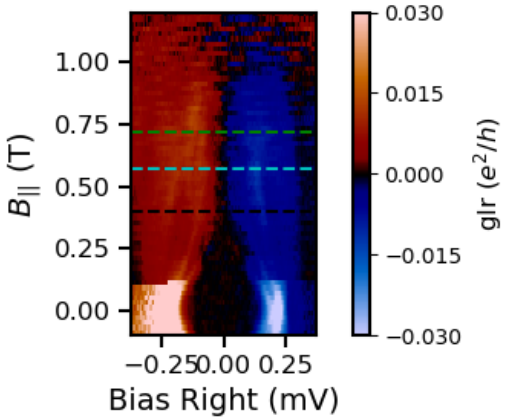
#432

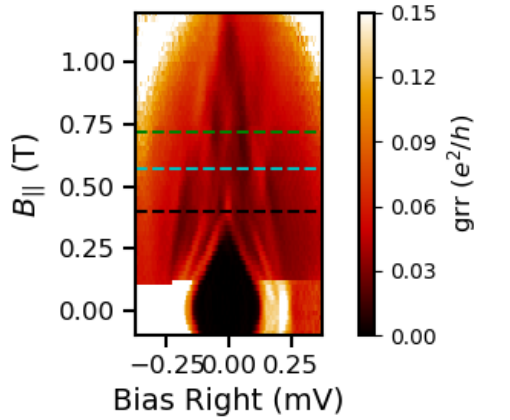
Dataset4 = extended field scan

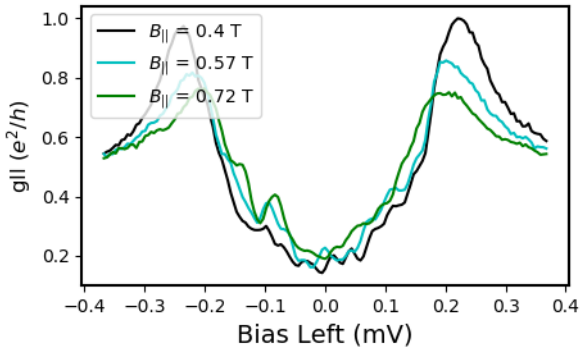
Left Barrier = -0.8125 V
Right Barrier = -0.842 V
Plunger = -1.58 V

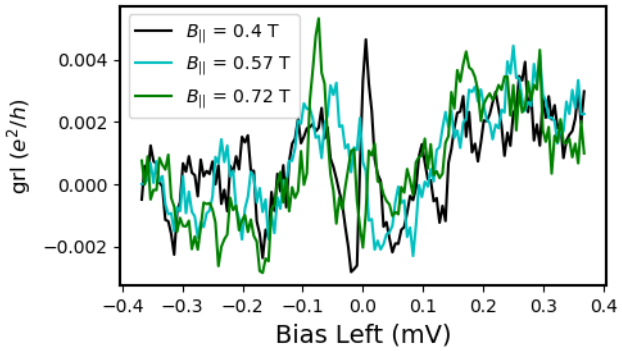


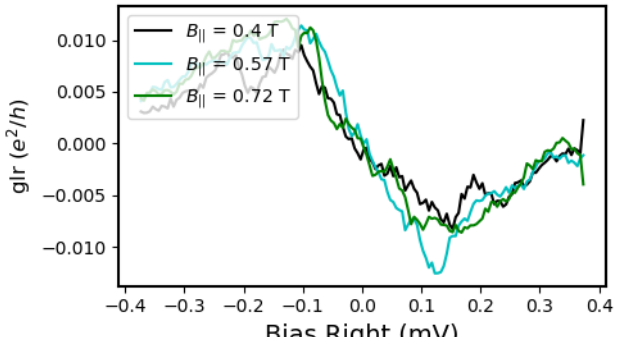


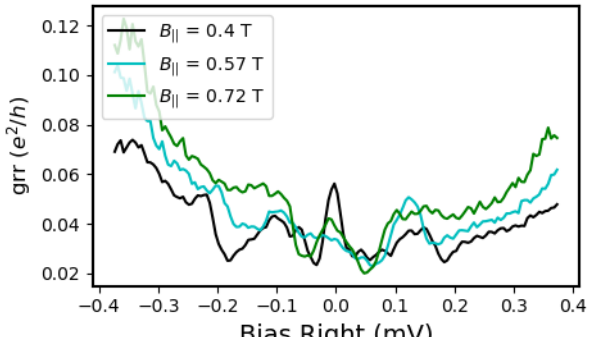






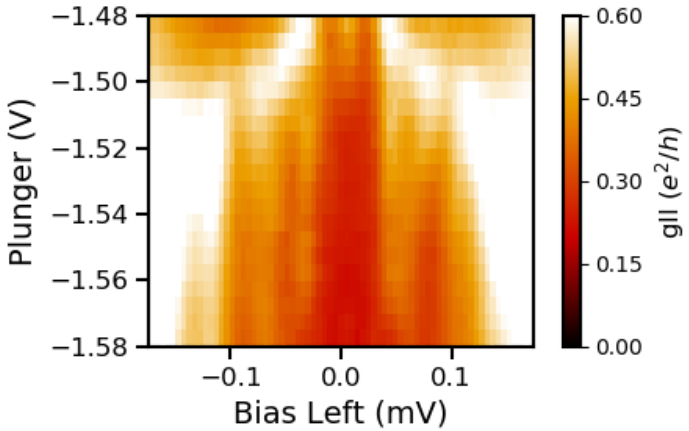


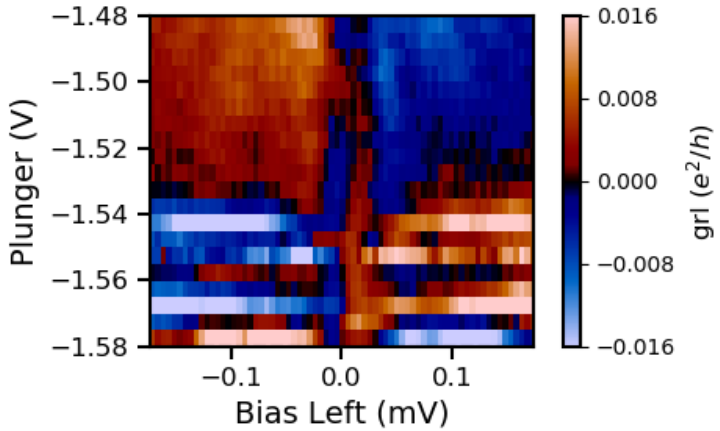


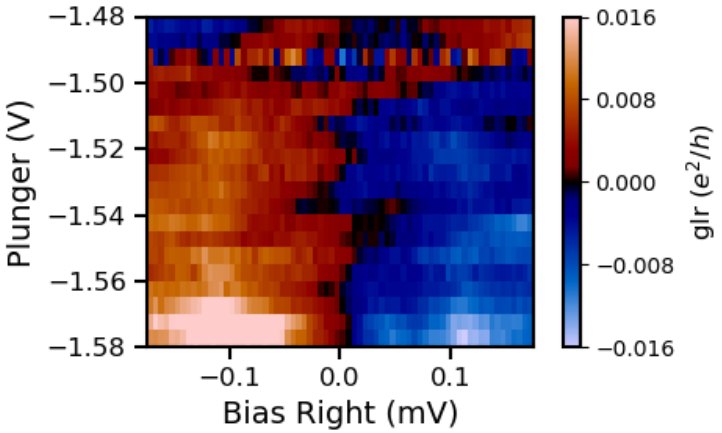


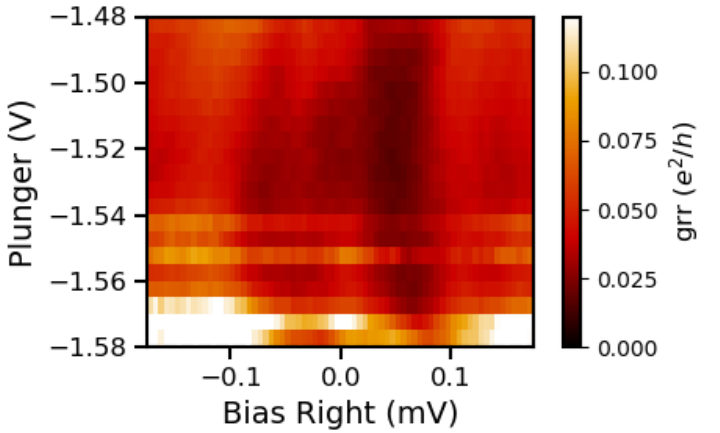
#441
Dataset4 – Plunger scan

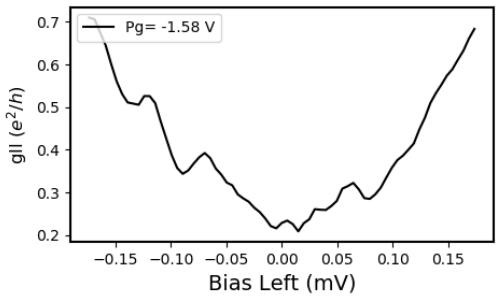
Left Barrier = -0.8125 V
Right Barrier = -0.842 V
Field = 0.76 T

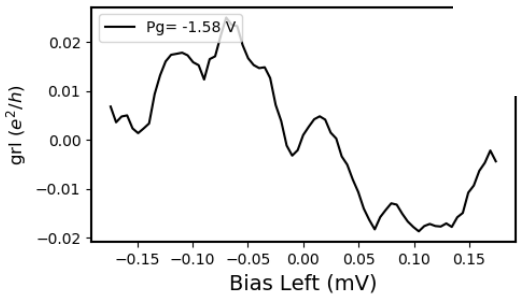


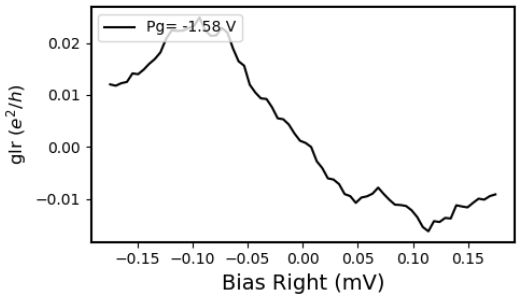


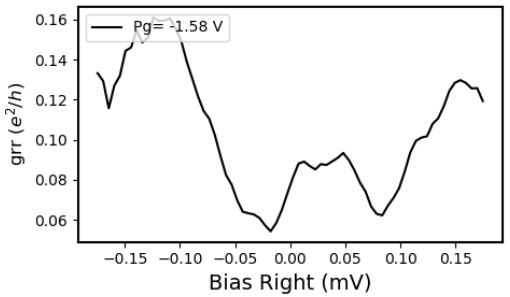




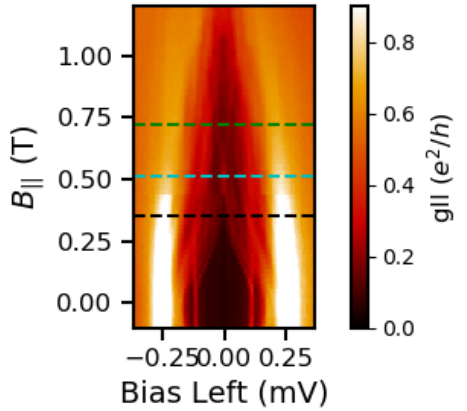


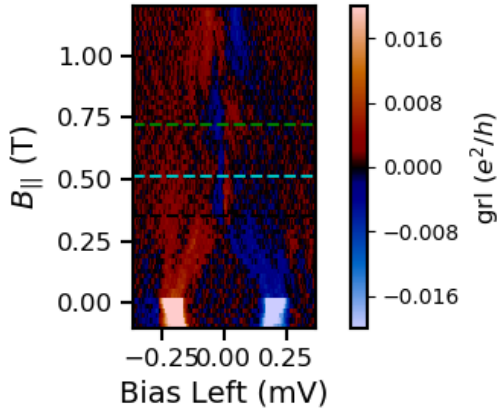


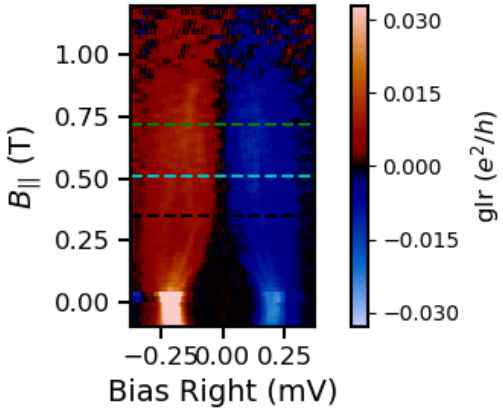


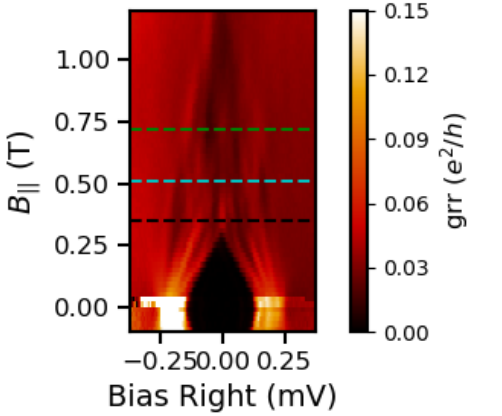


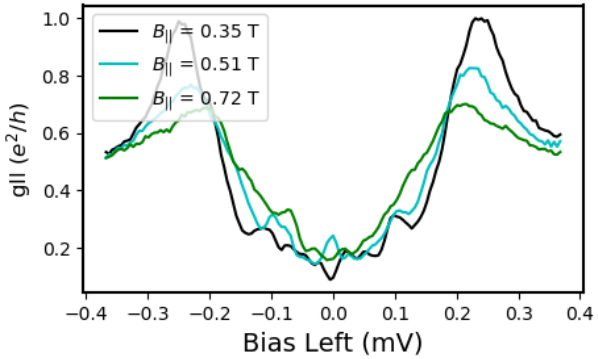
459 – Field scan at different plunger
Left Barrier = -0.8125 V
Right Barrier = -0.842 V
Plunger = -1.6 V

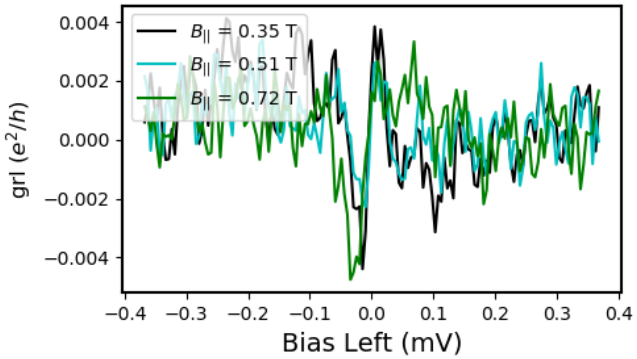


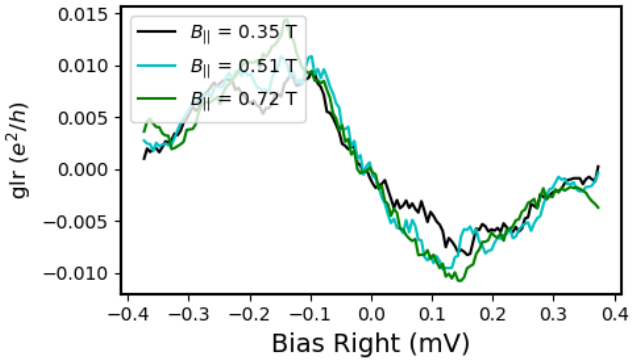


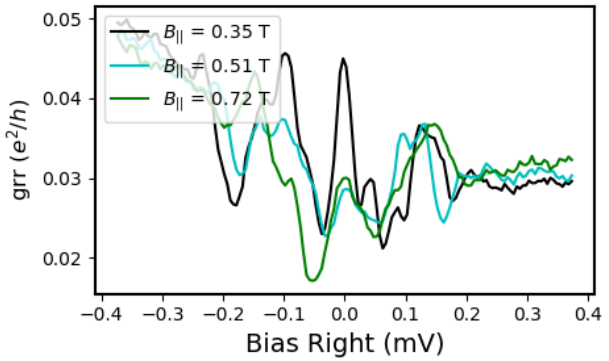








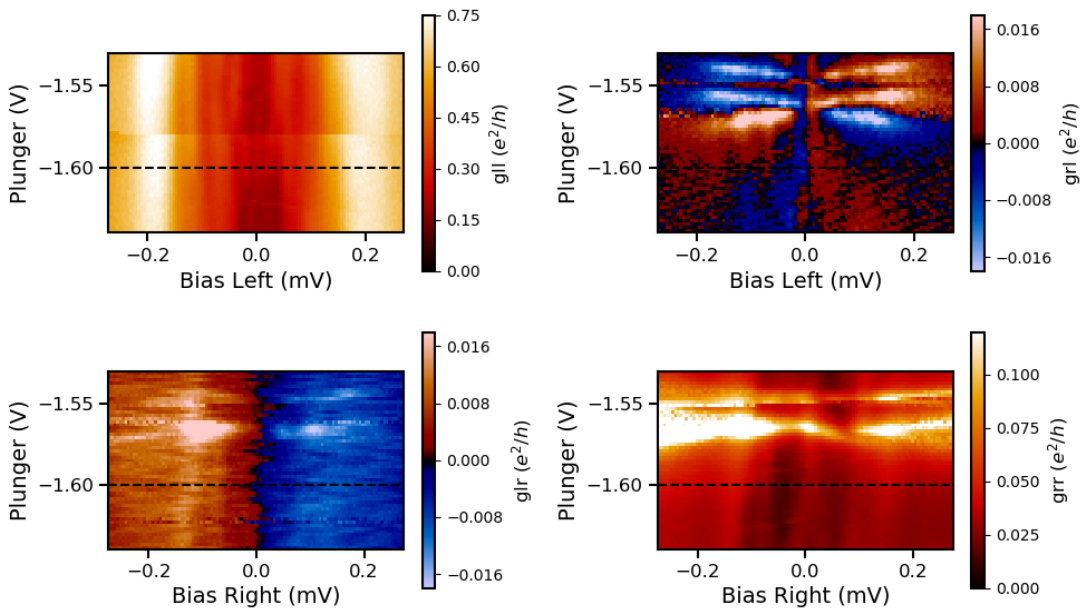




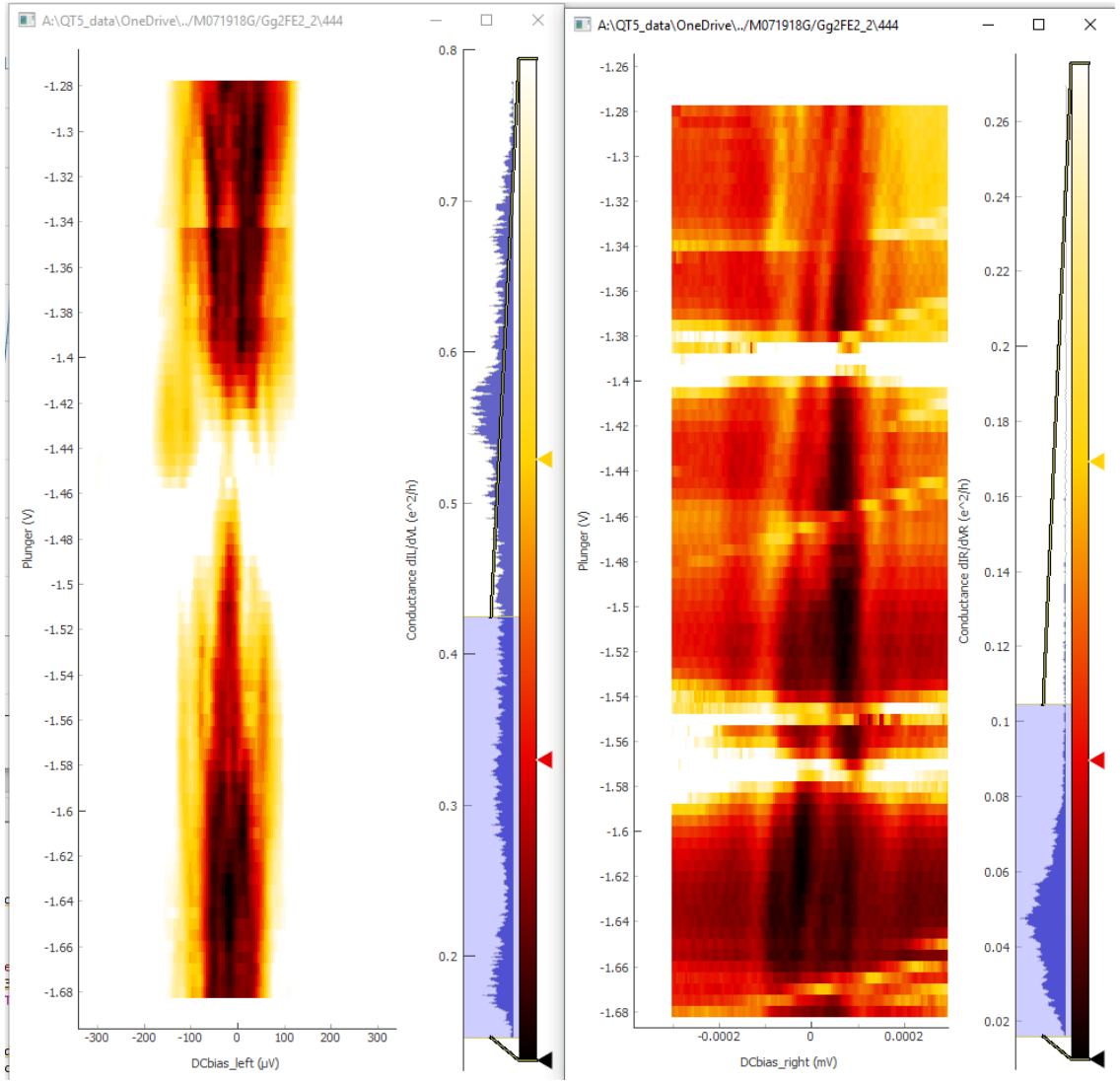
Dataset4 - more plunger scans
ZBP splitting simultaneously?

Left Barrier = -0.8125 V
Right Barrier = -0.842 V
Field = 0.76 T

#453



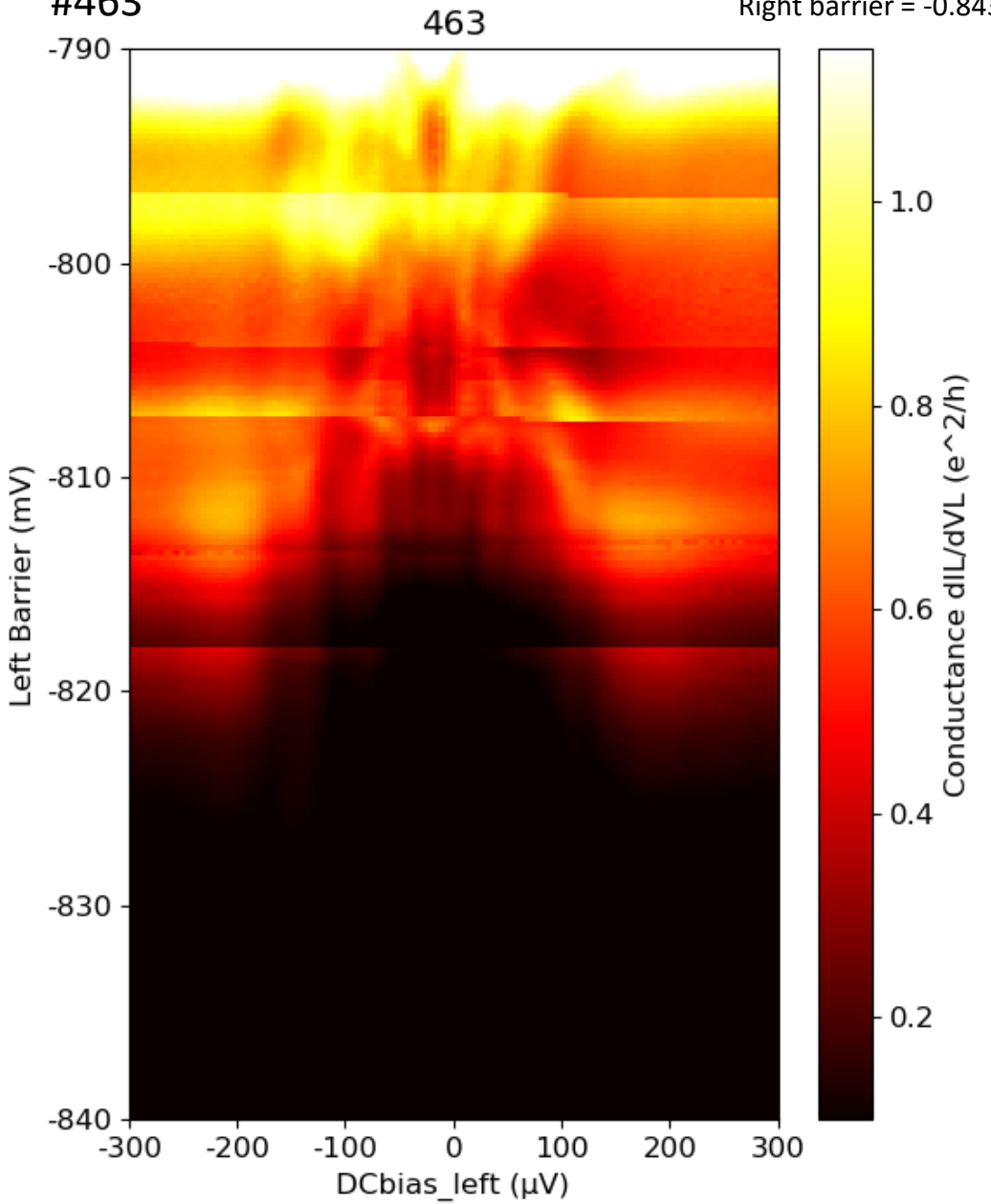
#444



Cutter scans

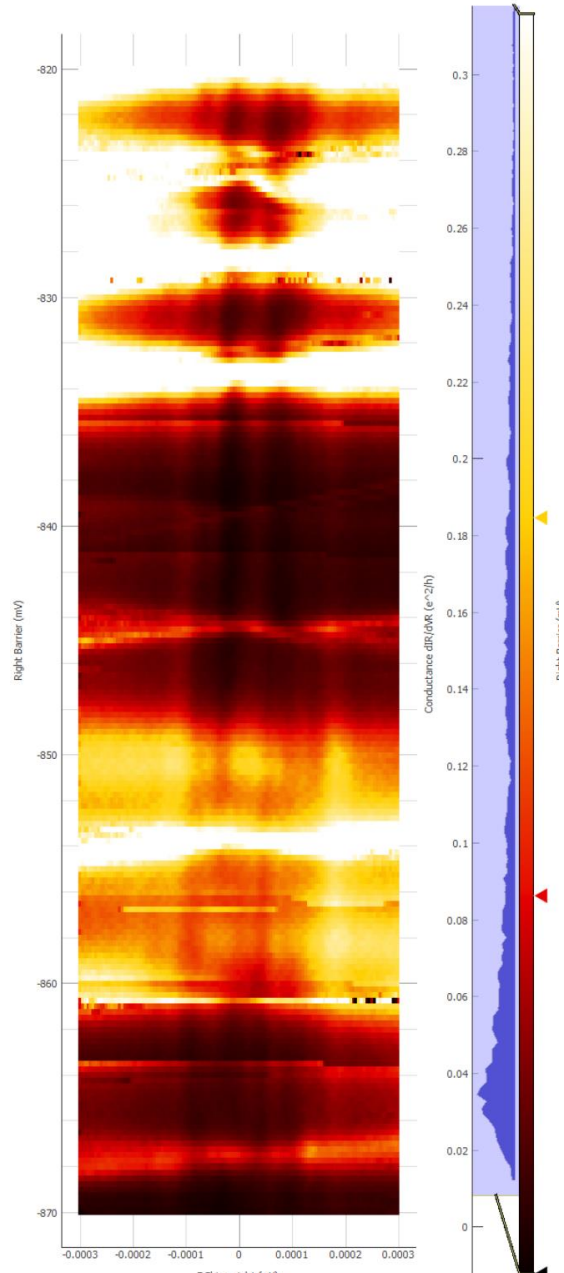
#463

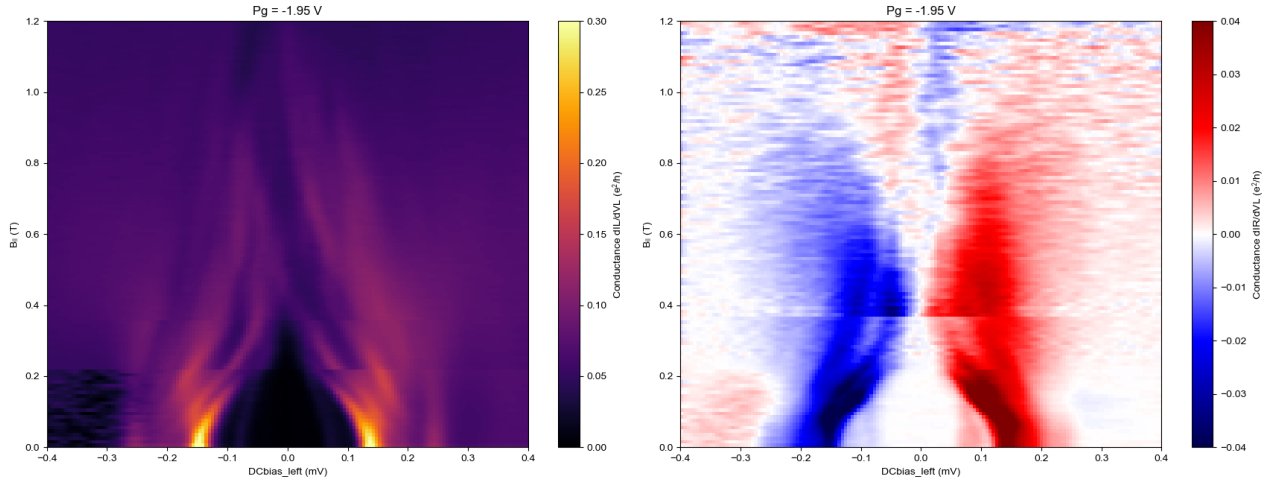
463
Pg = -1.6 V
Field = 0.76 T
Right barrier = -0.843 V

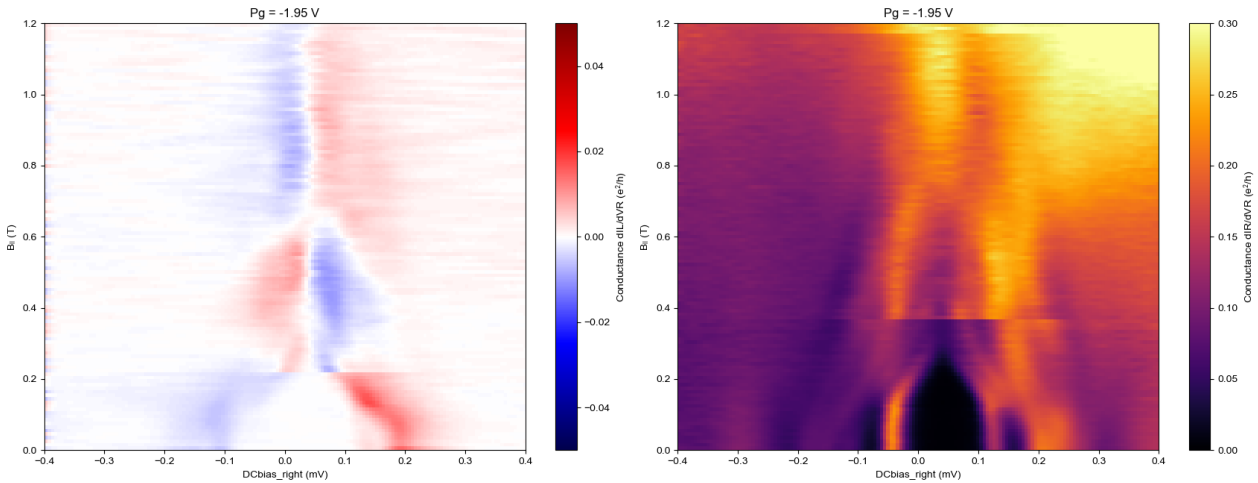


#462

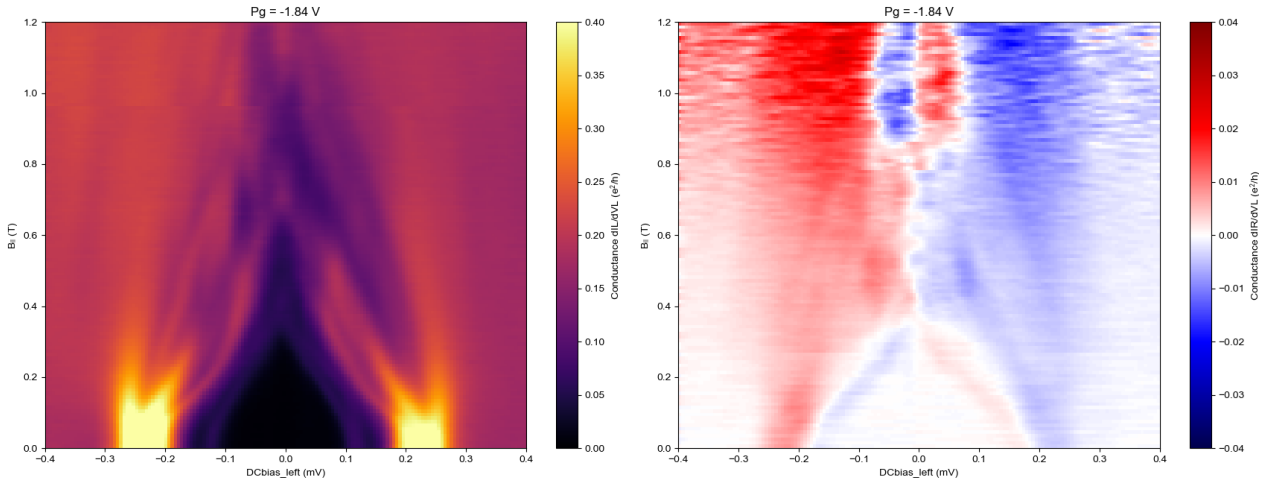
462
Pg = -1.75 V
Field = 0.7 T
Left barrier = =0.8125 V







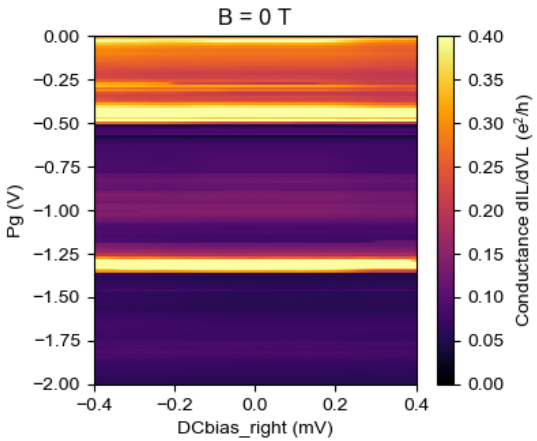
2737
Field scan
Left Barrier = -0.822 V
Right Barrier = -0.8408 V
Plunger = -1.95 V

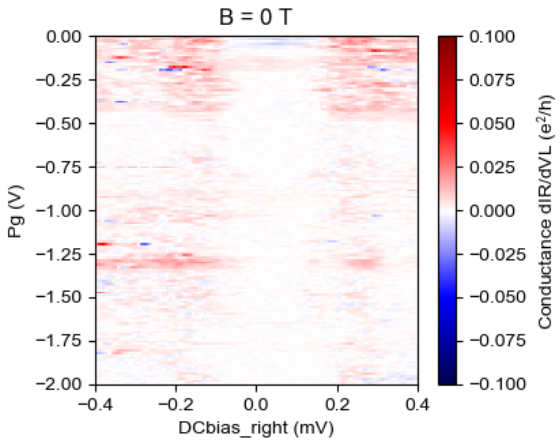


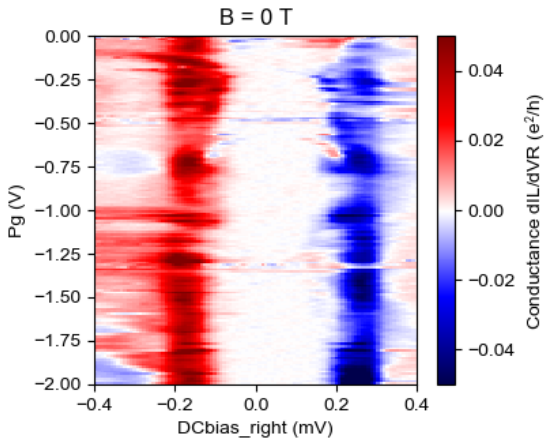
3301
Field scan
Left Barrier = -0.808 V
Right Barrier = -0.8408 V
Plunger = -1.84 V

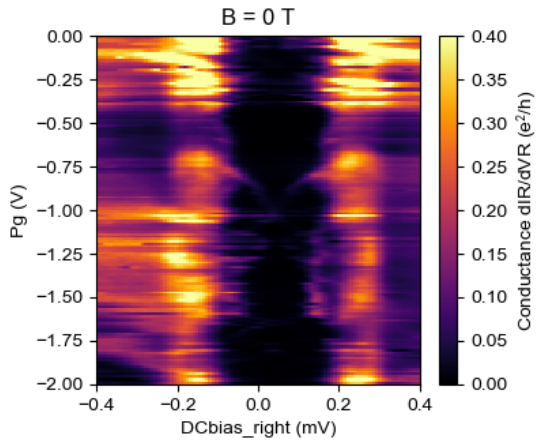
0 Field Plunger Scan

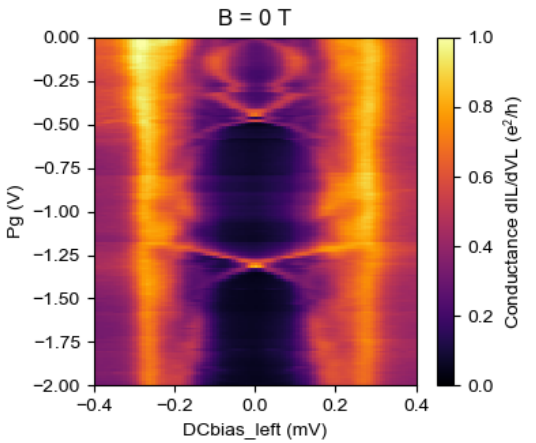
0 Field plunger scan
Left Barrier = -0.78 V
Right Barrier = -0.82 V

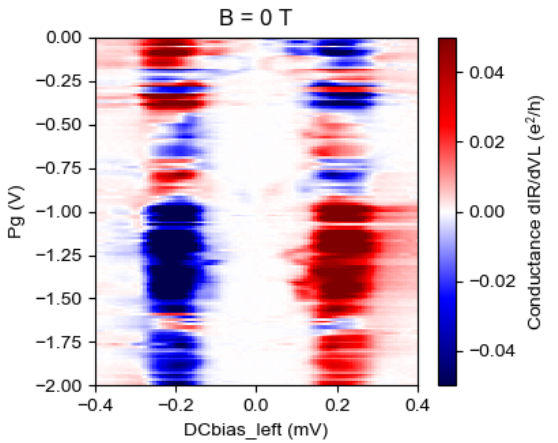


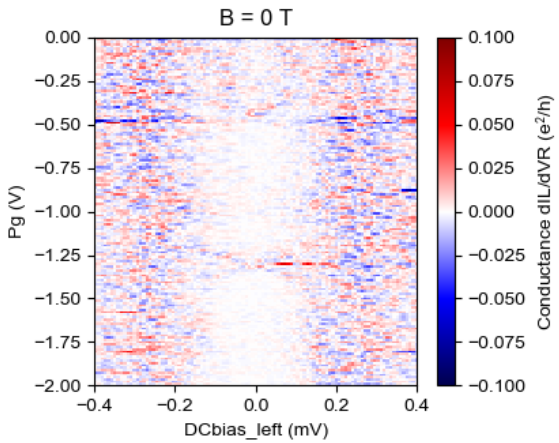


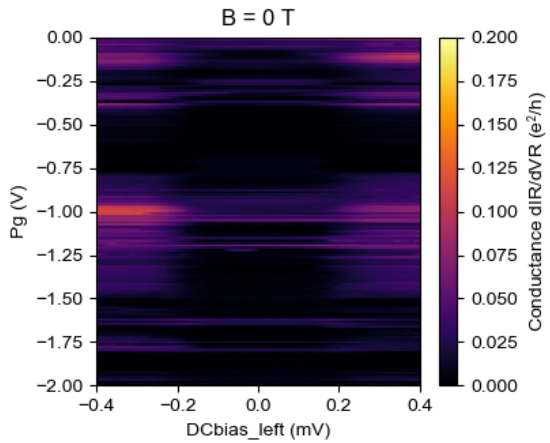






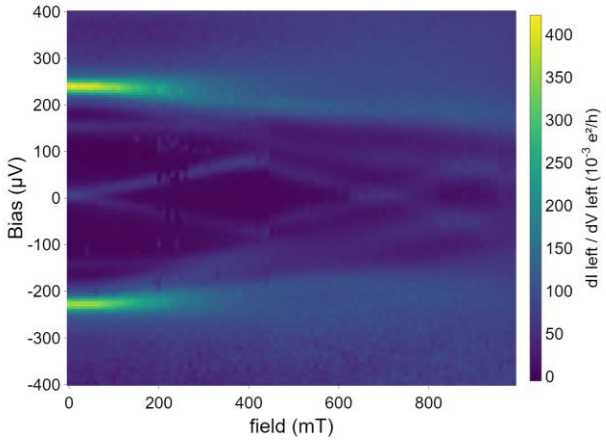




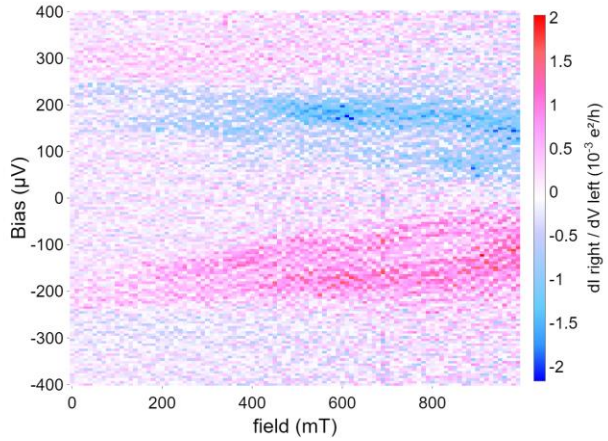


Other material data

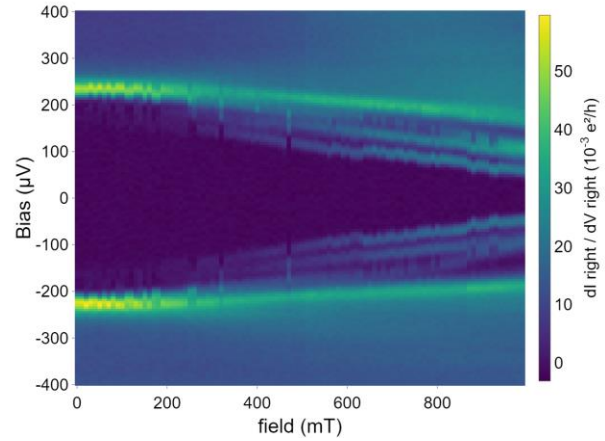
Run #5622, Experiment a1INW2 (PUSAG M010319.1D)



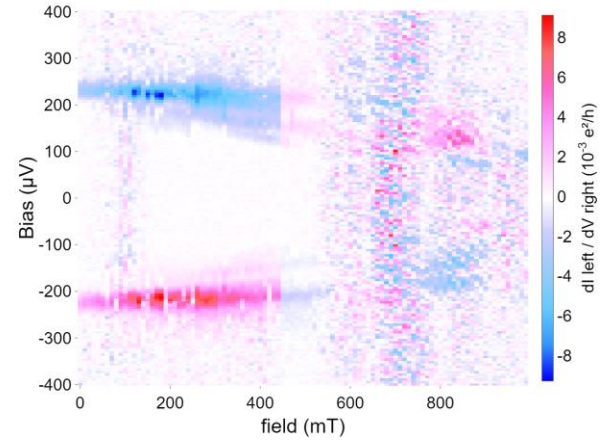
Run #5622, Experiment a1INW2 (PUSAG M010319.1D)



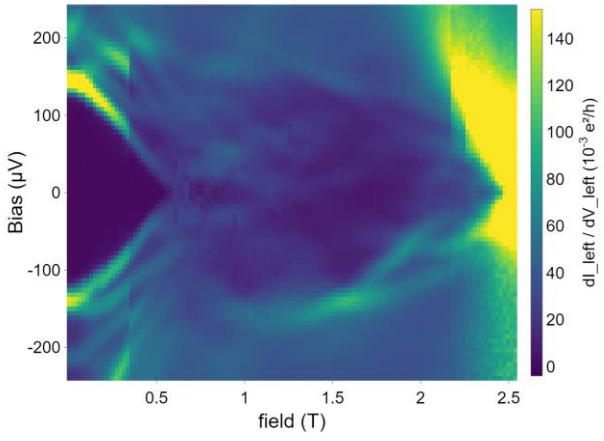
Run #5622, Experiment a1INW2 (PUSAG M010319.1D)



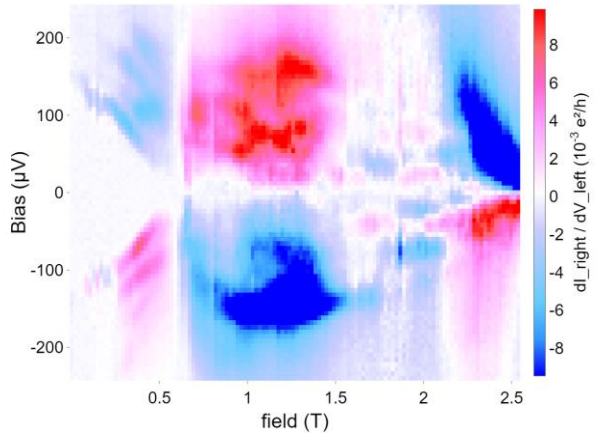
Run #5622, Experiment a1INW2 (PUSAG M010319.1D)



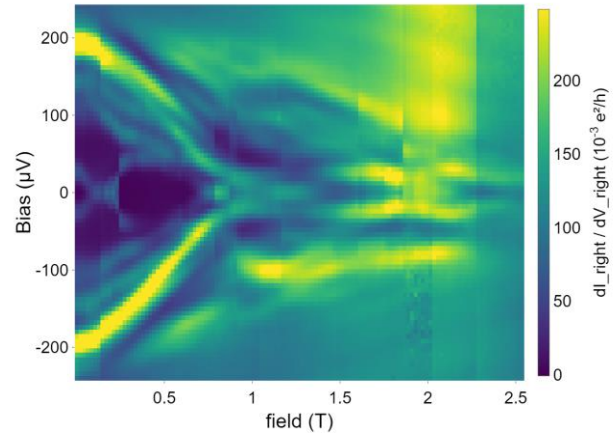
Run #13526, Experiment PUSAG M040219.1E (a1FE4_0)



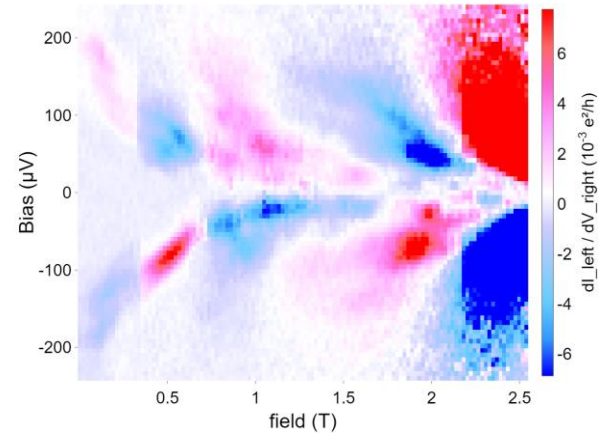
Run #13526, Experiment PUSAG M040219.1E (a1FE4_0)



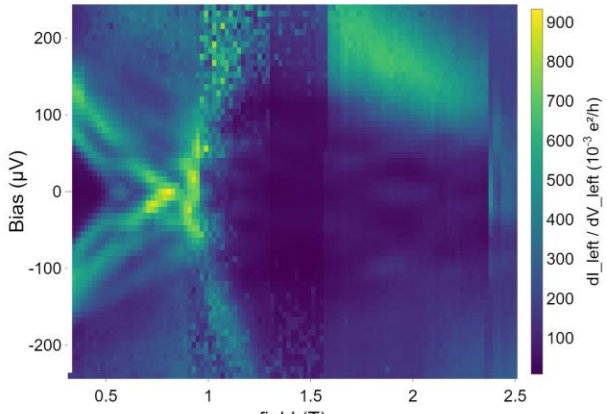
Run #13526, Experiment PUSAG M040219.1E (a1FE4_0)



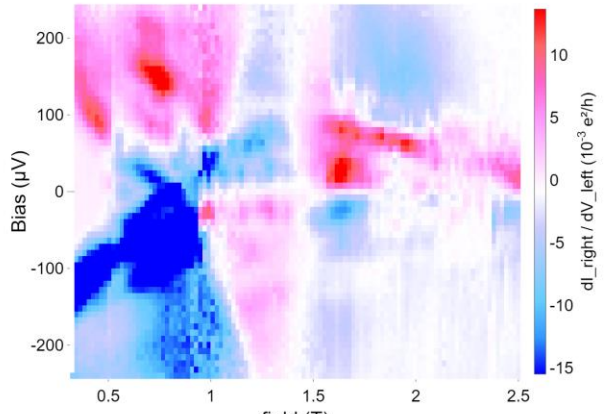
Run #13526, Experiment PUSAG M040219.1E (a1FE4_0)



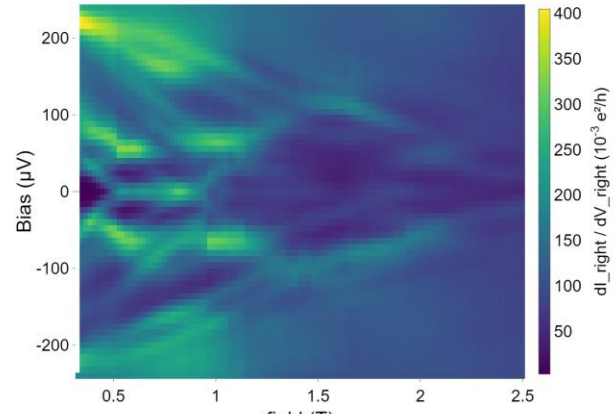
Run #13516, Experiment PUSAG M040219.1E (a1FE4_0)



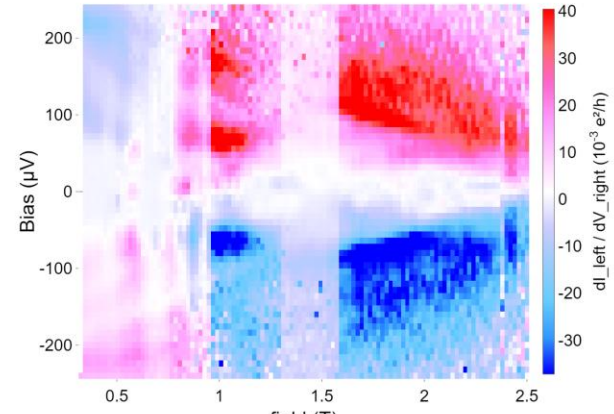
Run #13516, Experiment PUSAG M040219.1E (a1FE4_0)

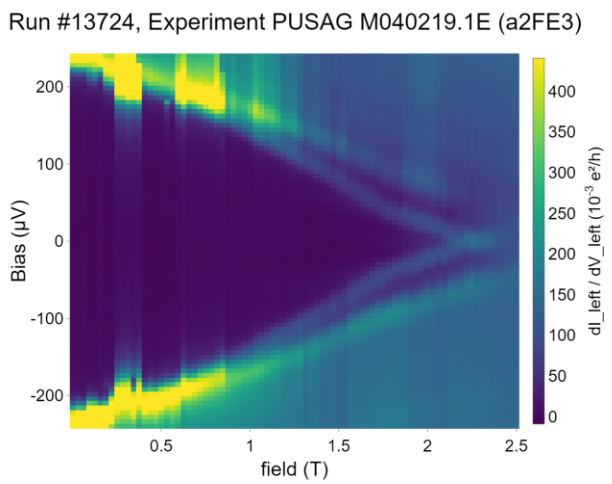


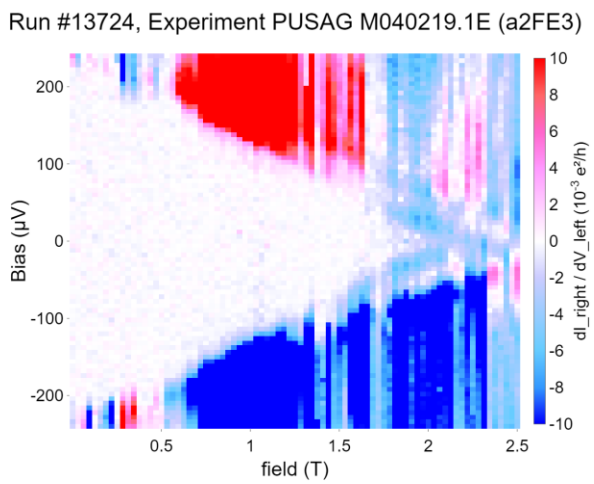
Run #13516, Experiment PUSAG M040219.1E (a1FE4_0)

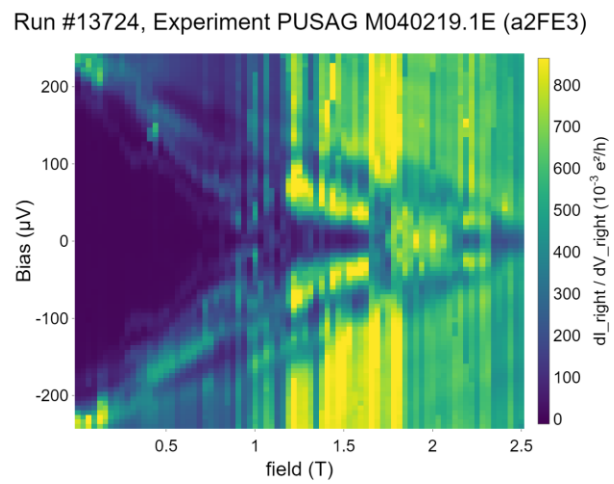


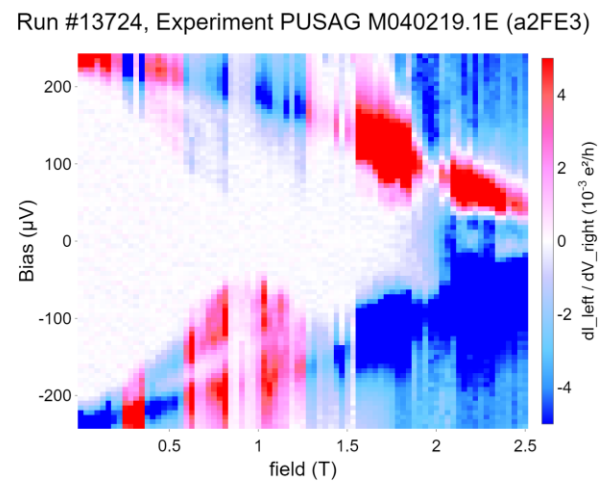
Run #13516, Experiment PUSAG M040219.1E (a1FE4_0)




Run #13724, Experiment PUSAG M040219.1E (a2FE3)
Bias (μV)
field (T)
dI_left / dV_left (10^-3 e²/h)


Run #13724, Experiment PUSAG M040219.1E (a2FE3)
Bias (μV)
field (T)
dI_right / dV_left (10^-3 e²/h)


Run #13724, Experiment PUSAG M040219.1E (a2FE3)
Bias (μV)
field (T)
dI_right / dV_right (10^-3 e²/h)


Run #13724, Experiment PUSAG M040219.1E (a2FE3)
Bias (μV)
field (T)
dI_left / dV_right (10^-3 e²/h)