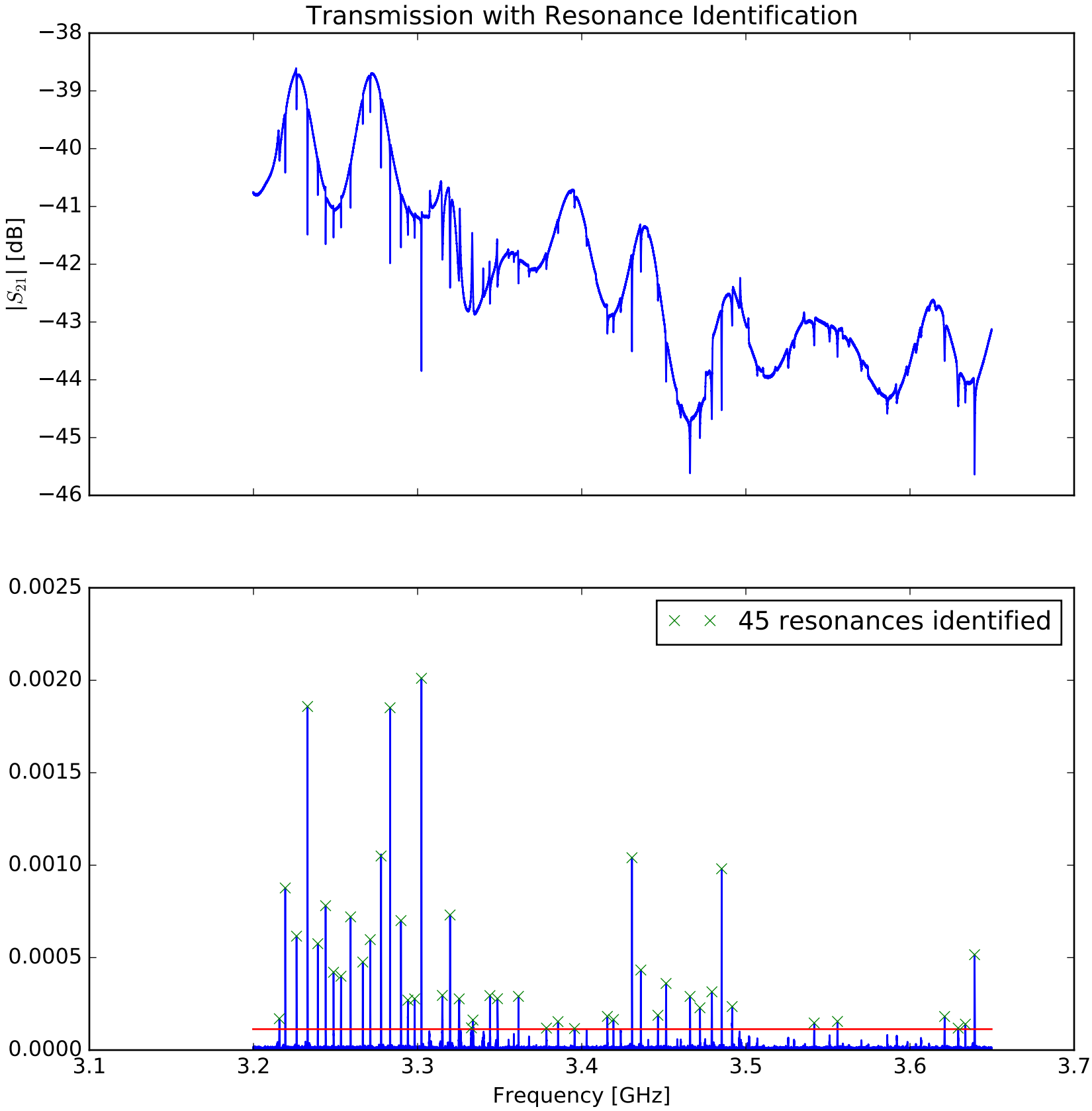
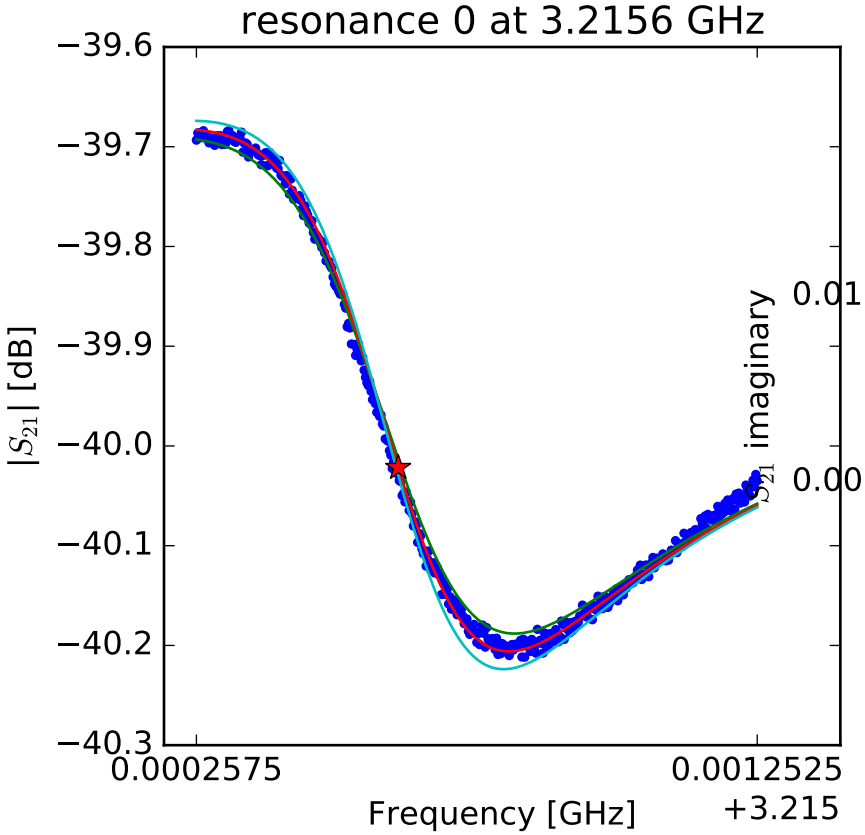
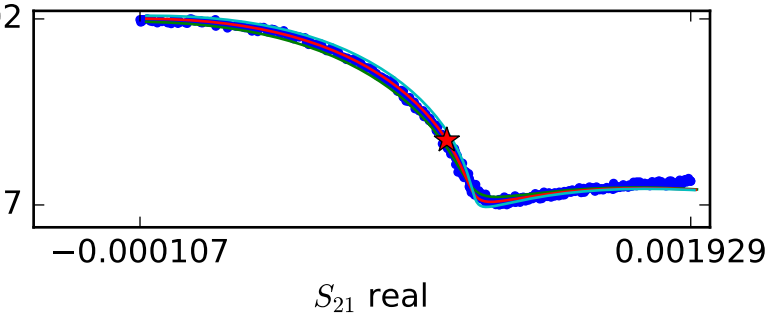
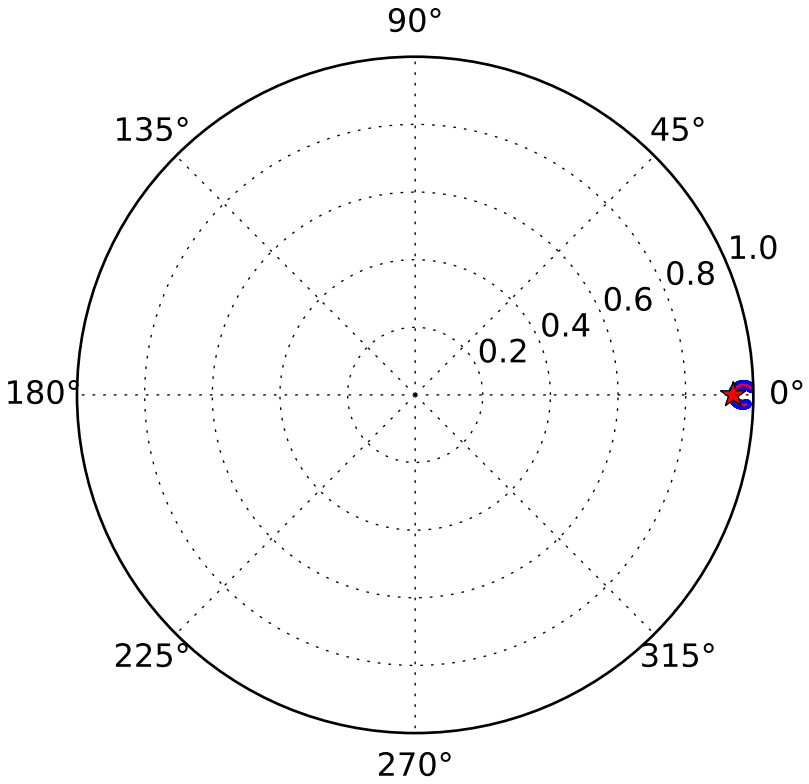
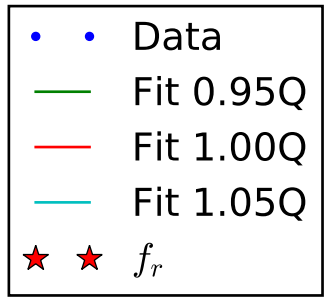

Transmission with Resonance Identification
−38
−39
−40
−41
−42
−43
−44
−45
−46
$|S_{21}|$ [dB]
0.0025
0.0020
0.0015
0.0010
0.0005
0.0000
45 resonances identified
3.1
3.2
3.3
3.4
3.5
3.6
3.7
Frequency [GHz]



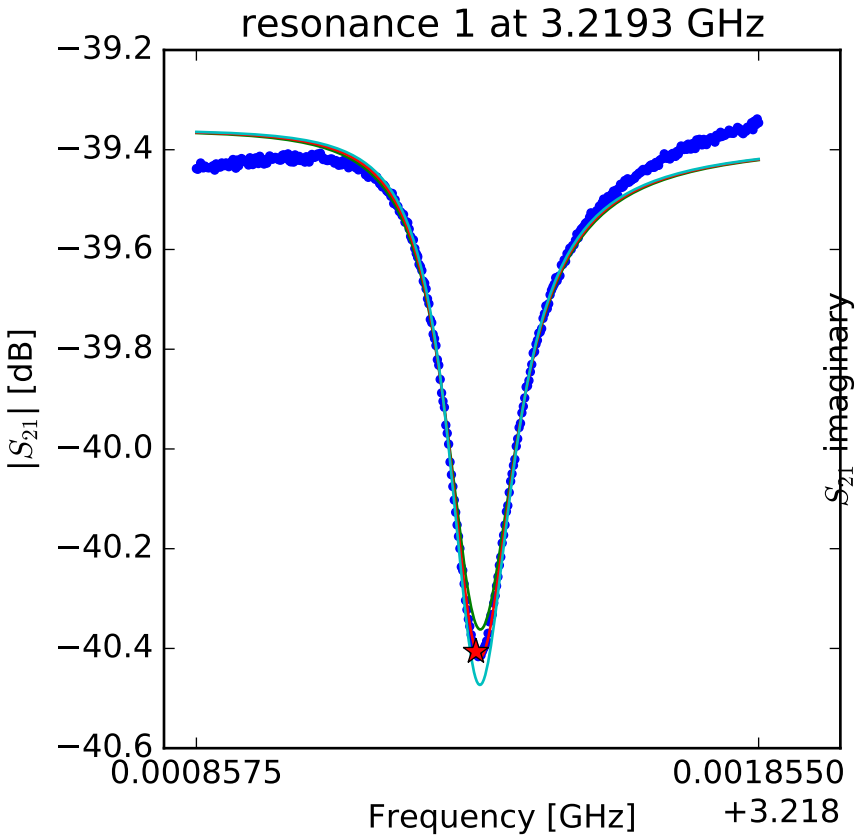


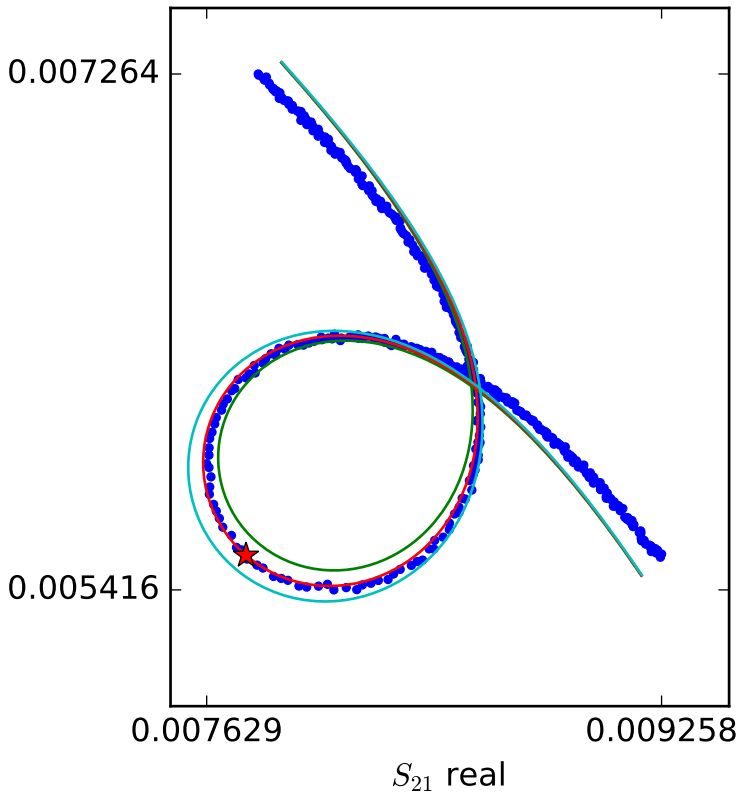


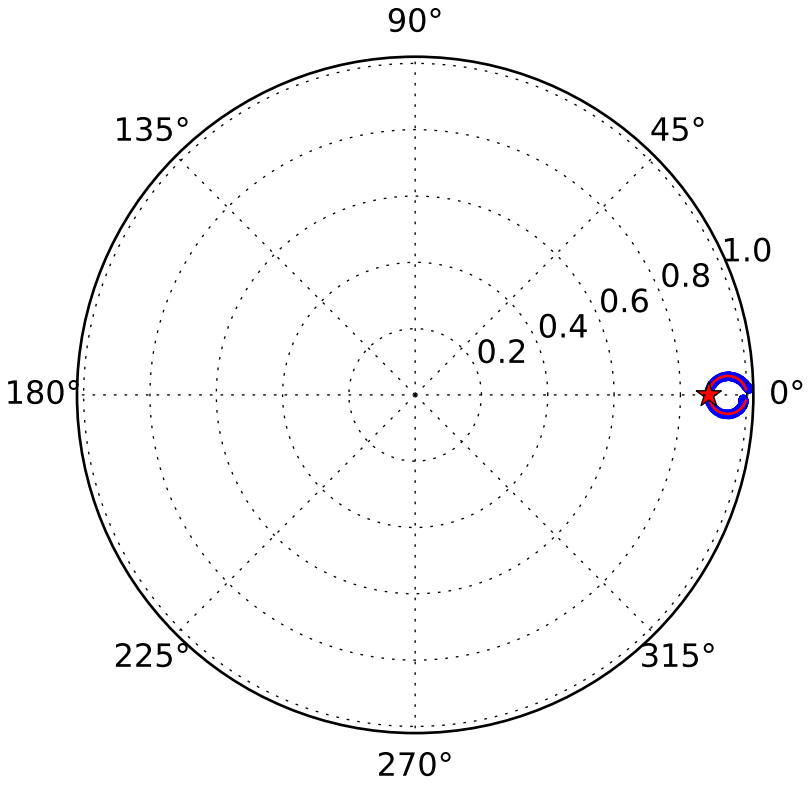


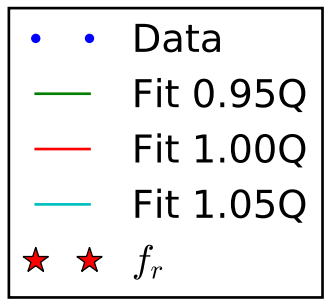
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.21561558202
Q_r = 5861.36664723
Q_c = 98284.1969113
a = (-7.96486045357e-05-0.0101706700349j)
ϕ_0 = 1.21351679286
τ = 37.4752815386



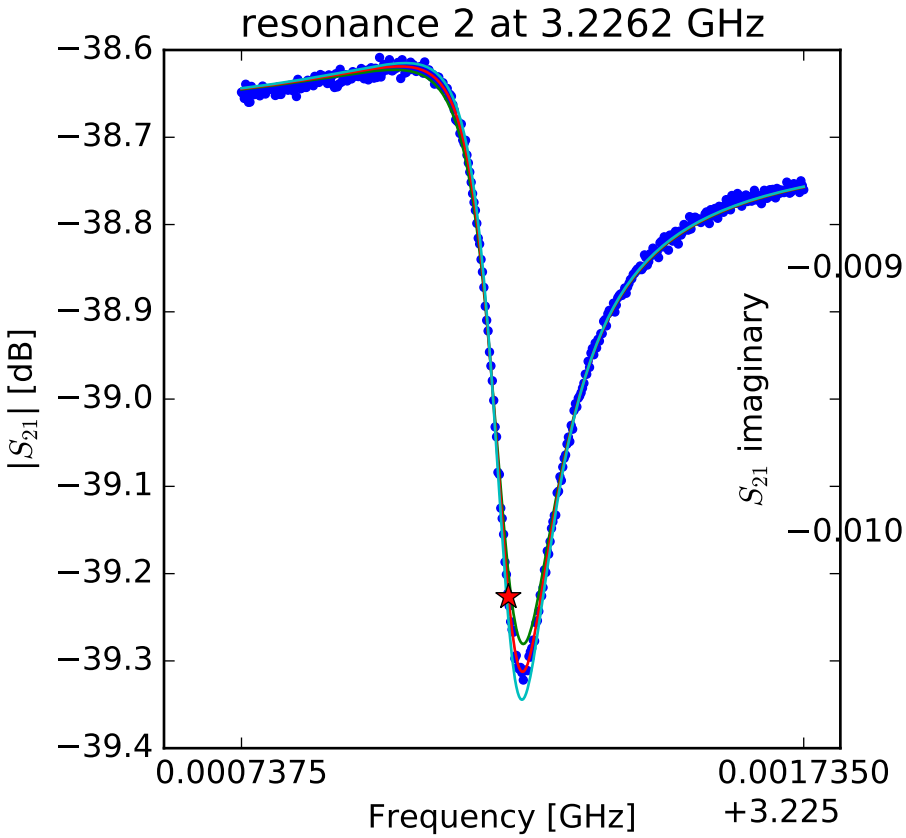


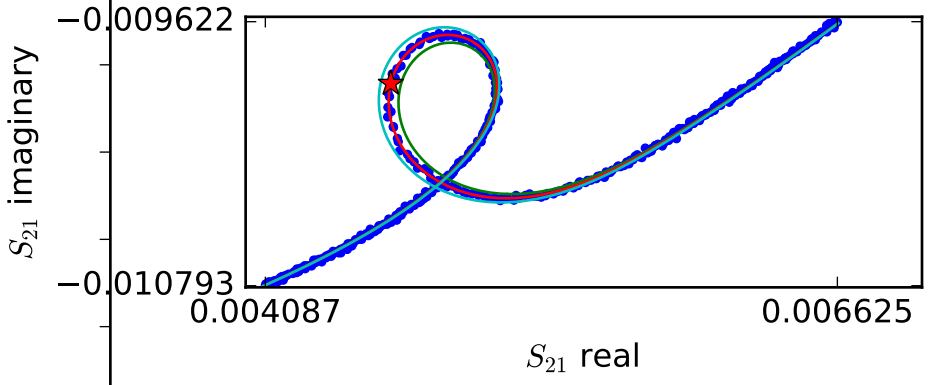


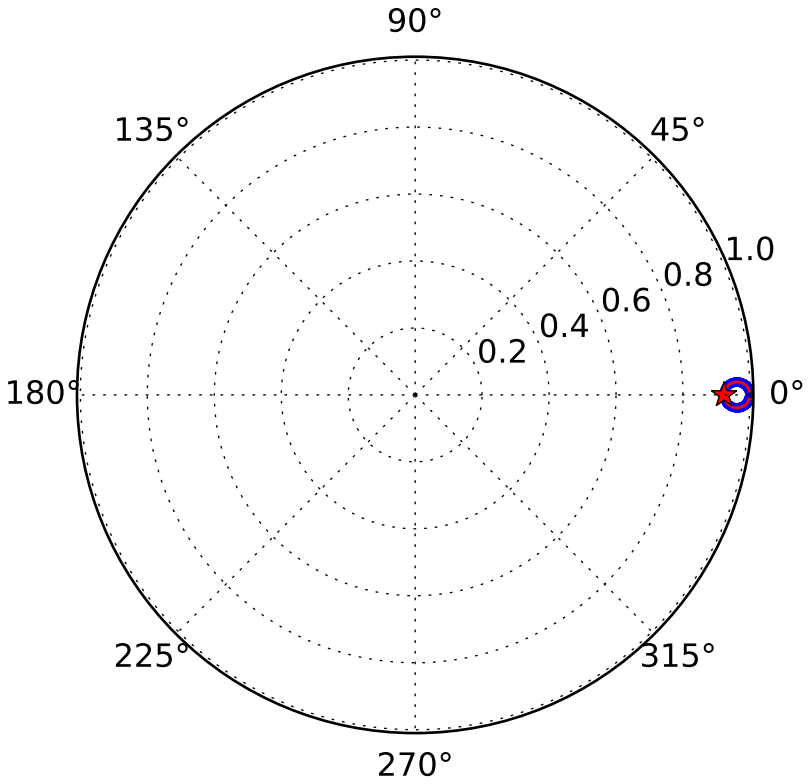


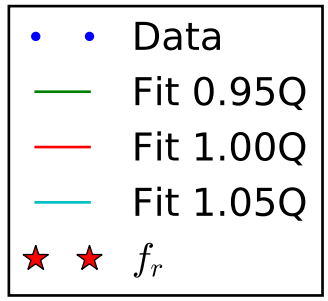
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.21935337016
Q_r = 20987.3882918
Q_c = 183269.44994
a = (0.00680372016678+0.00832401457507j)
ϕ_0 = 0.183500119883
τ = 38.8396681823



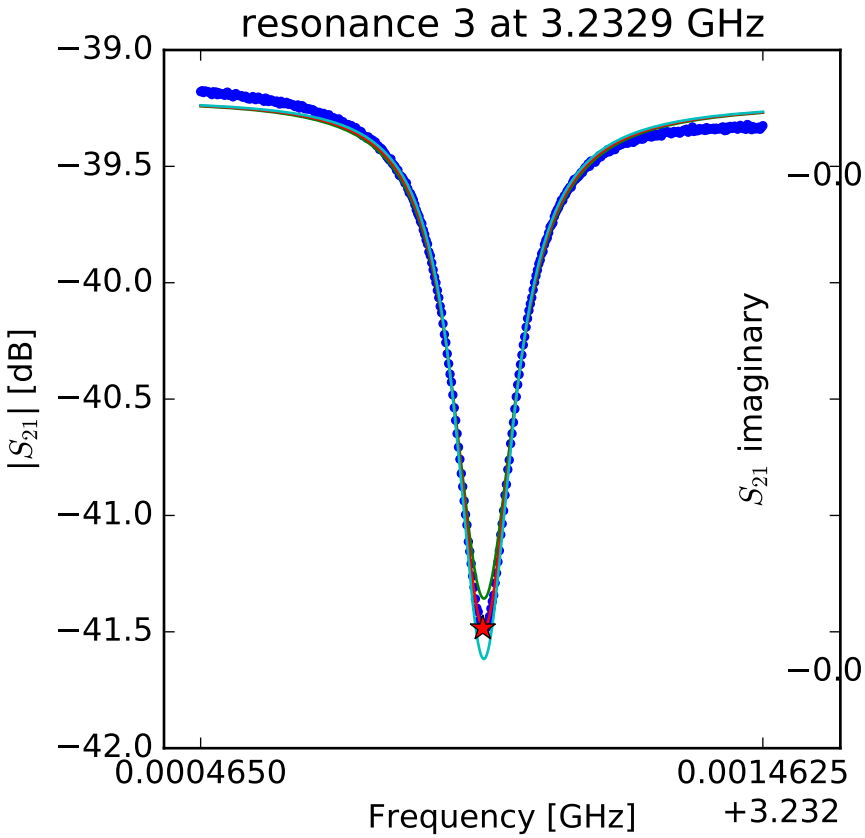


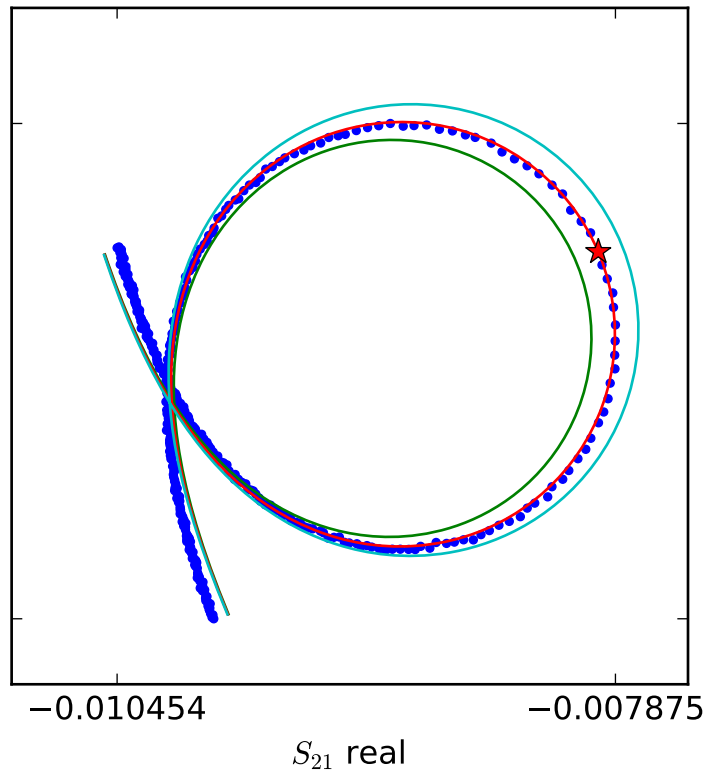


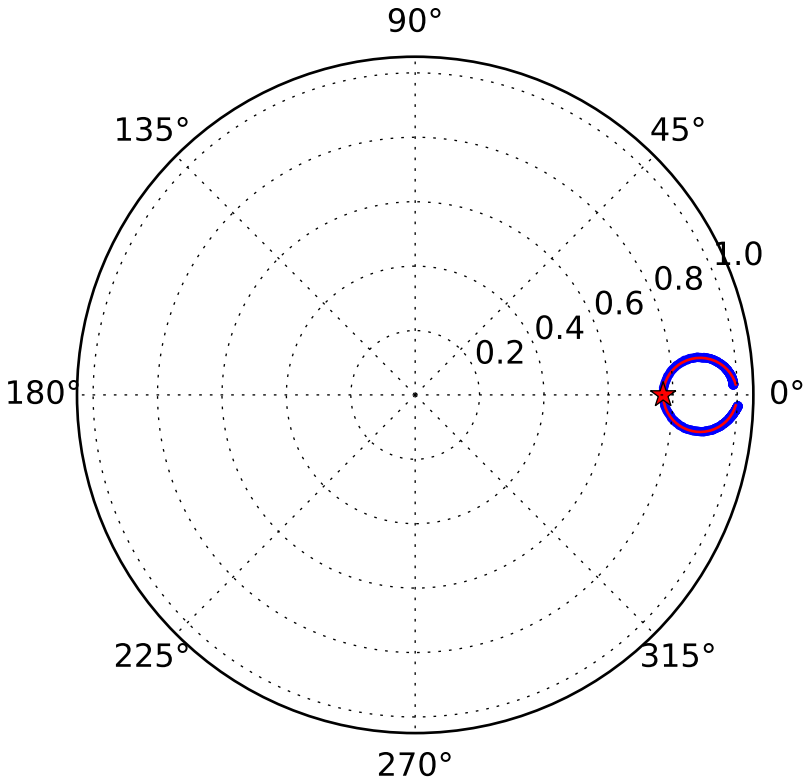


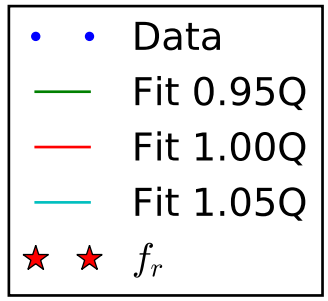
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.22621106772
Q_r = 23215.1630047
Q_c = 299815.55349
a = (0.00973810567291-0.00634573478049j)
ϕ_0 = 0.668671926668
τ = 41.2496646335



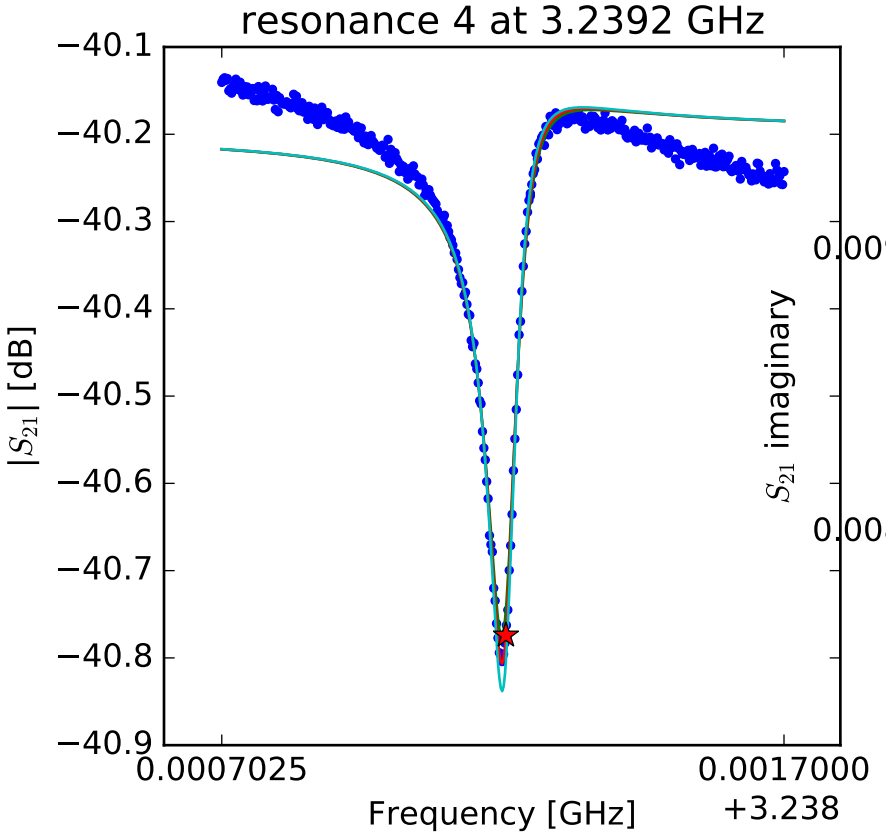


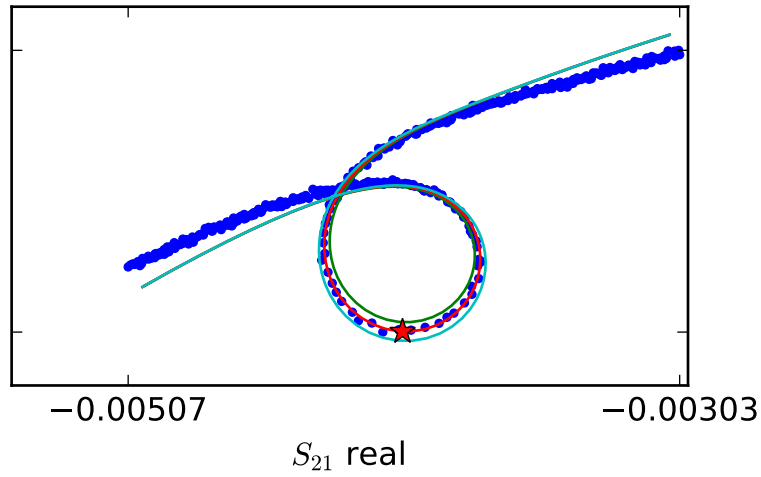


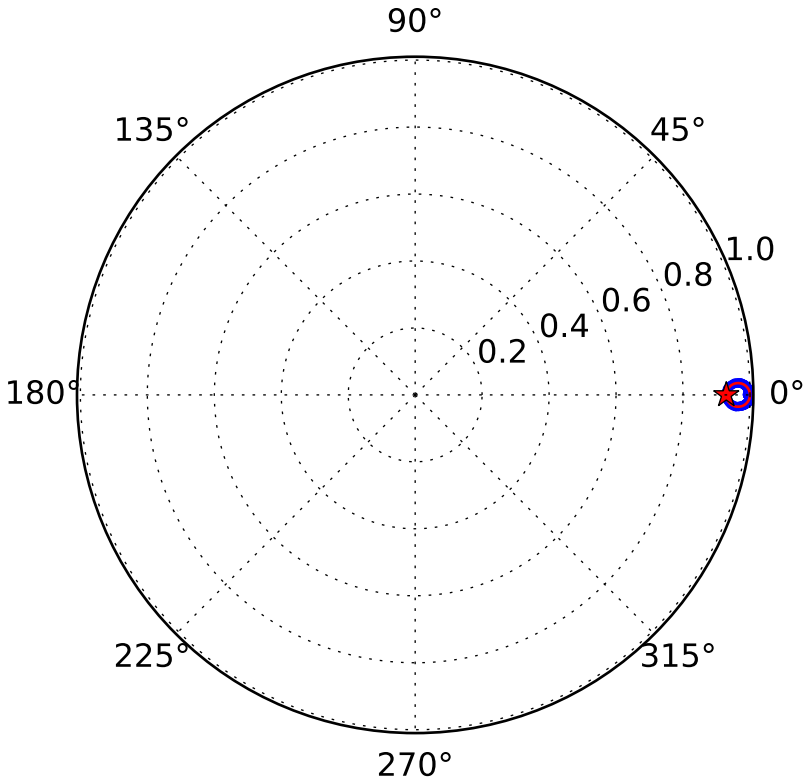


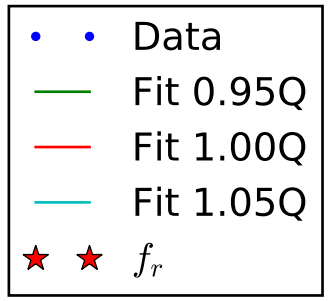
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.23296559841
Q_r = 22332.3337846
Q_c = 97062.4367509
a = (-0.00811570027774-0.00734145187447j)
ϕ_0 = 0.047849369698
τ = 39.3018824741



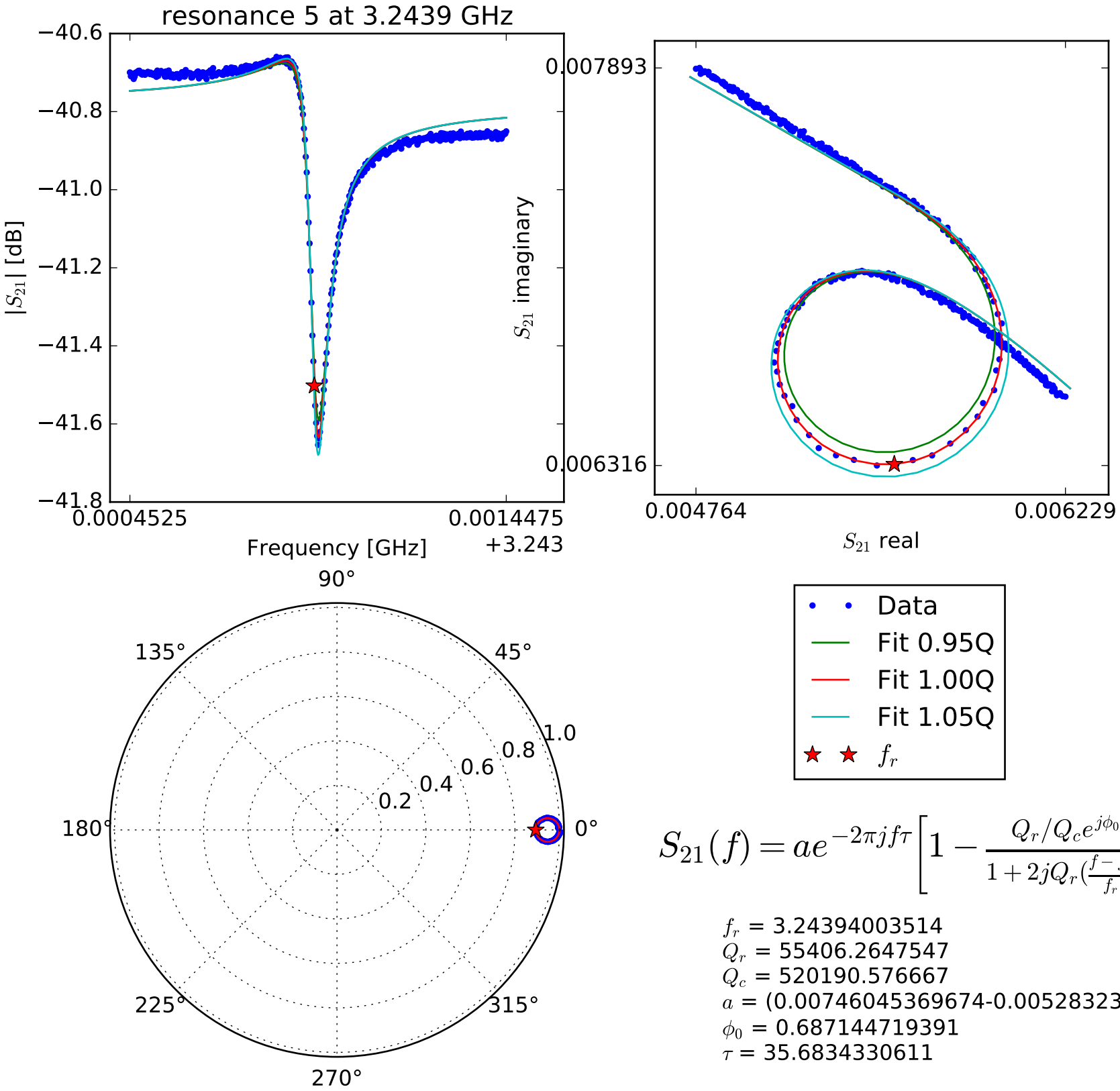






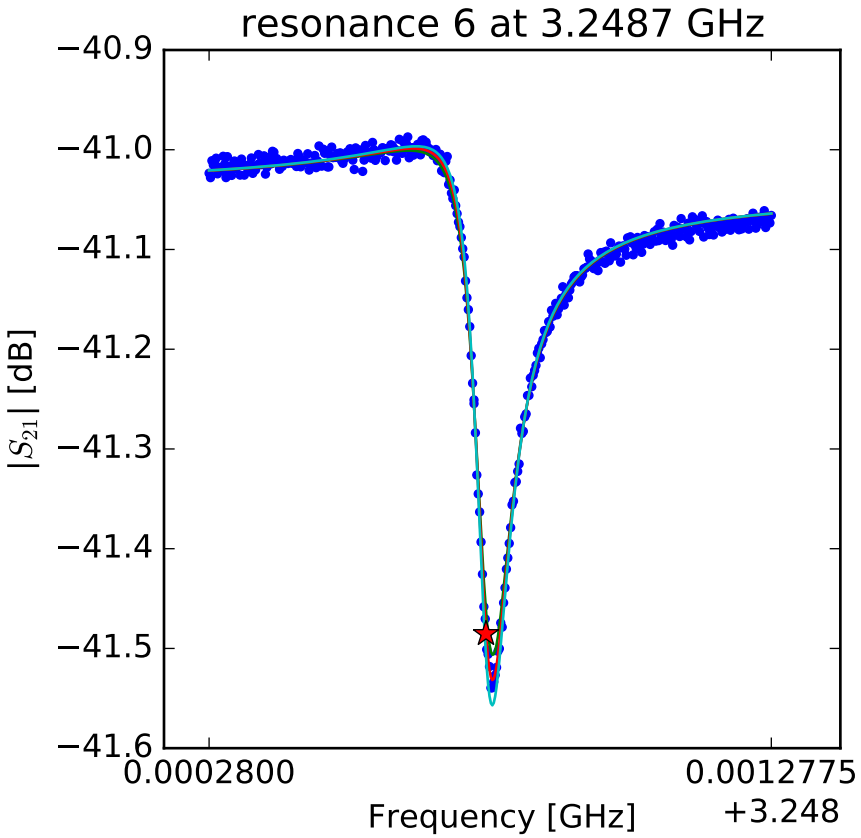
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

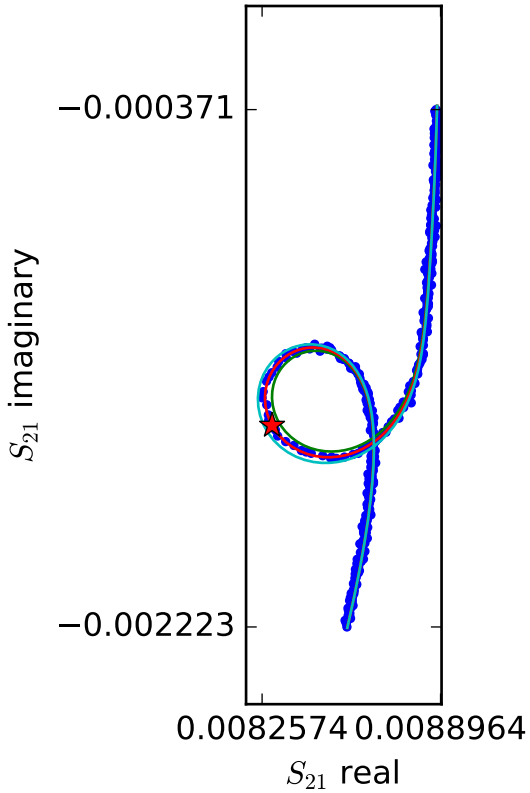
f_r = 3.23920666909
Q_r = 50525.0924628
Q_c = 713301.553469
a = (0.00976161440826-0.000485008291559j)
ϕ_0 = -0.424748661498
τ = 36.6367373458

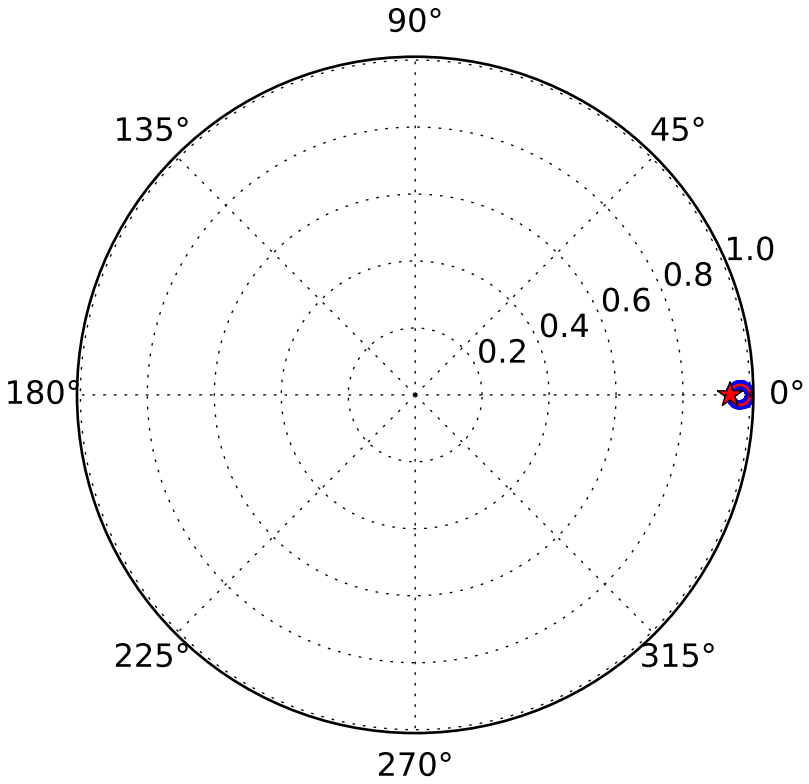


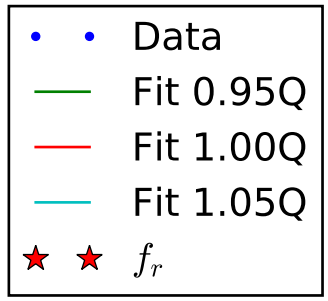
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.24394003514
Q_r = 55406.2647547
Q_c = 520190.576667
a = (0.00746045369674-0.005283236135j)
ϕ_0 = 0.687144719391
τ = 35.6834330611



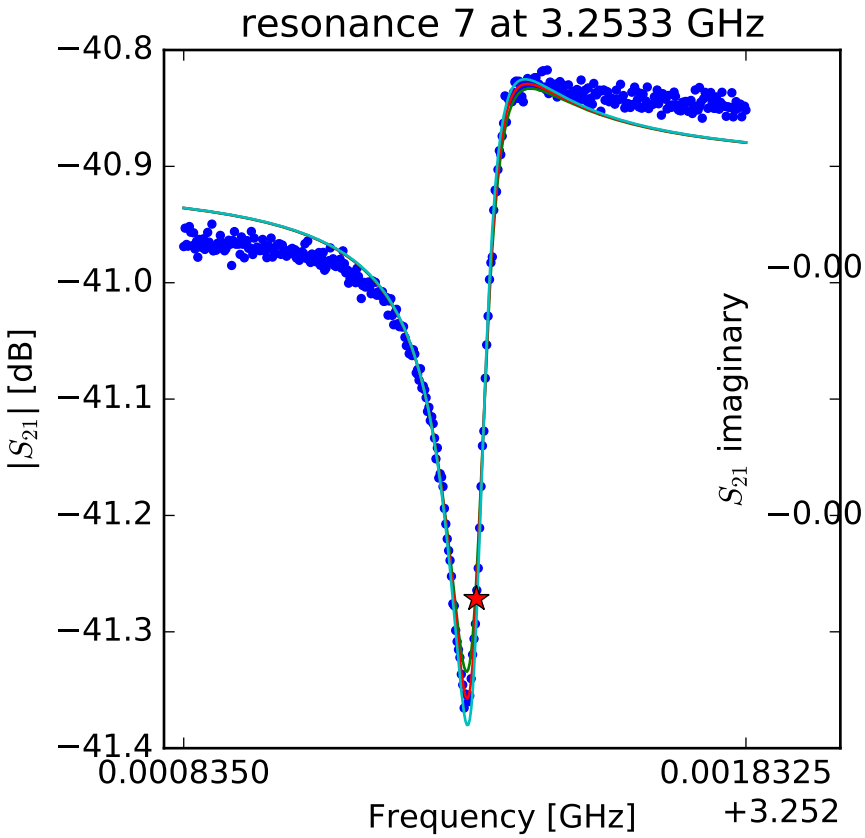


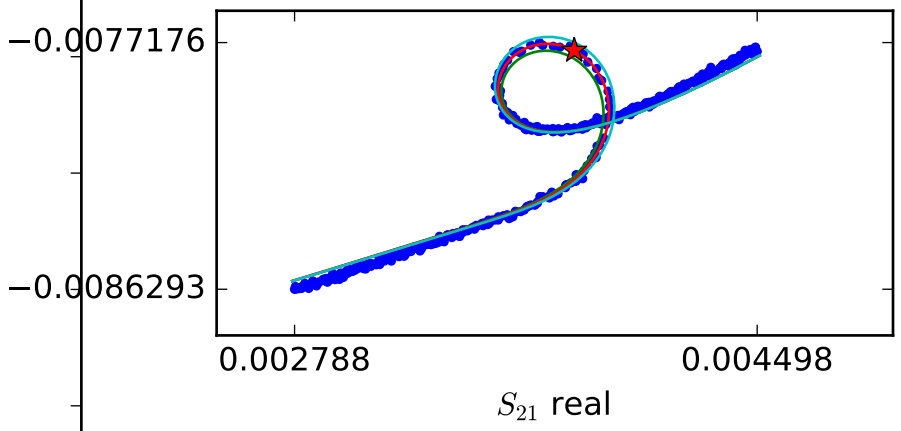


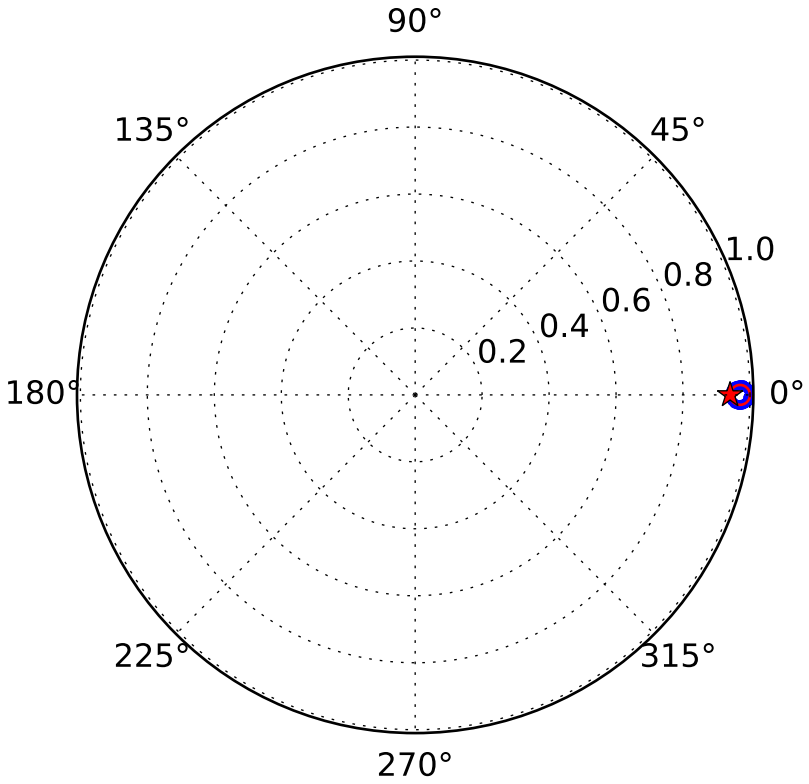


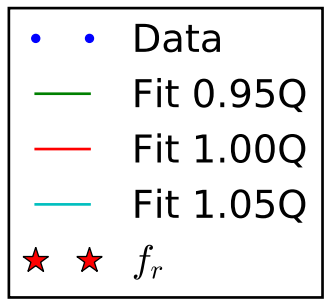
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.24877125508
Q_r = 41708.5680196
Q_c = 697275.622852
a = (0.00837478775304+0.00292657166478j)
ϕ_0 = 0.565531668194
τ = 35.4215917863



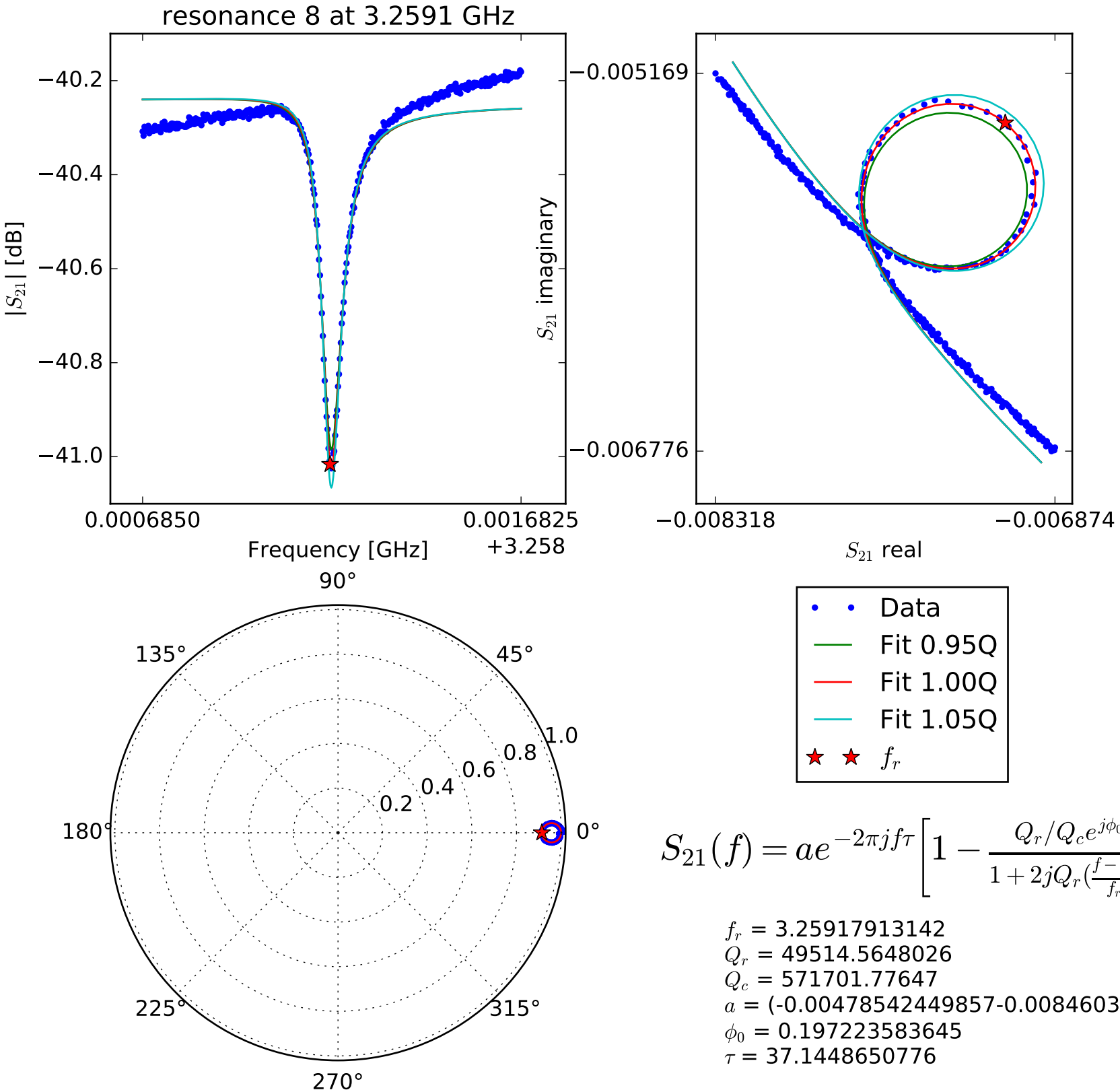






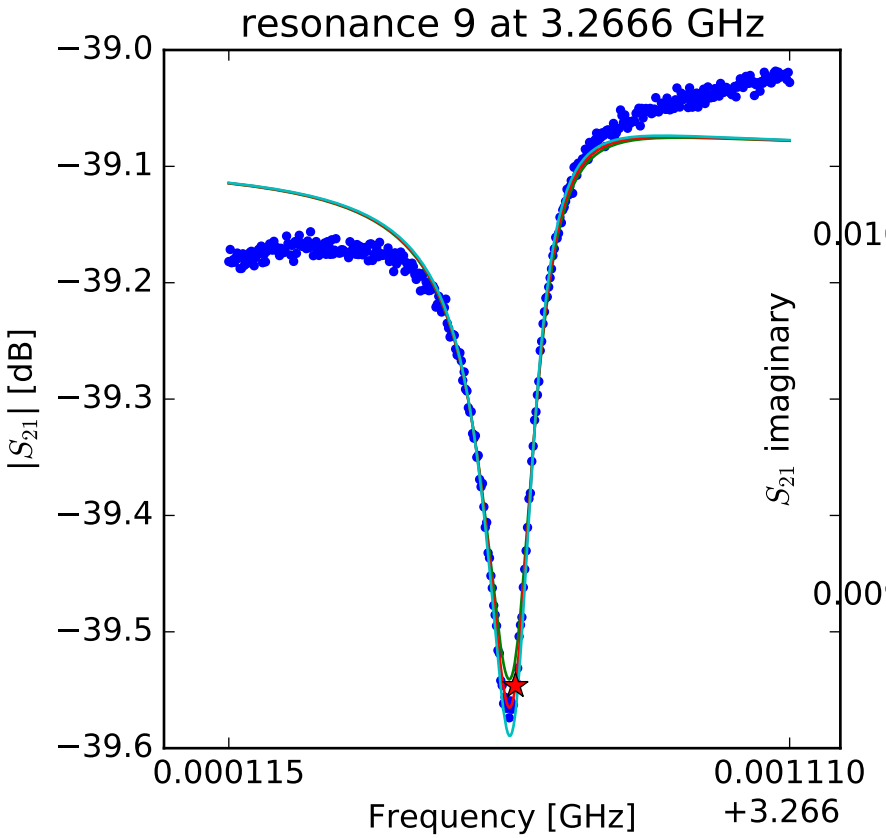
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

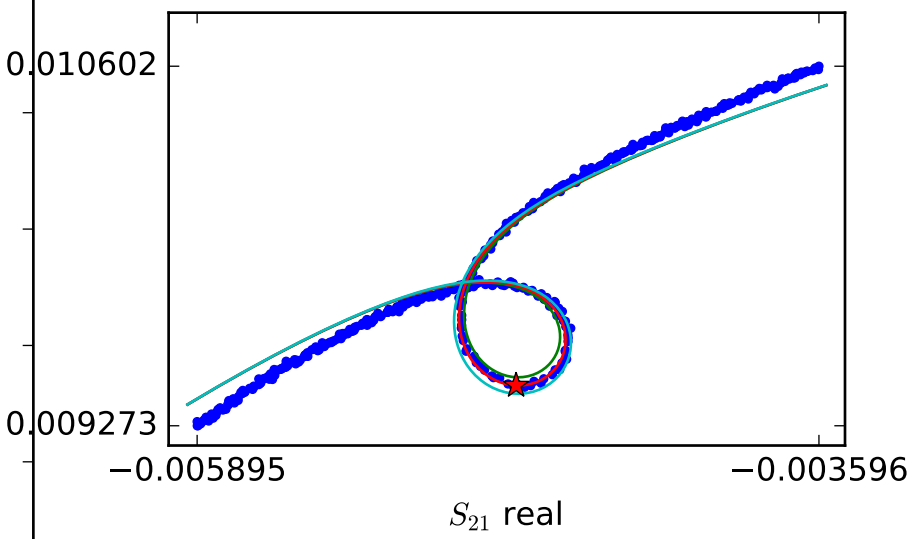
f_r = 3.25335437967
Q_r = 41997.1182697
Q_c = 705328.552864
a = (0.0075409895555-0.00492883234839j)
ϕ_0 = -0.786076947713
τ = 35.0690103738

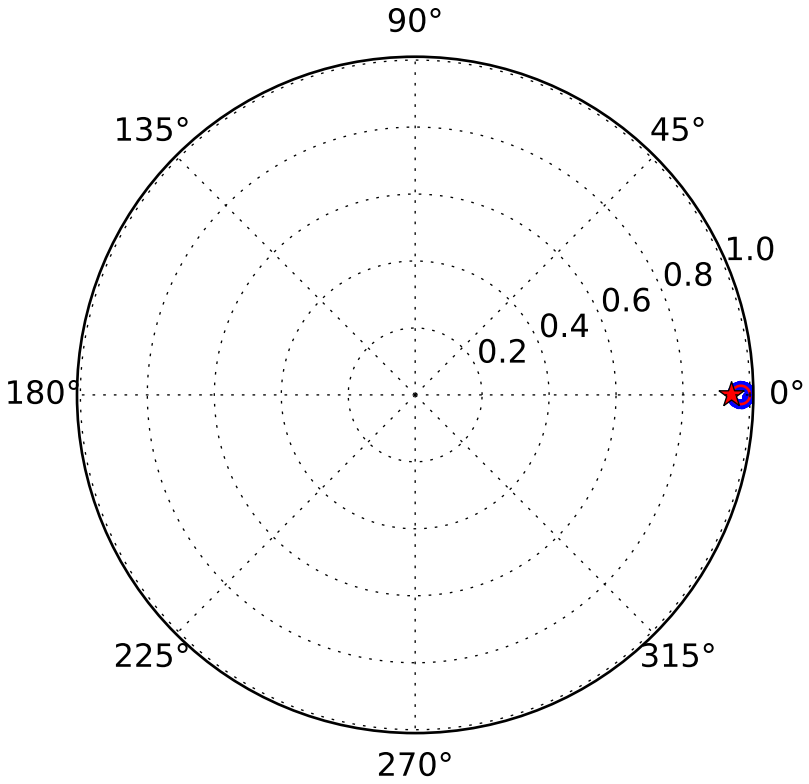


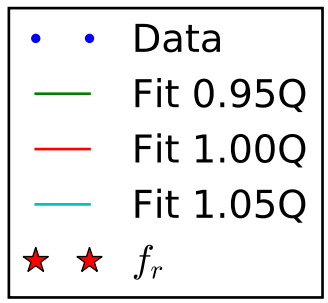
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.25917913142
Q_r = 49514.5648026
Q_c = 571701.77647
a = (-0.00478542449857-0.00846031841204j)
ϕ_0 = 0.197223583645
τ = 37.1448650776



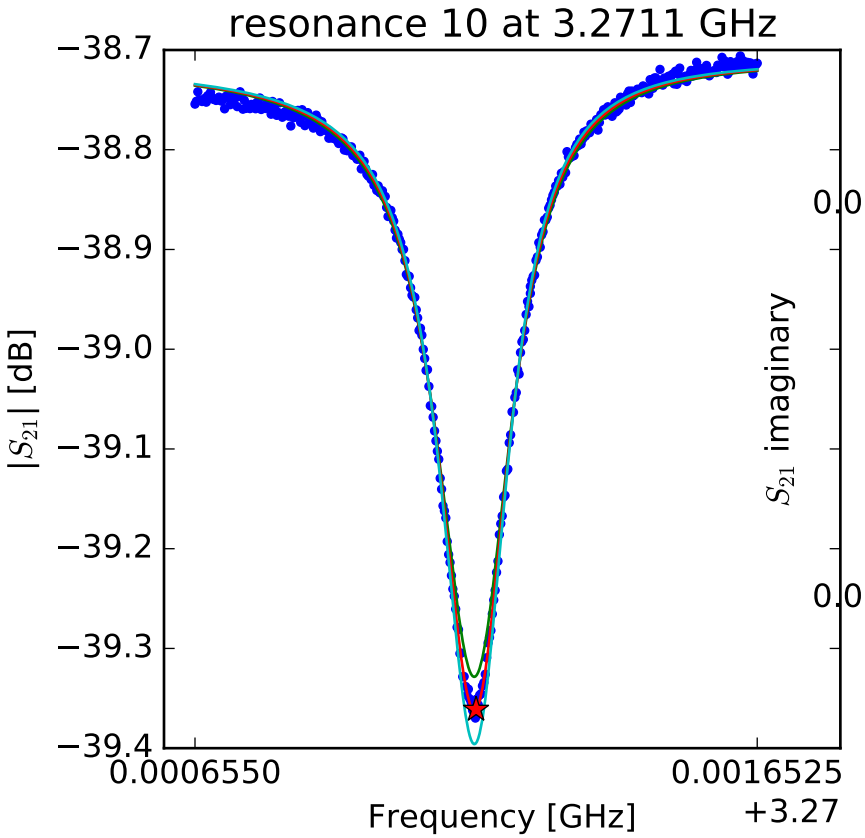


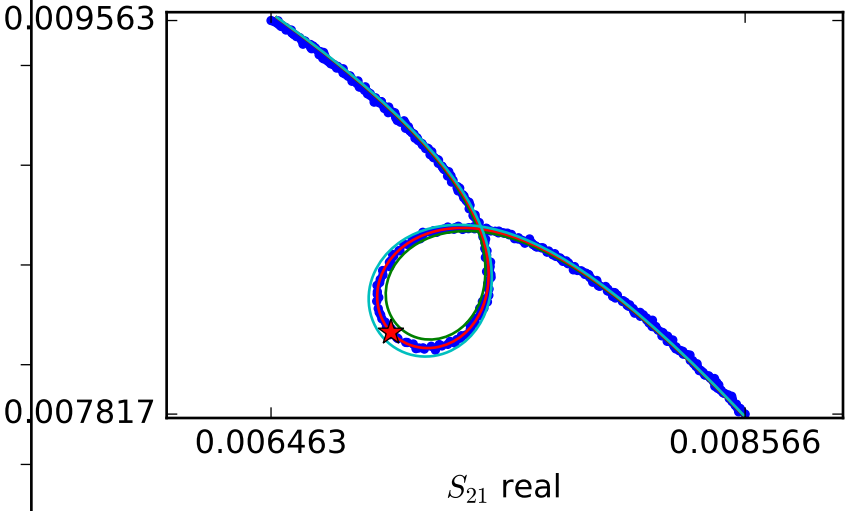


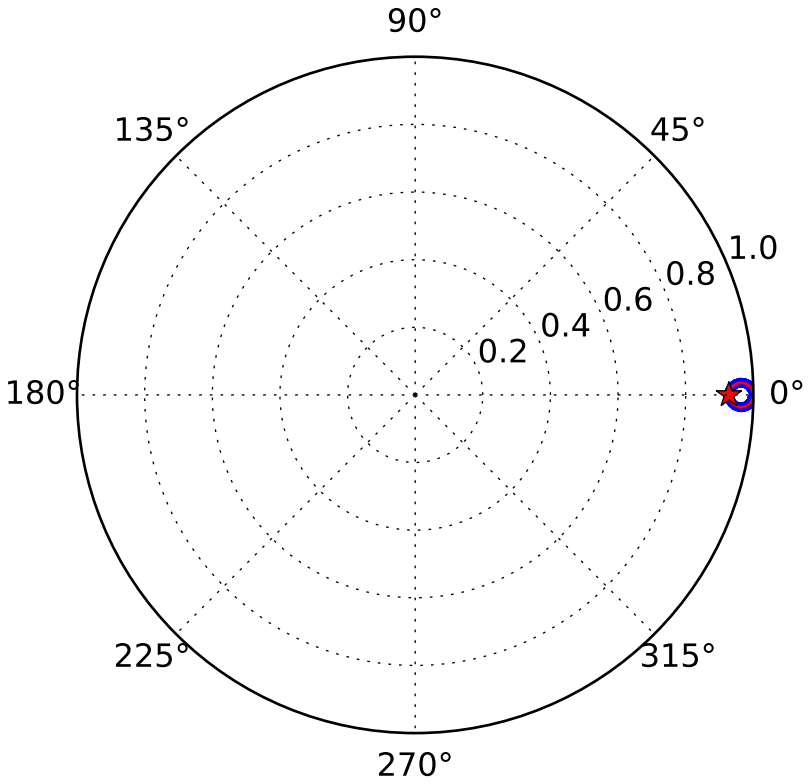


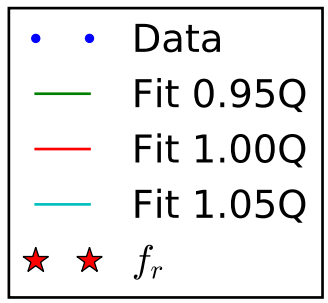
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.2666235173
Q_r = 30598.3562948
Q_c = 555892.67957
a = (-0.0101408387595-0.00452019560367j)
ϕ_0 = -0.374216372354
τ = 39.8718289362



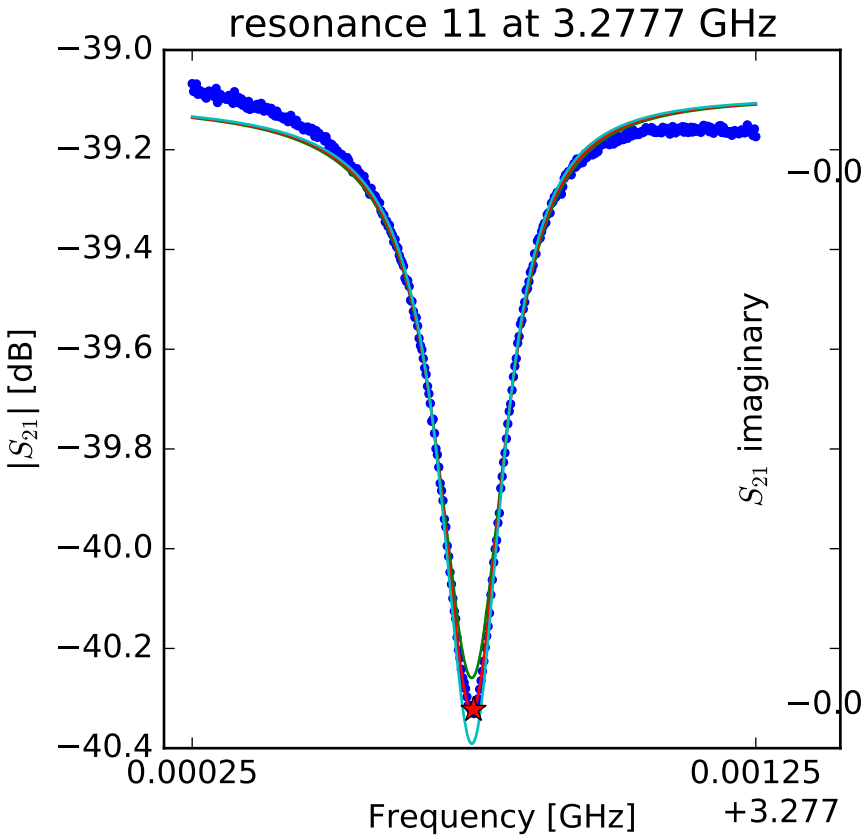


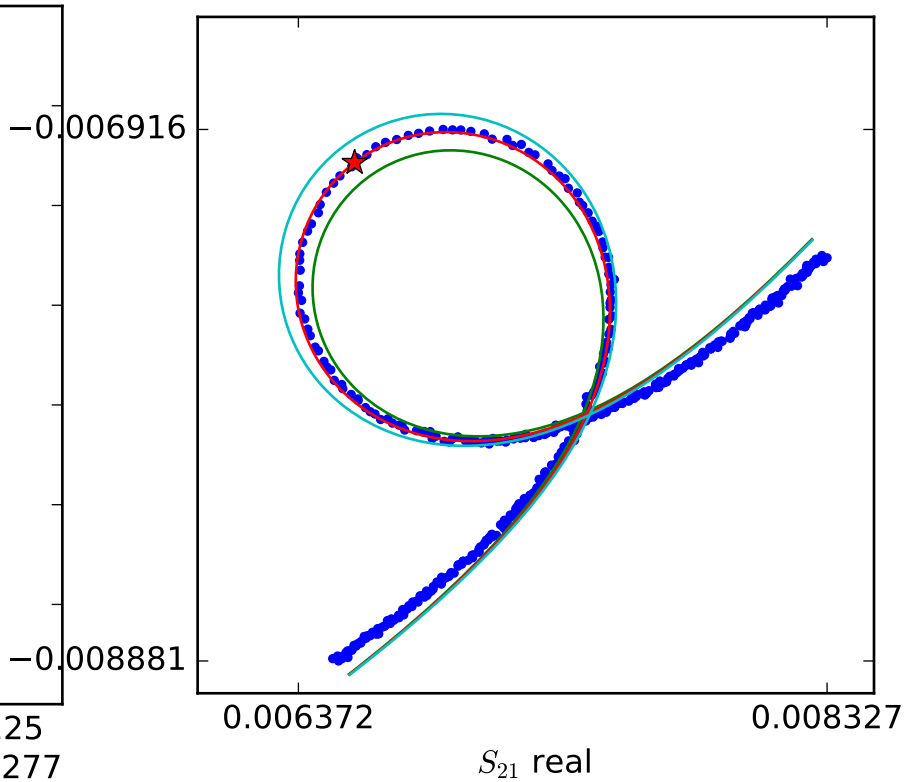


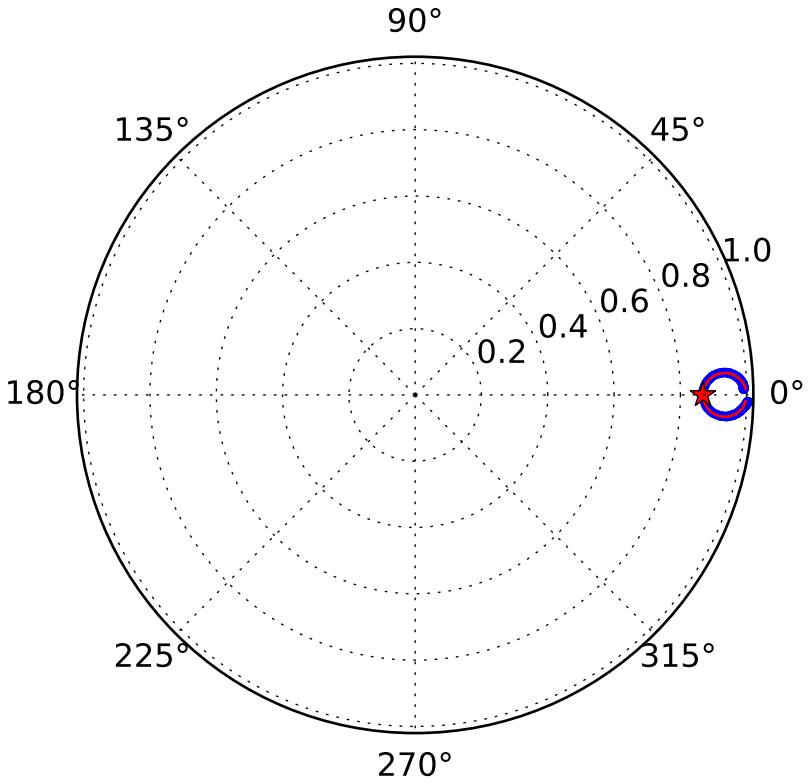


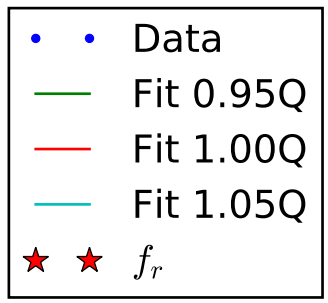
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.27115369709
Q_r = 20365.500102
Q_c = 282047.013872
a = (0.0107174234263-0.0044331721841j)
ϕ_0 = -0.075423712385
τ = 41.2090417284



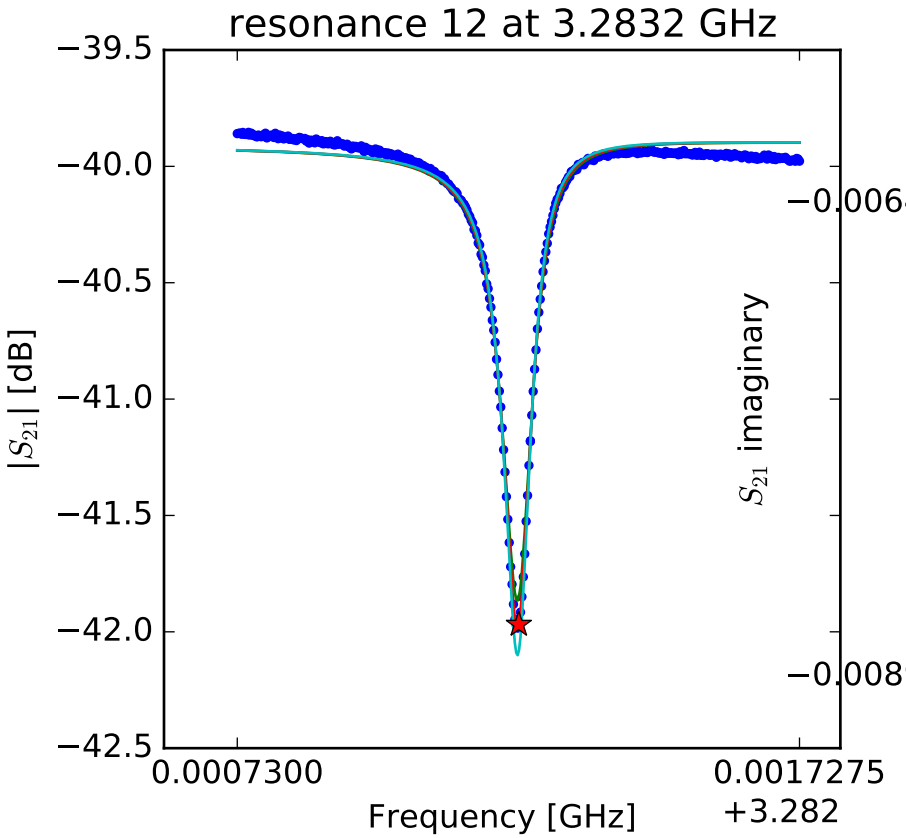


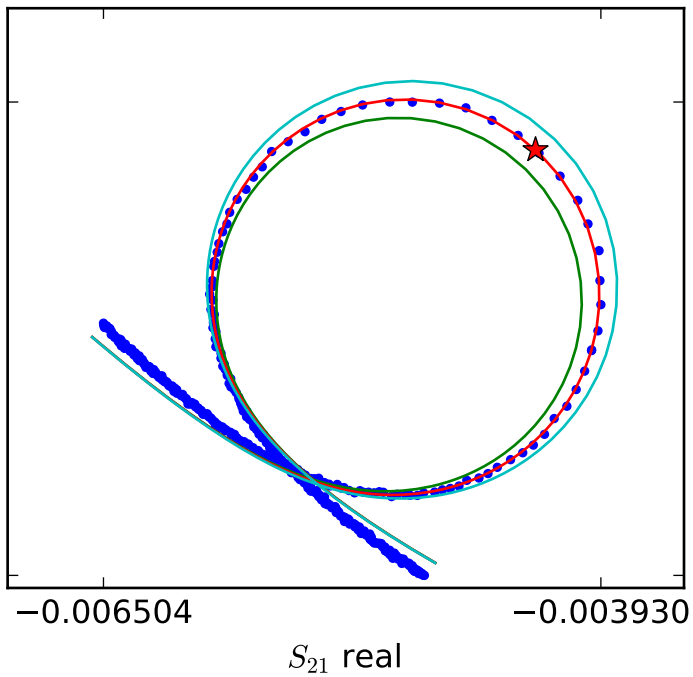


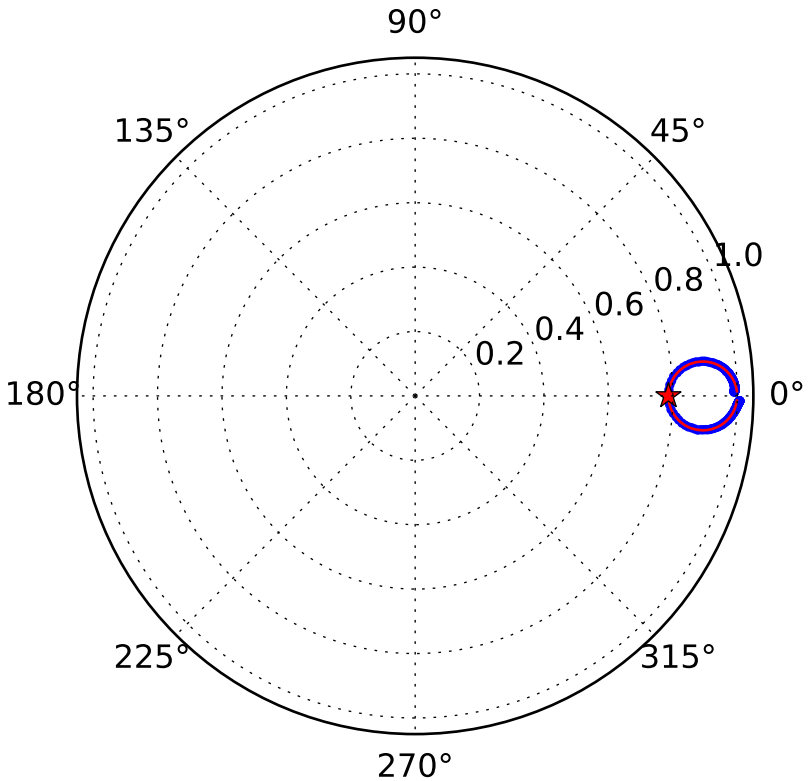


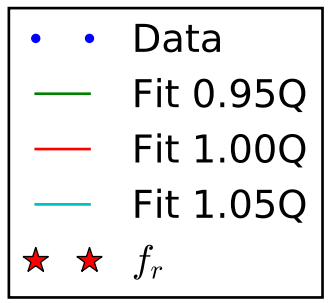
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.27774925144
Q_r = 21685.0540156
Q_c = 164240.94213
a = (0.00967084301068+0.00543845311856j)
ϕ_0 = -0.0782050573612
τ = 40.0316697858



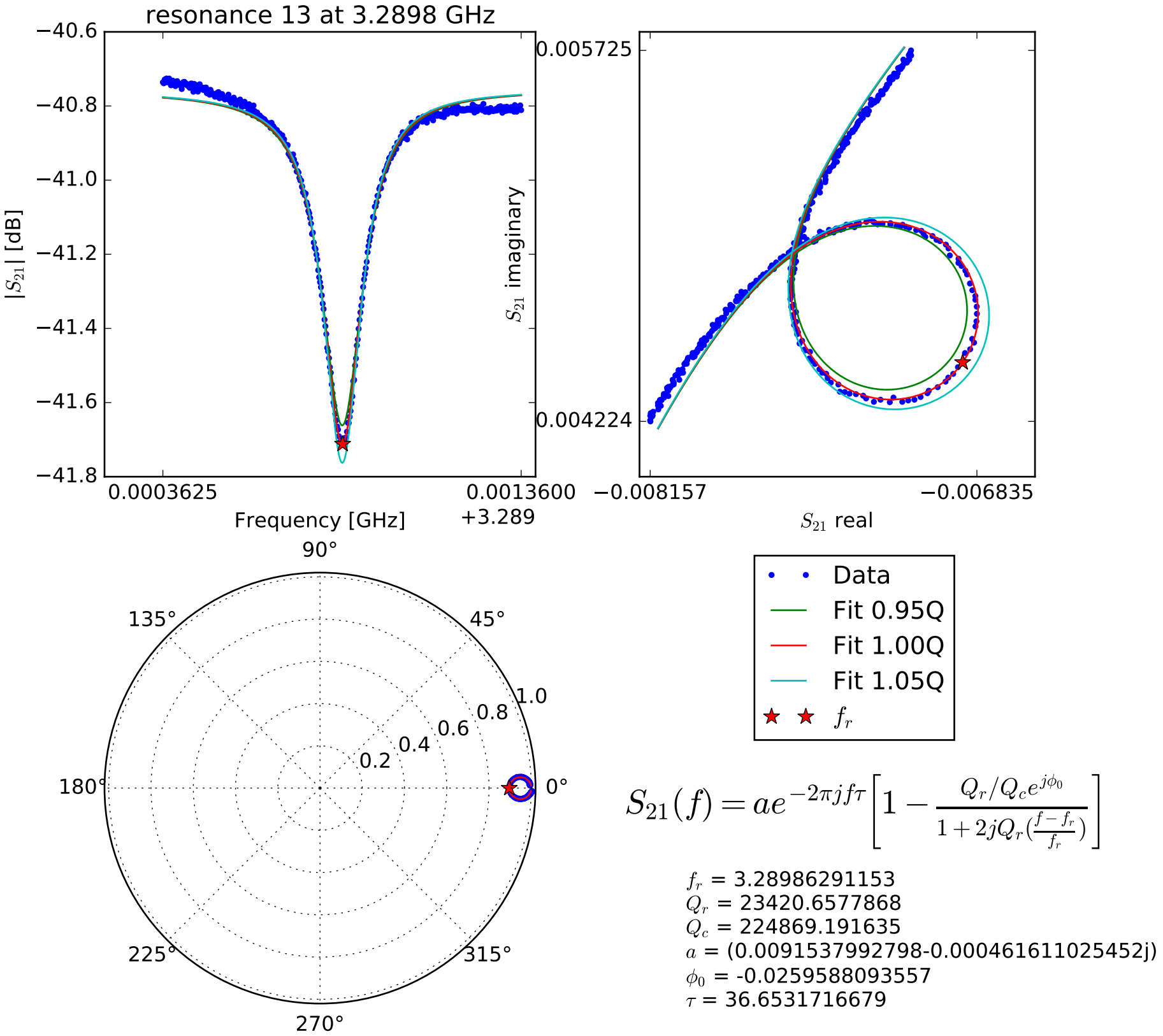






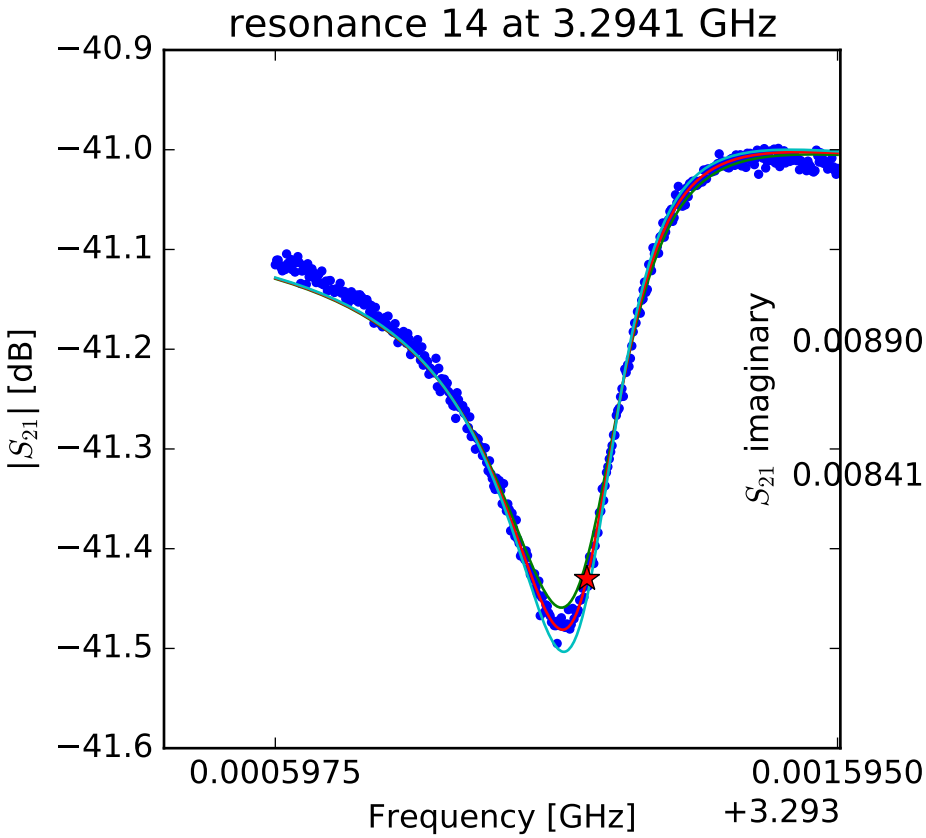
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

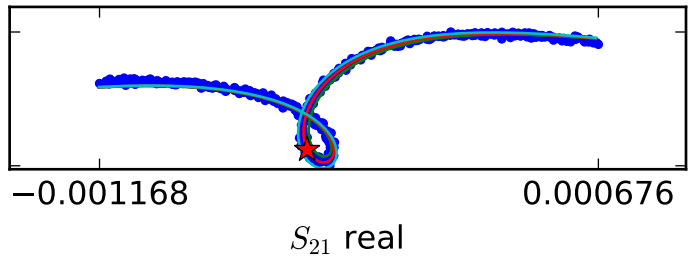
f_r = 3.28322945953
Q_r = 47898.363664
Q_c = 224181.747661
a = (-0.000522536547784+0.0100945613038j)
ϕ_0 = -0.131775524261
τ = 38.256179461

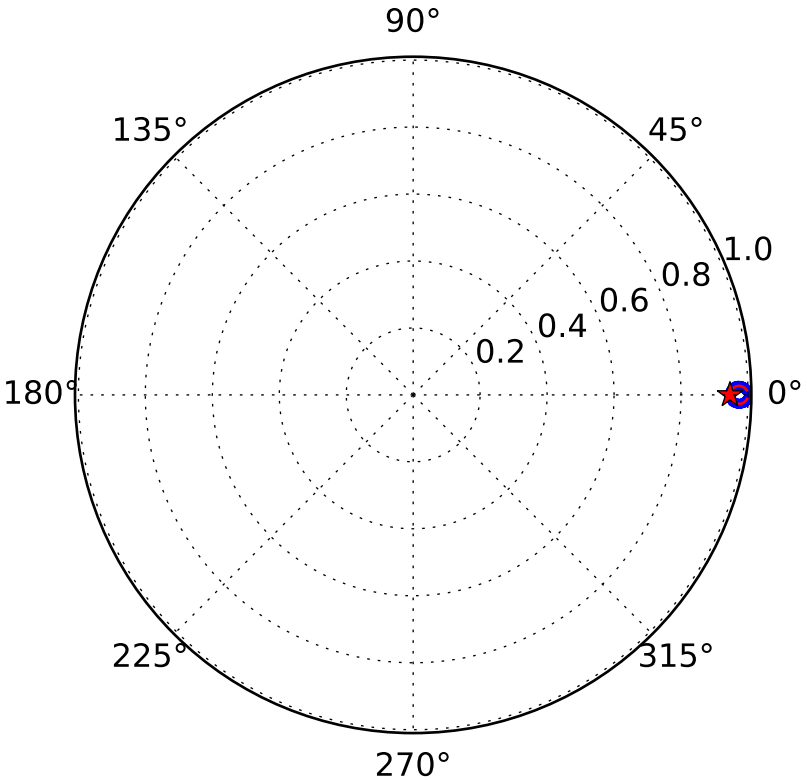


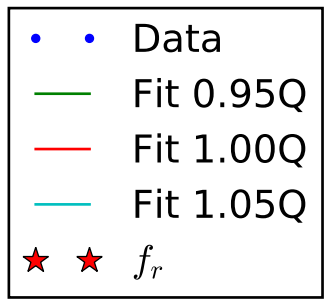
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.28986291153
Q_r = 23420.6577868
Q_c = 224869.191635
a = (0.0091537992798-0.000461611025452j)
ϕ_0 = -0.0259588093557
τ = 36.6531716679



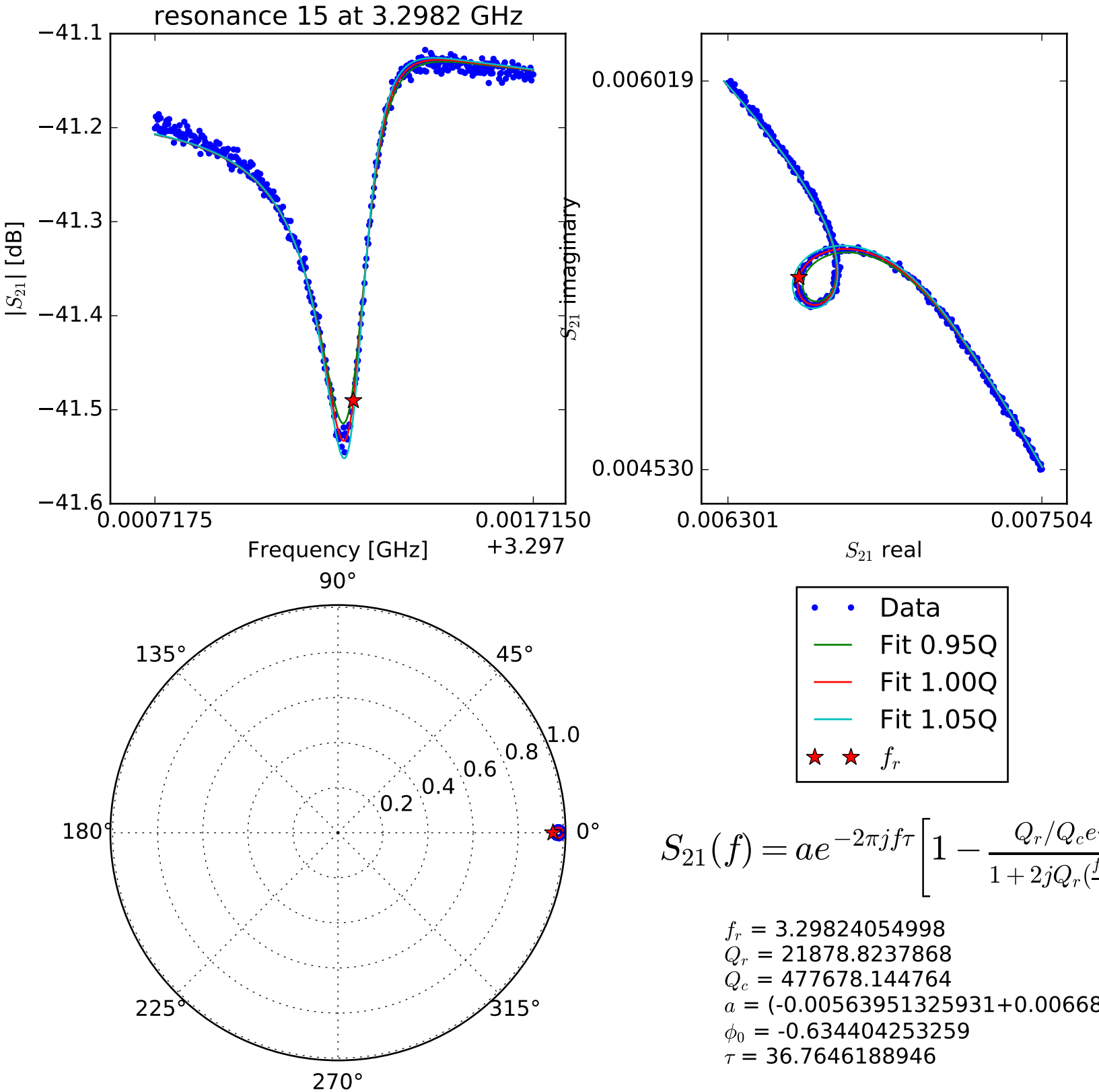






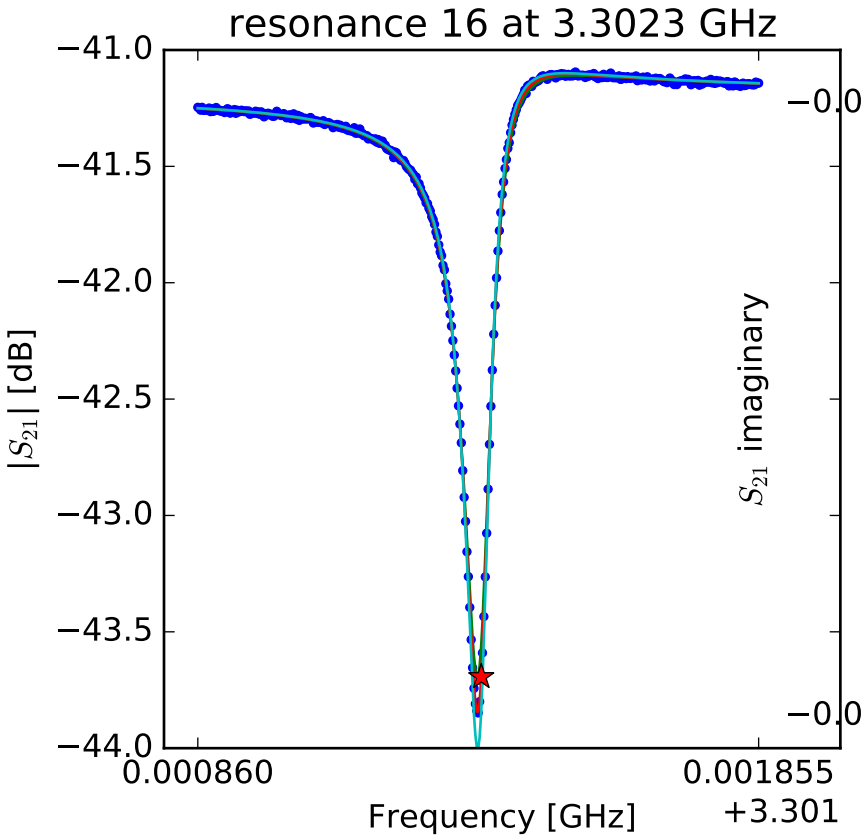
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

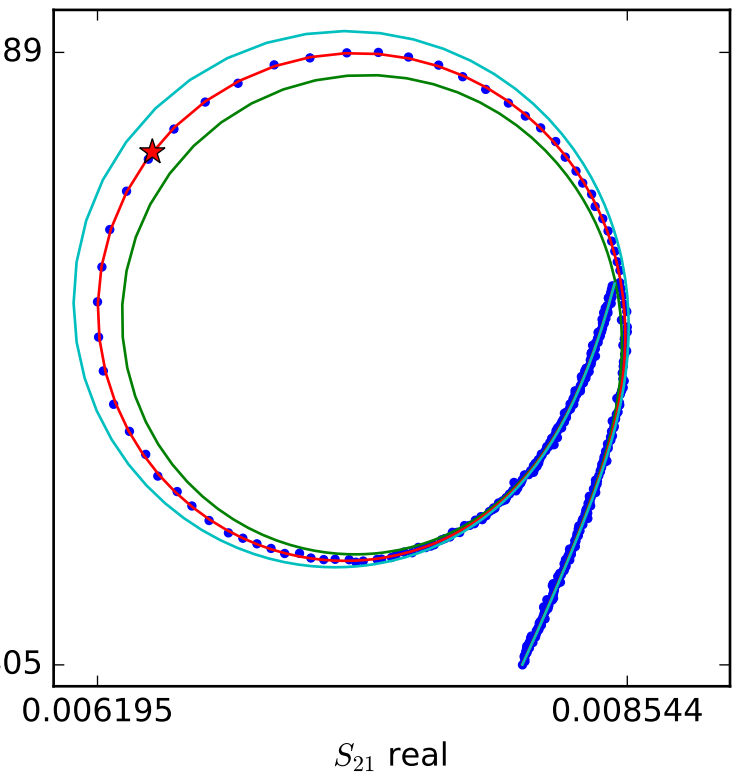
f_r = 3.29415039361
Q_r = 12900.3541272
Q_c = 239176.099614
a = (-0.00701325198742+0.00541856679563j)
ϕ_0 = -0.633263700758
τ = 36.7752184602

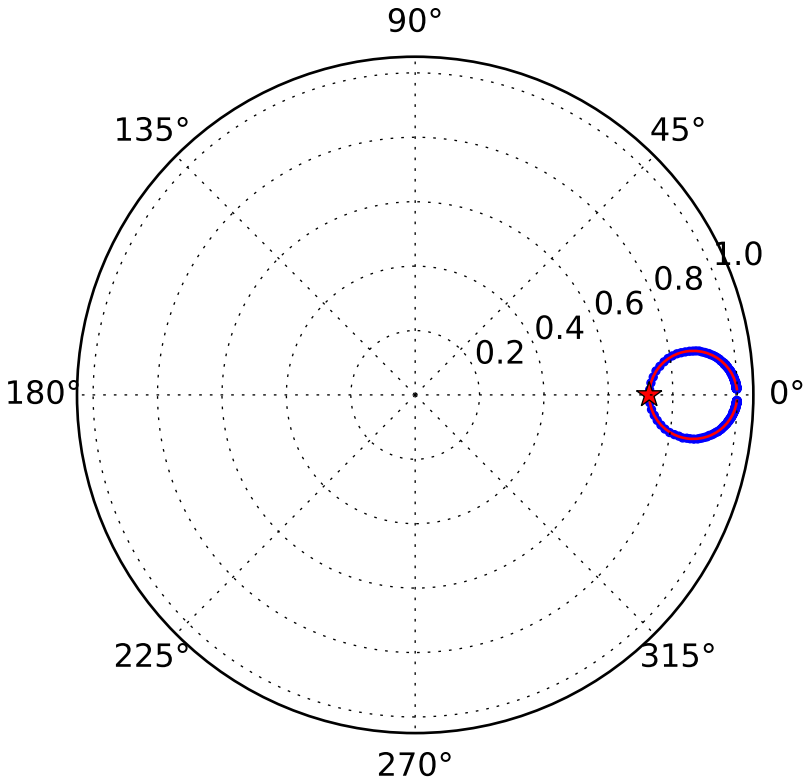


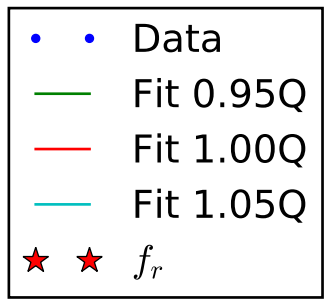
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.29824054998
Q_r = 21878.8237868
Q_c = 477678.144764
a = (-0.00563951325931+0.0066804461924j)
ϕ_0 = -0.634404253259
τ = 36.7646188946



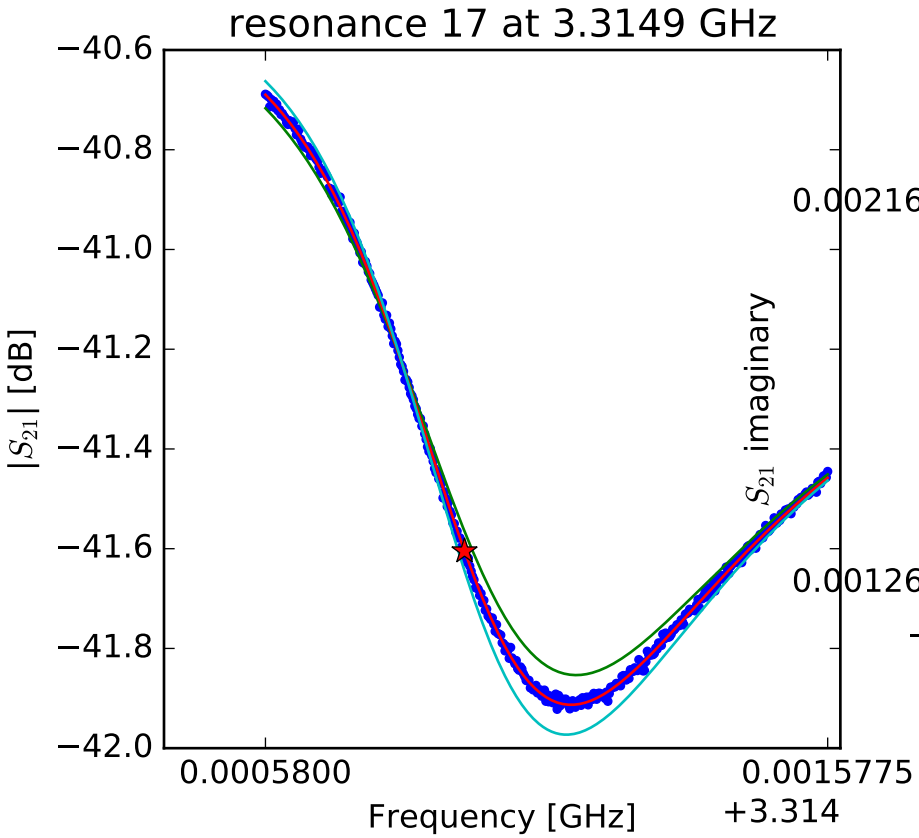


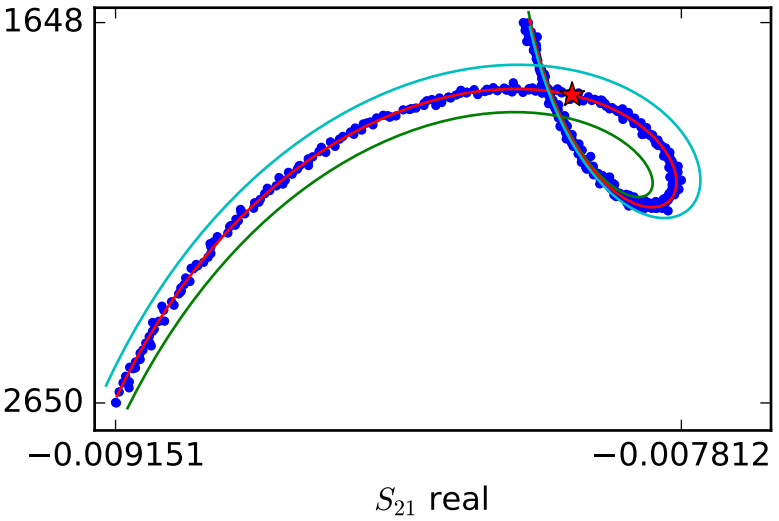


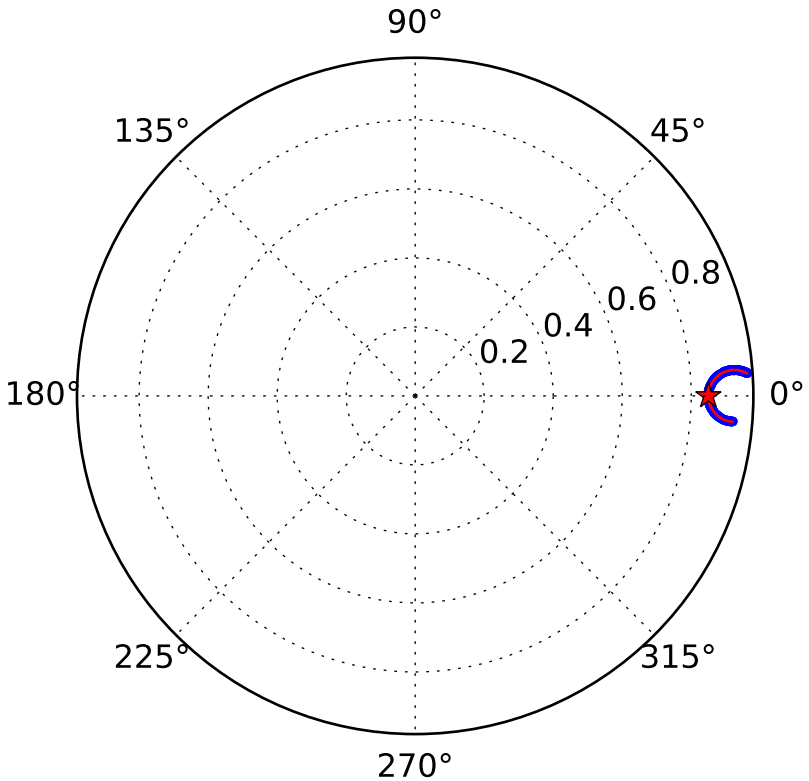


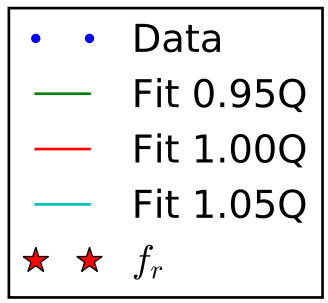
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.30236294743
Q_r = 50817.2363929
Q_c = 185813.579929
a = (0.00856239977439-0.00165354180995j)
ϕ_0 = -0.354219932195
τ = 37.2513559276



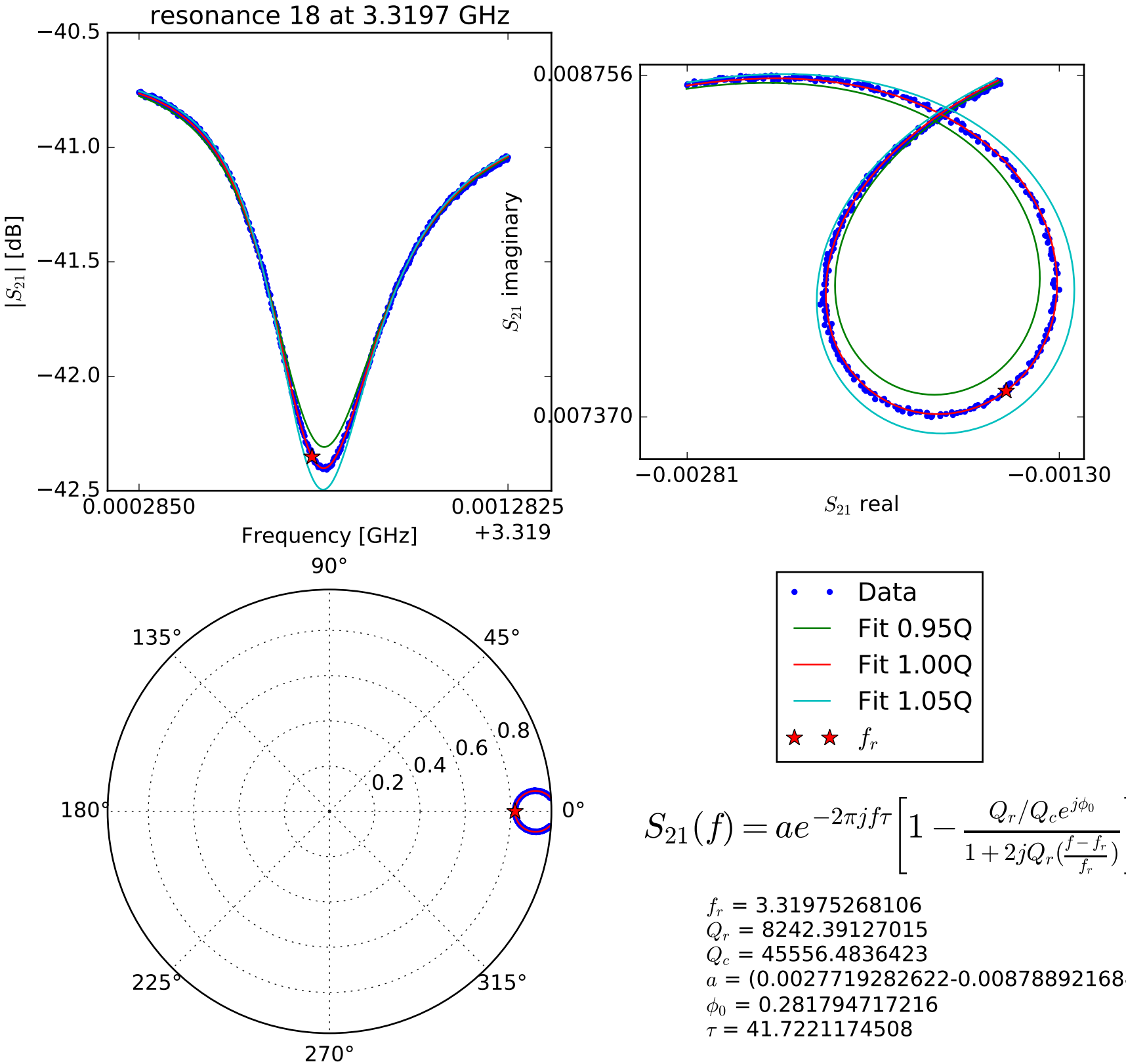






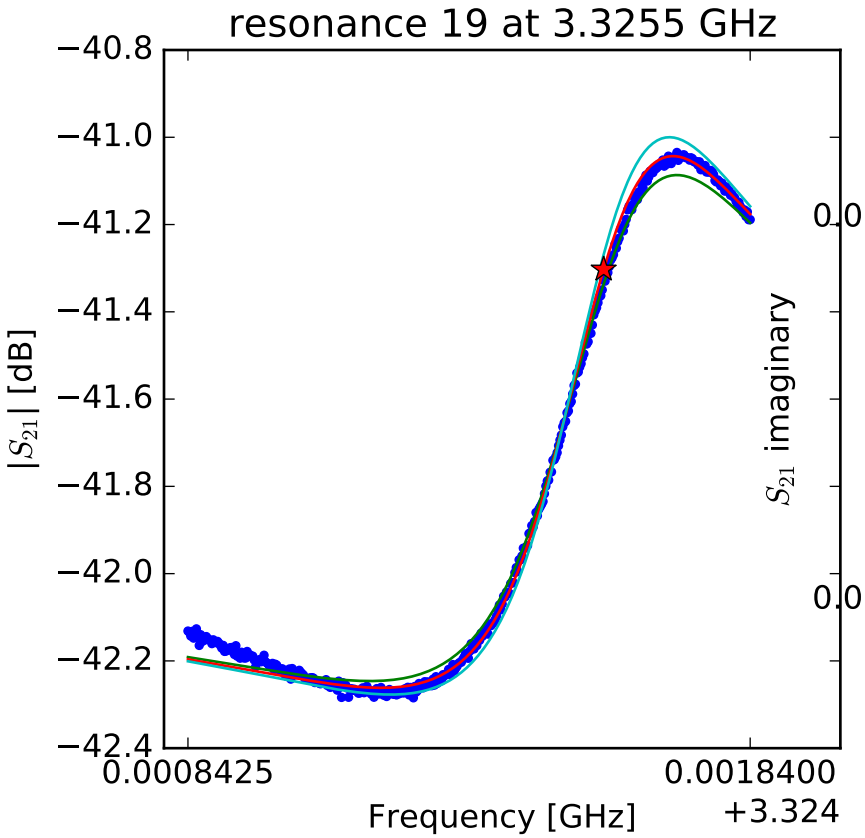
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

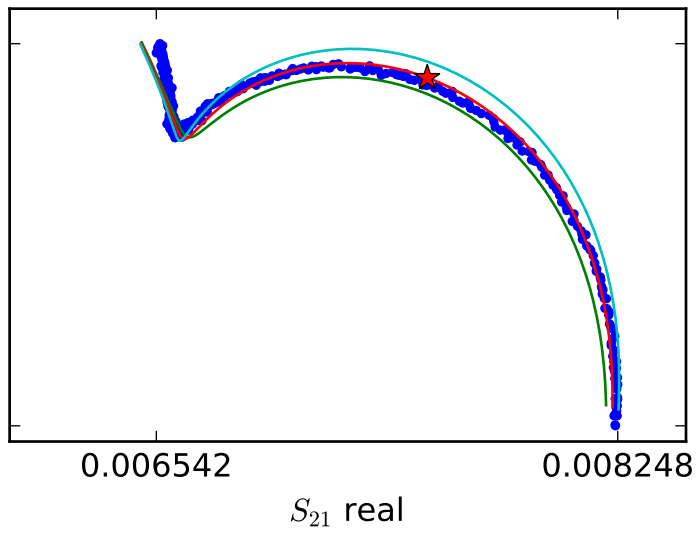
f_r = 3.31493316819
Q_r = 4351.91276717
Q_c = 28935.2088242
a = (-0.00315076491151-0.00858292410814j)
ϕ_0 = 0.861443330773
τ = 38.9789203806

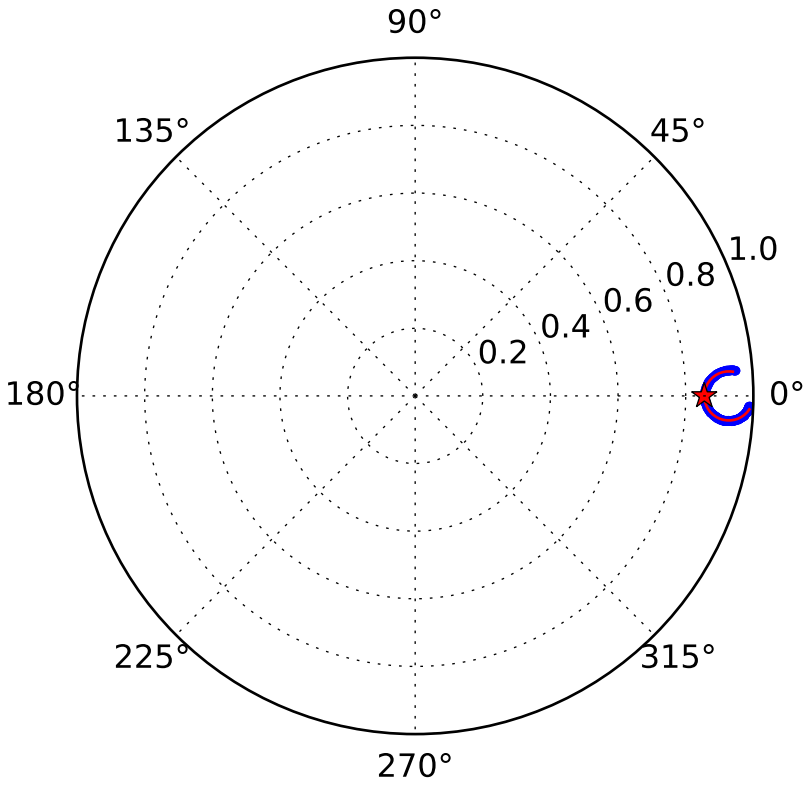


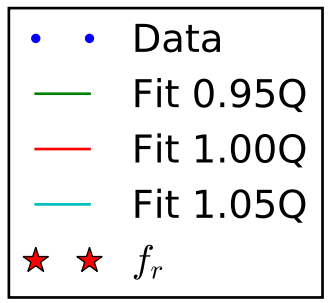
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.31975268106
Q_r = 8242.39127015
Q_c = 45556.4836423
a = (0.0027719282622-0.0087889216845j)
ϕ_0 = 0.281794717216
τ = 41.7221174508



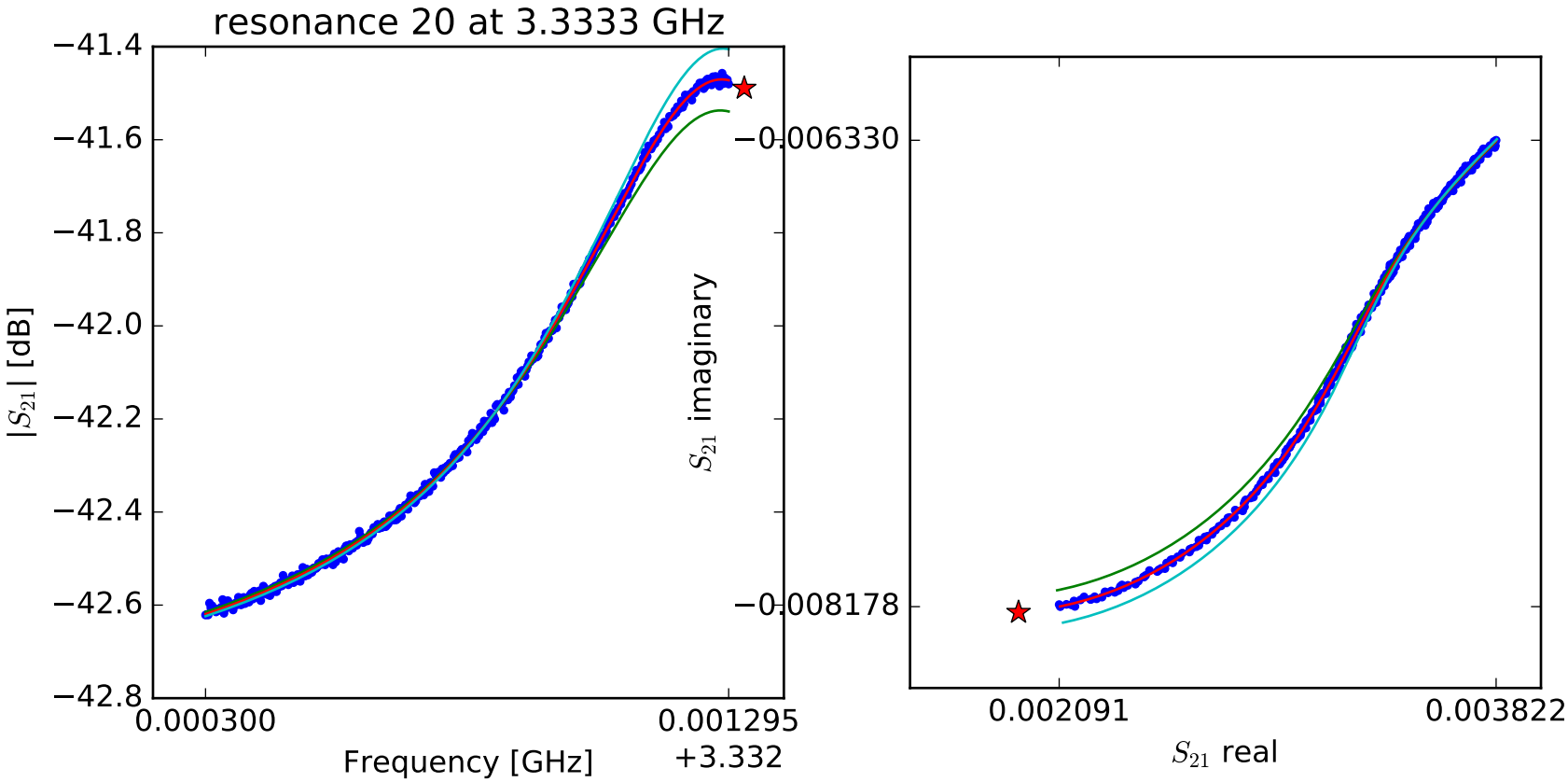


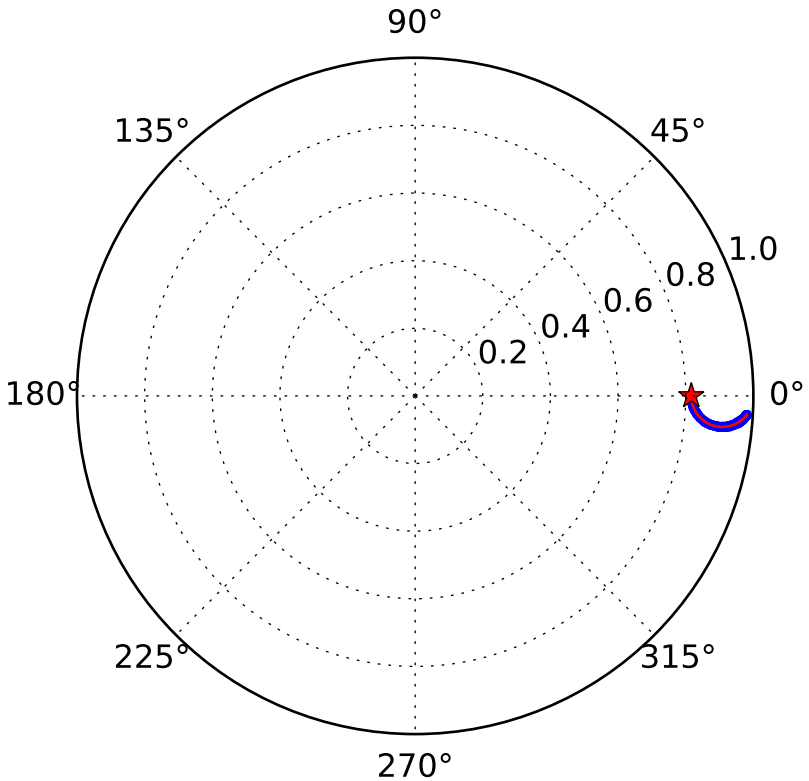


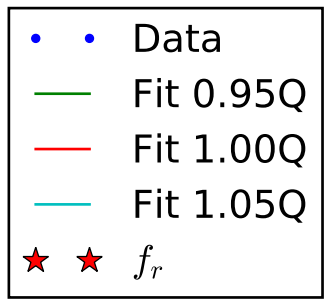


$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.32558002191
Q_r = 7541.54676947
Q_c = 51960.97787
a = (-0.0023135217793+0.00765609450605j)
ϕ_0 = -2.06267759467
τ = 36.4555078386

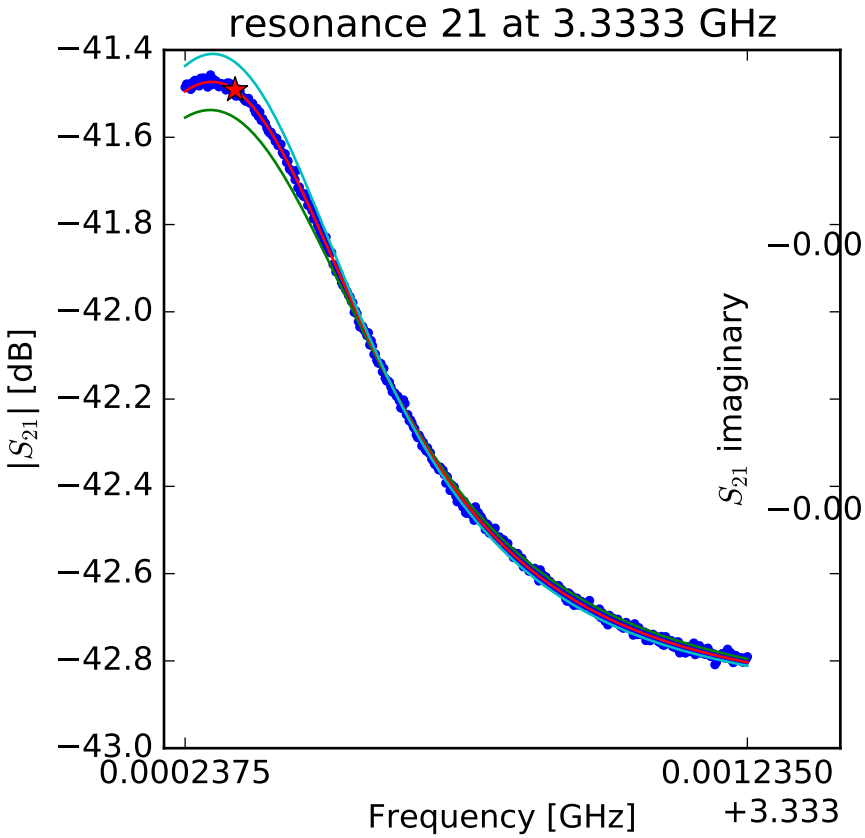


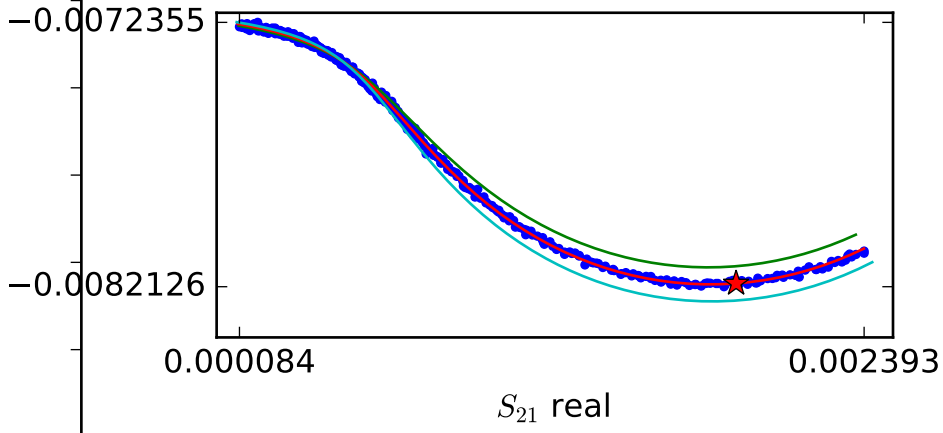


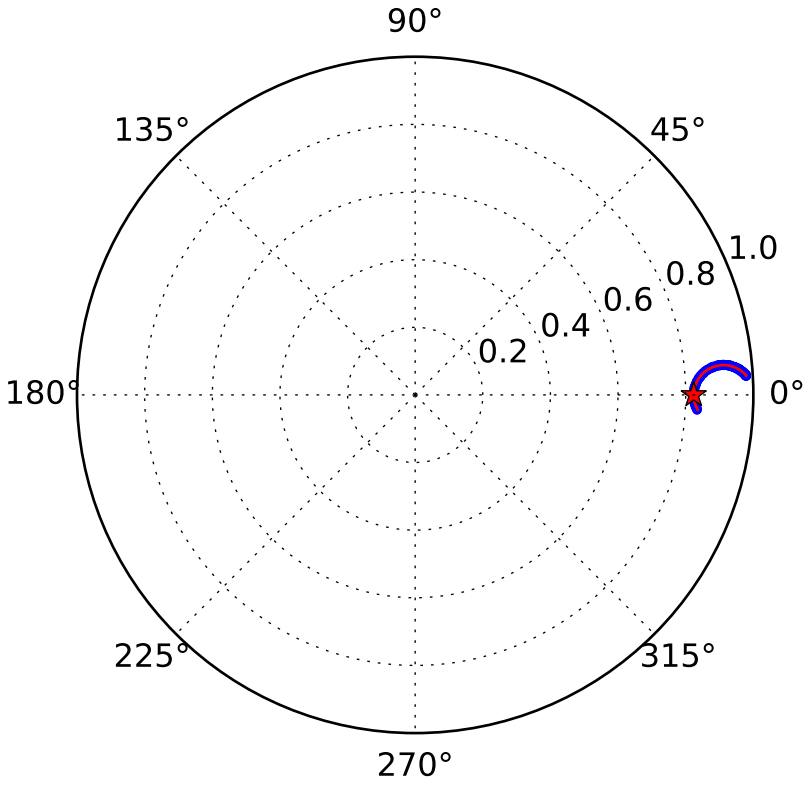


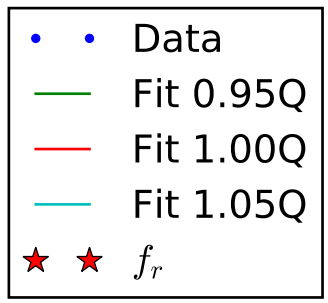
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.33332467161
Q_r = 4805.31568982
Q_c = 26183.9020151
a = (-0.00662156402182+0.00270296747062j)
ϕ_0 = 2.87175865906
τ = 34.6935656246



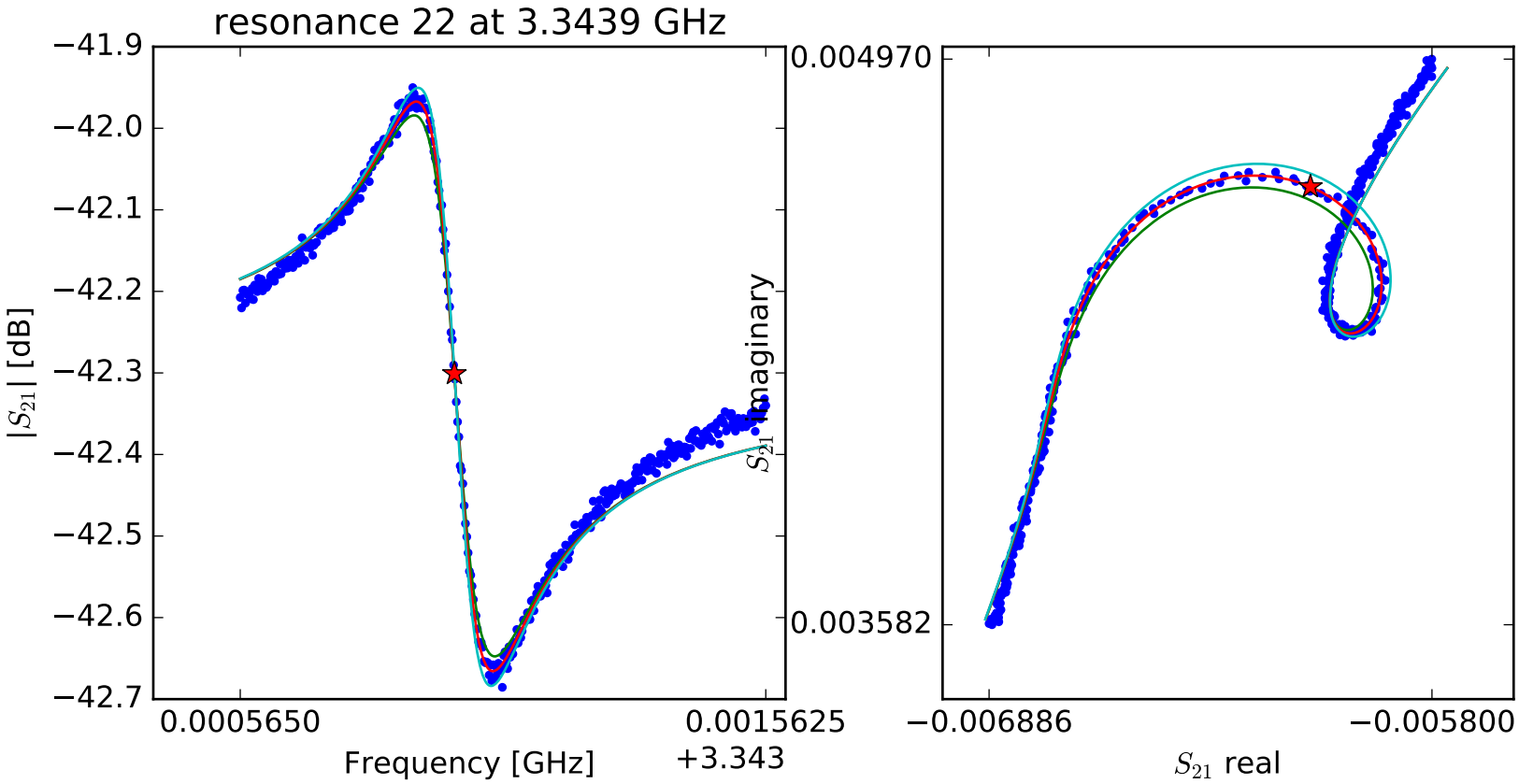


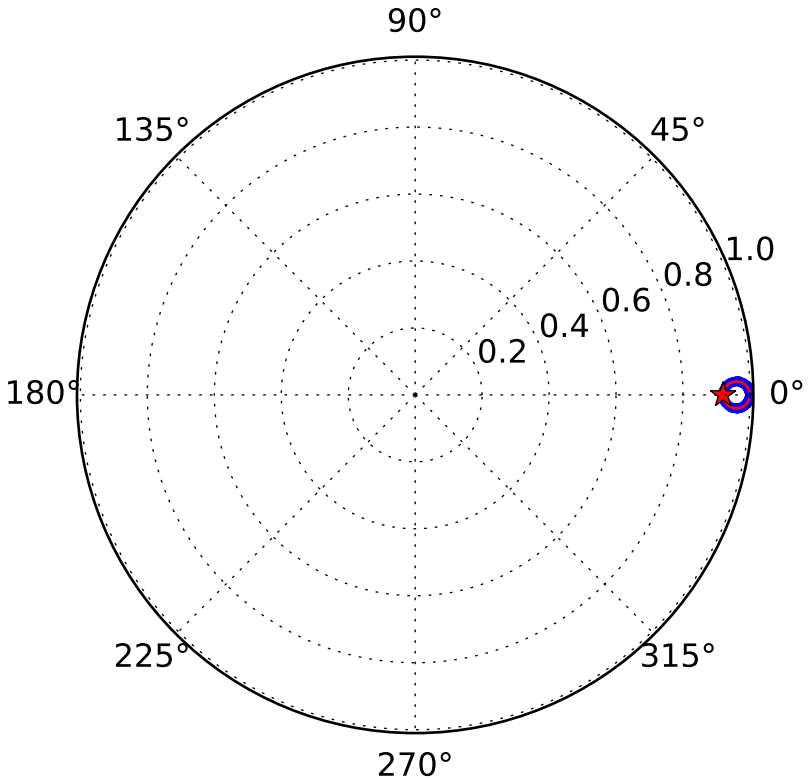


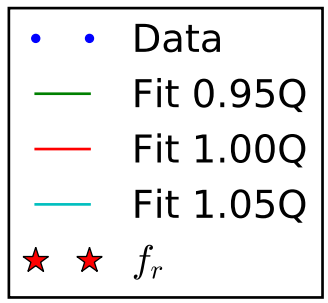


$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.33332620805
Q_r = 4989.93458264
Q_c = 28286.053942
a = (0.005779628774+0.00428118958649j)
ϕ_0 = -3.41179448144
τ = 34.8926128835

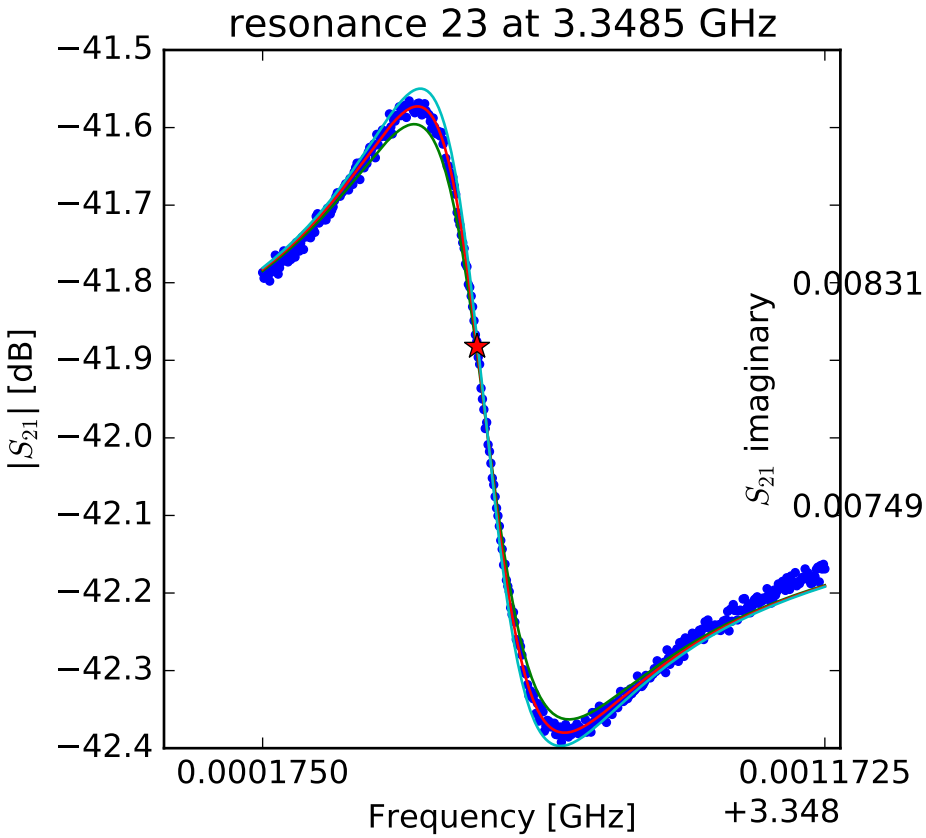


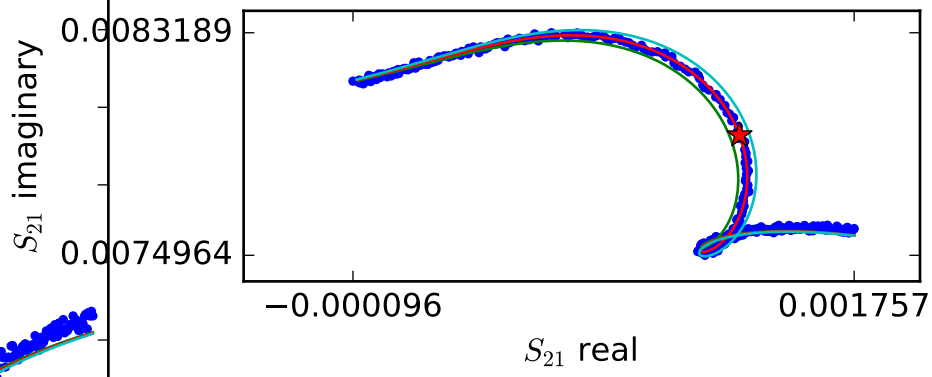


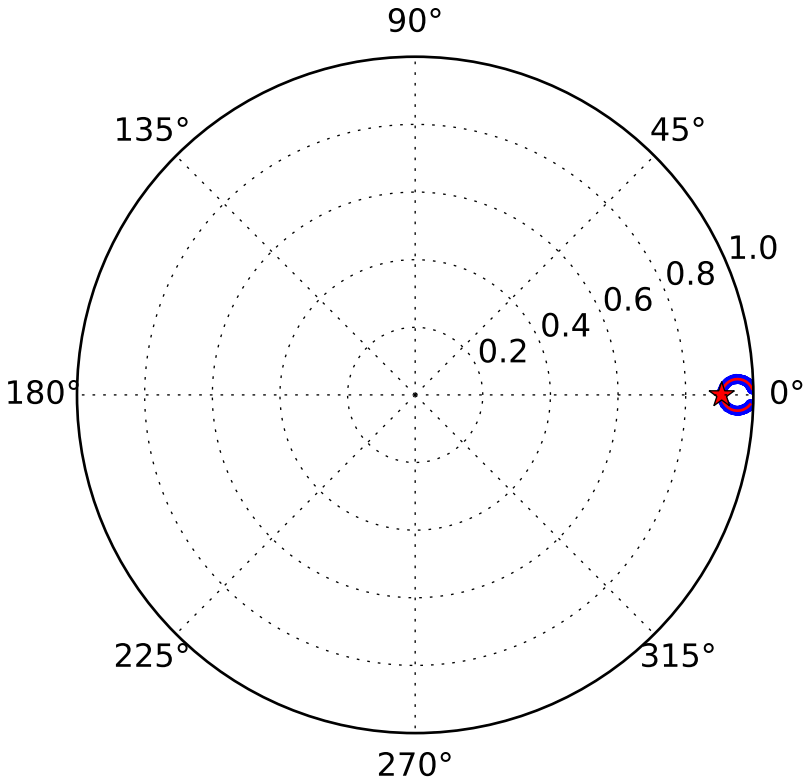


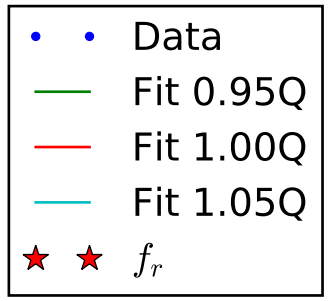
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.34397146735
Q_r = 22991.079552
Q_c = 286253.34781
a = (-0.00766436097742+0.00029660608818j)
ϕ_0 = 1.53500174731
τ = 36.8079848583



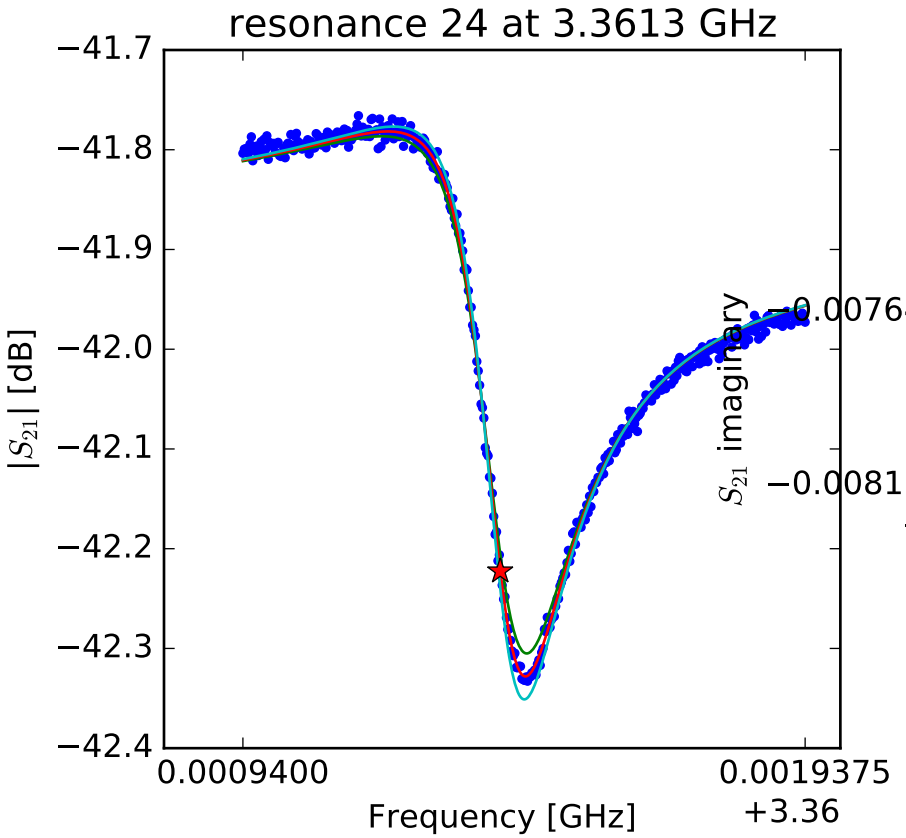


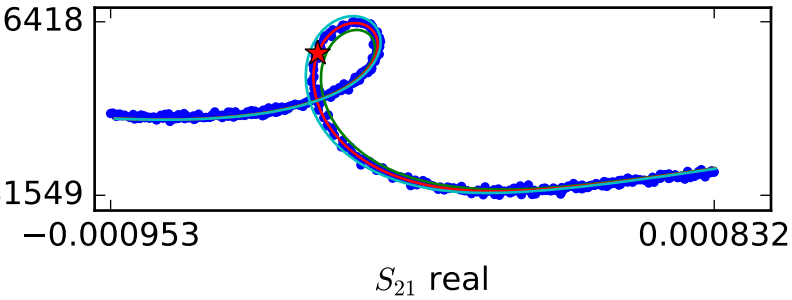


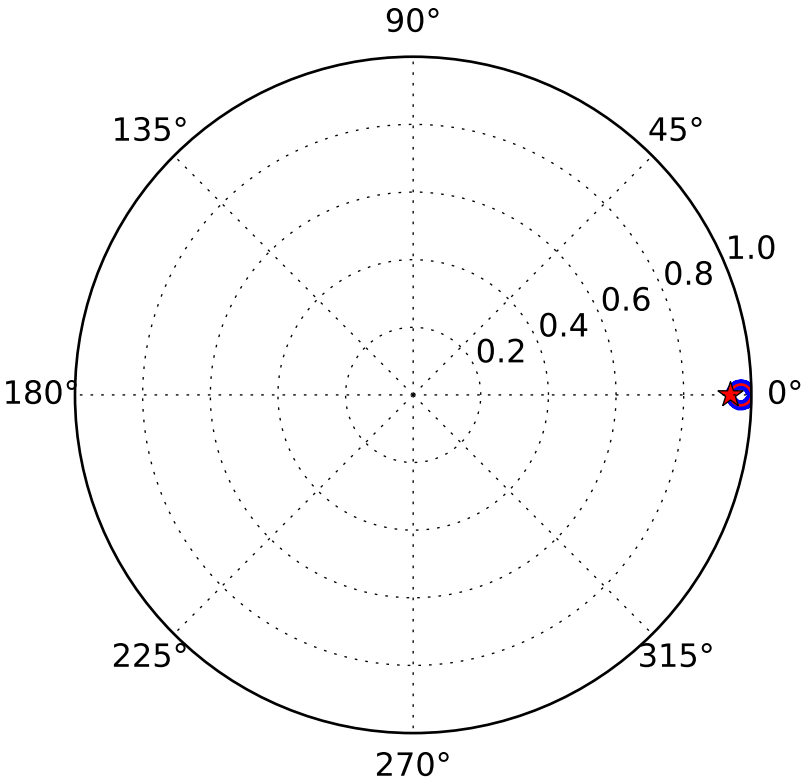


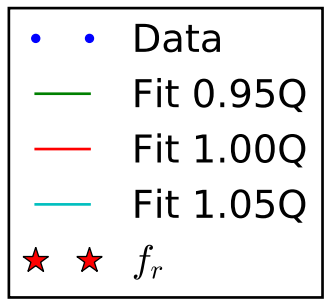
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.34855547141
Q_r = 13065.3901881
Q_c = 139567.00578
a = (-0.00779057280892+0.00138011651655j)
ϕ_0 = 1.71498873206
τ = 37.6980629483



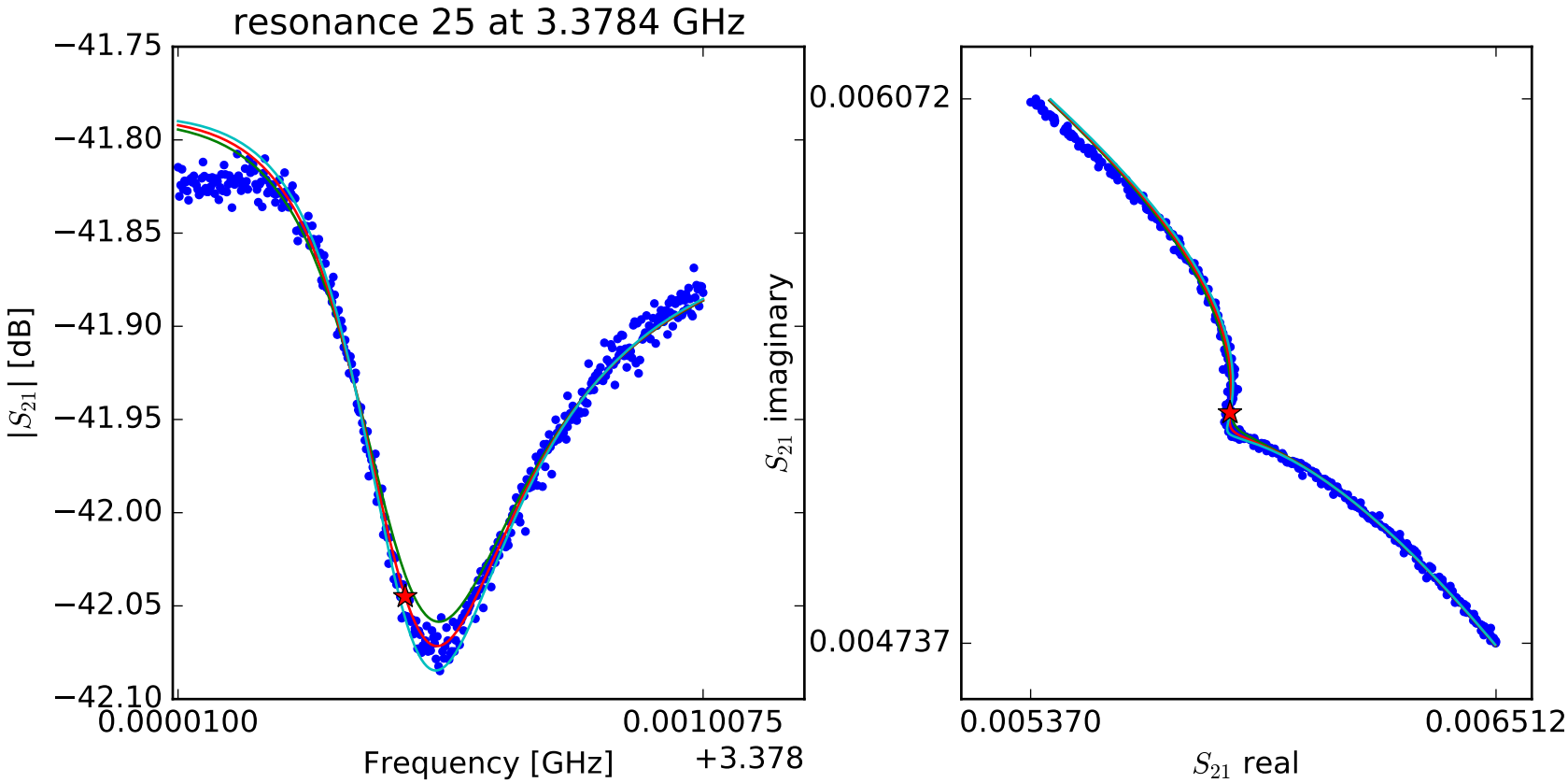


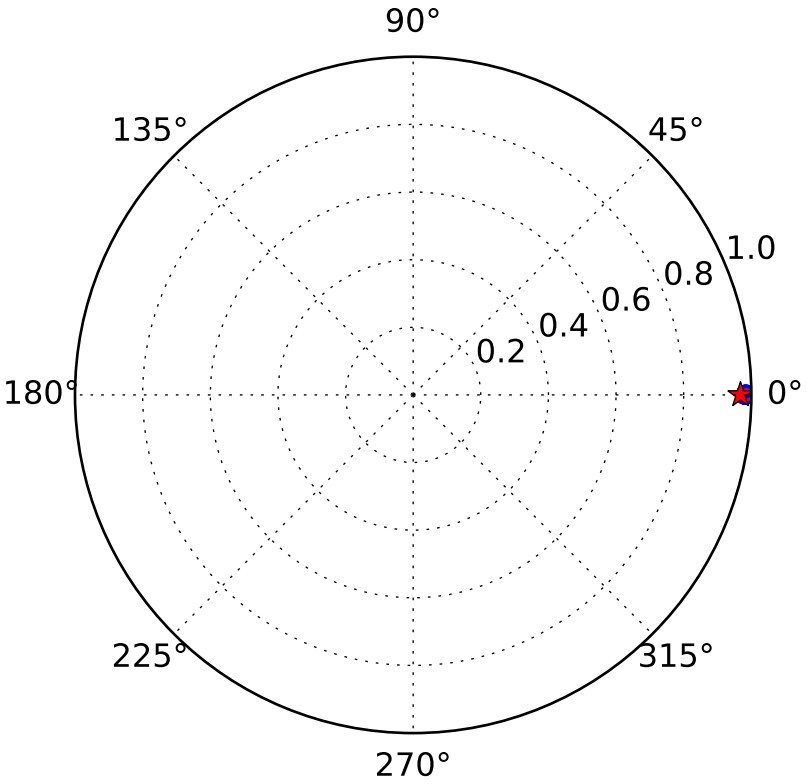


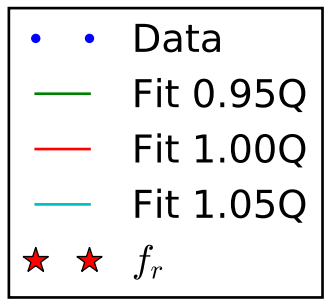


$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.36139653344
Q_r = 17798.3315087
Q_c = 288727.145221
a = (-0.00757019562953-0.00275739020025j)
ϕ_0 = 0.861245642126
τ = 37.7238578772

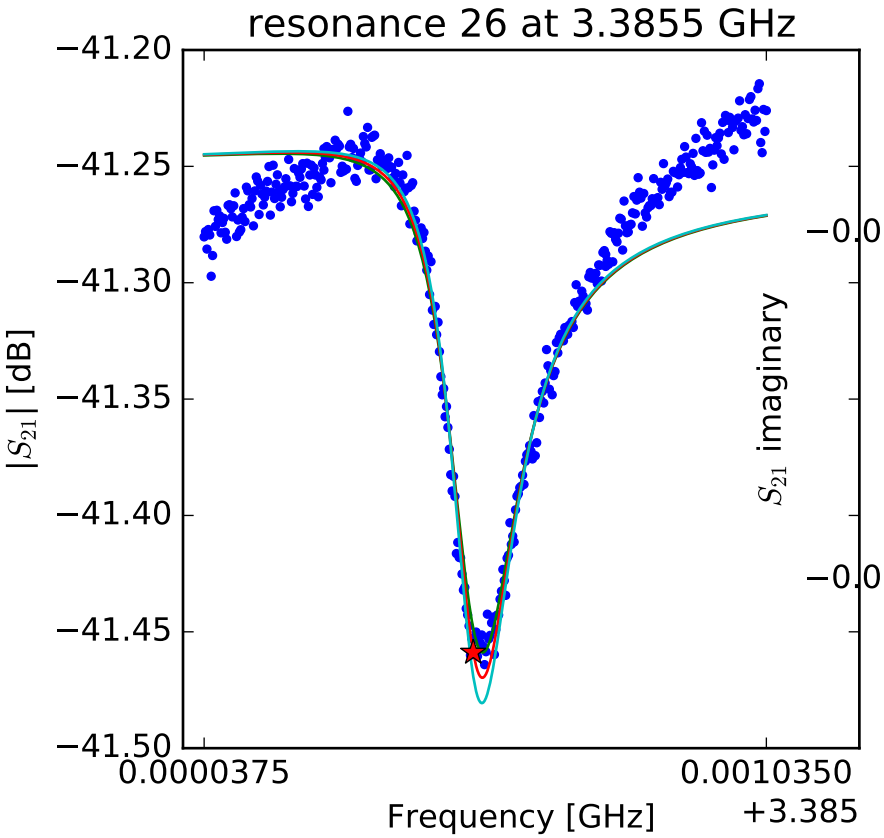


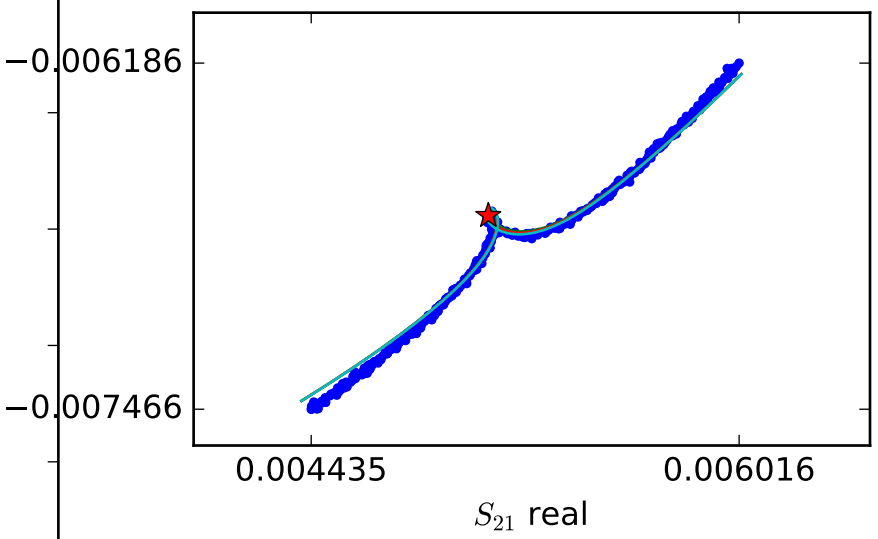


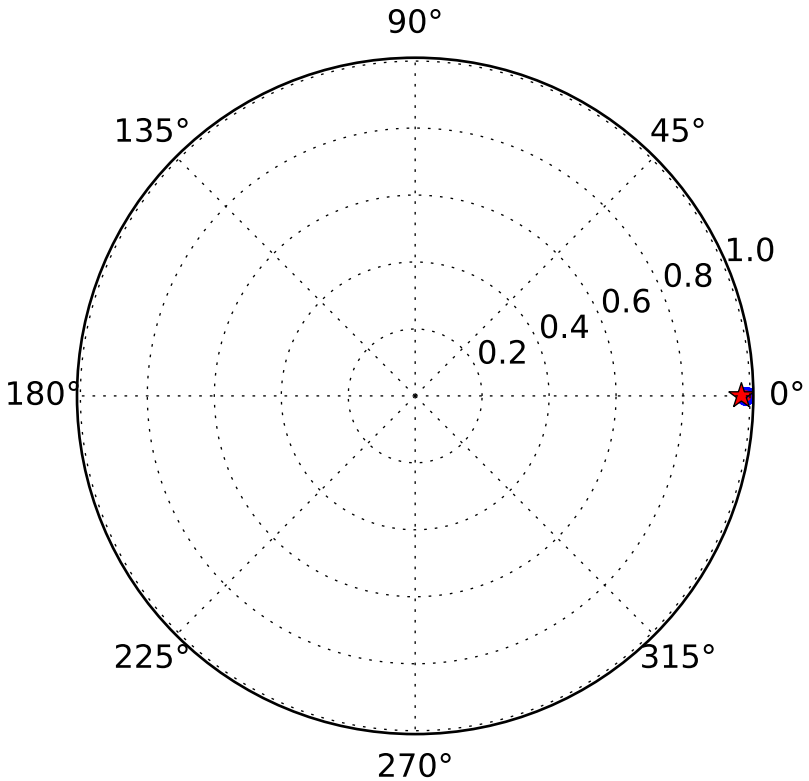


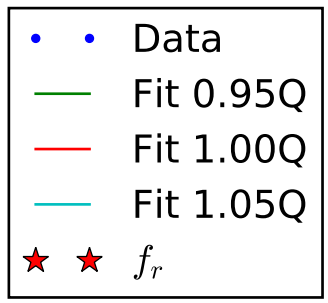
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.37844152088
Q_r = 8802.14694997
Q_c = 273893.230018
a = (-0.00809235579705+0.000612113865161
ϕ_0 = 0.6041146505
τ = 37.1082155984



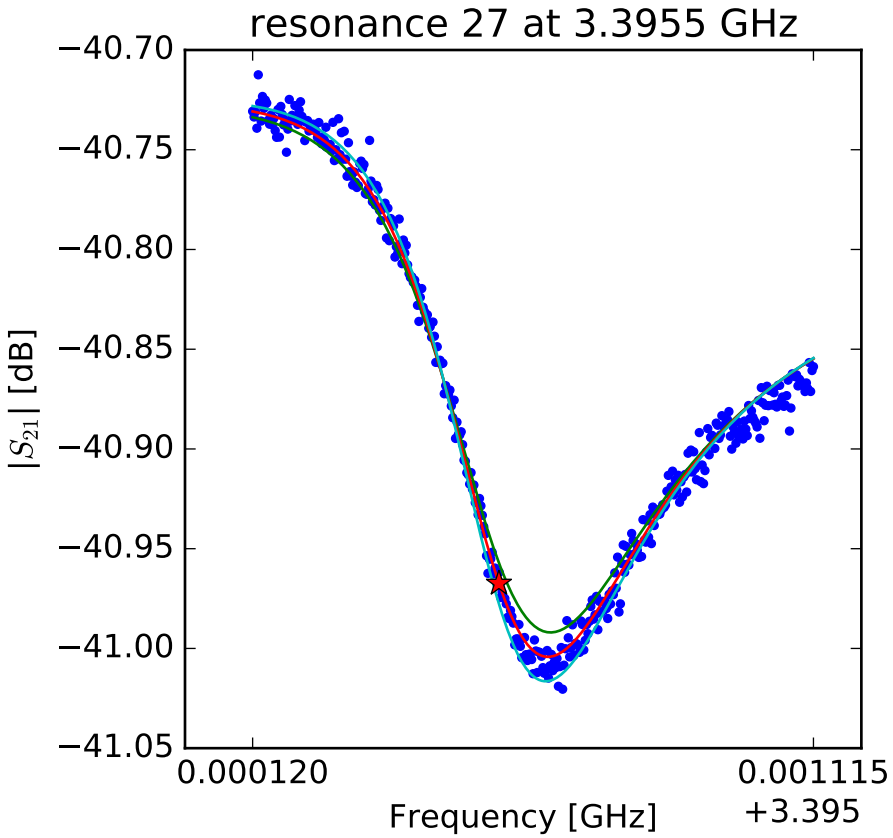


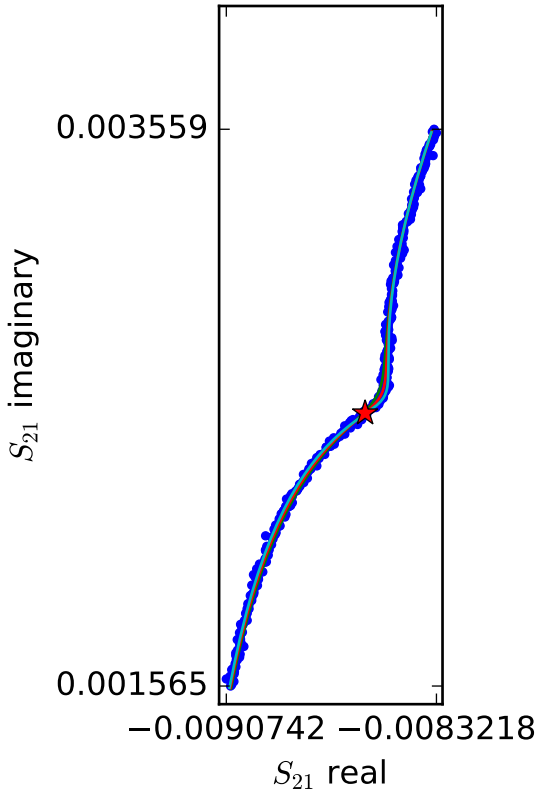


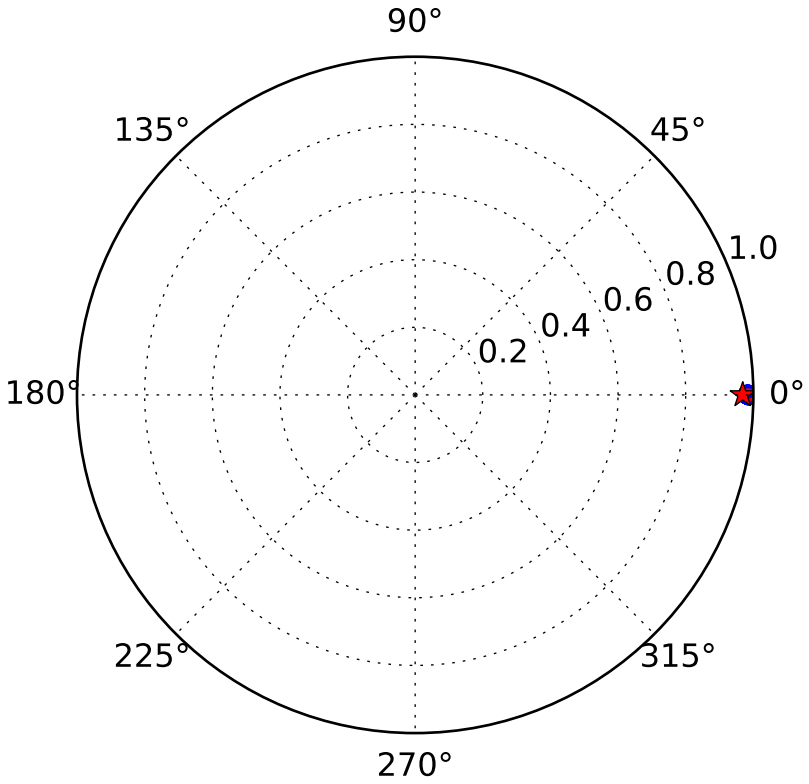


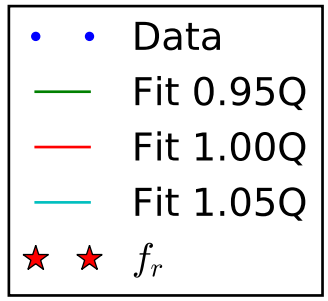
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.38551494066
Q_r = 23310.9580471
Q_c = 907576.159637
a = (0.0036488157711+0.00784852764841j)
ϕ_0 = -5.85096949176
τ = 38.4952284408



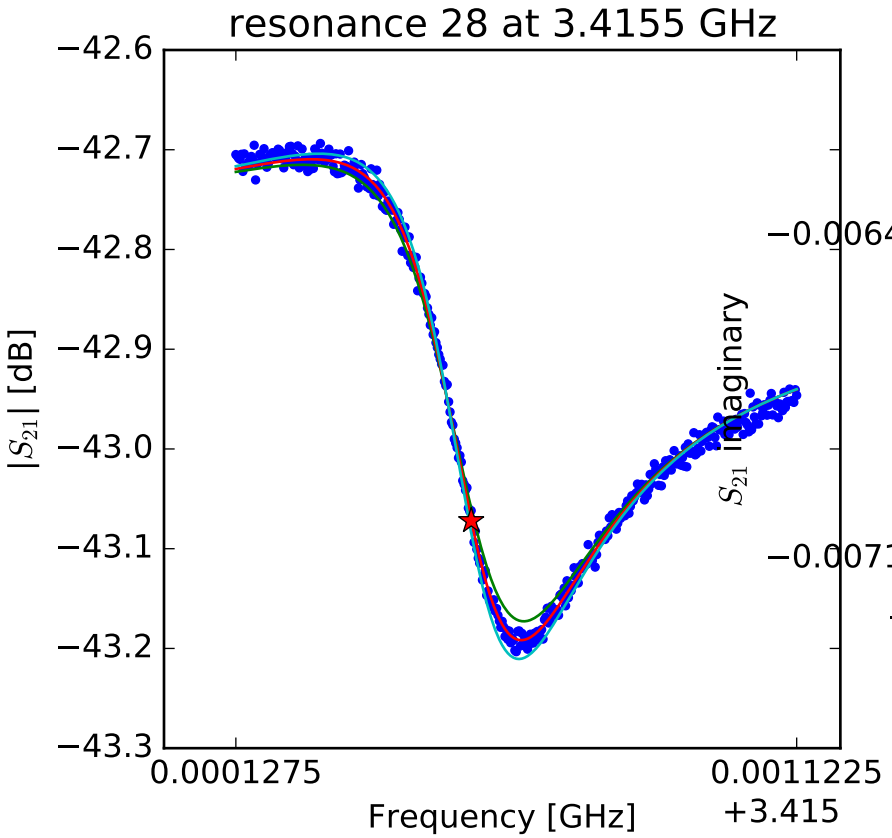


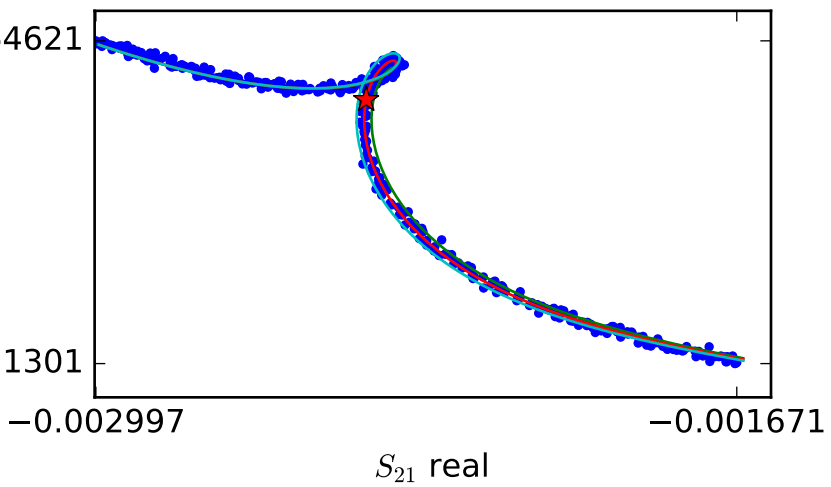


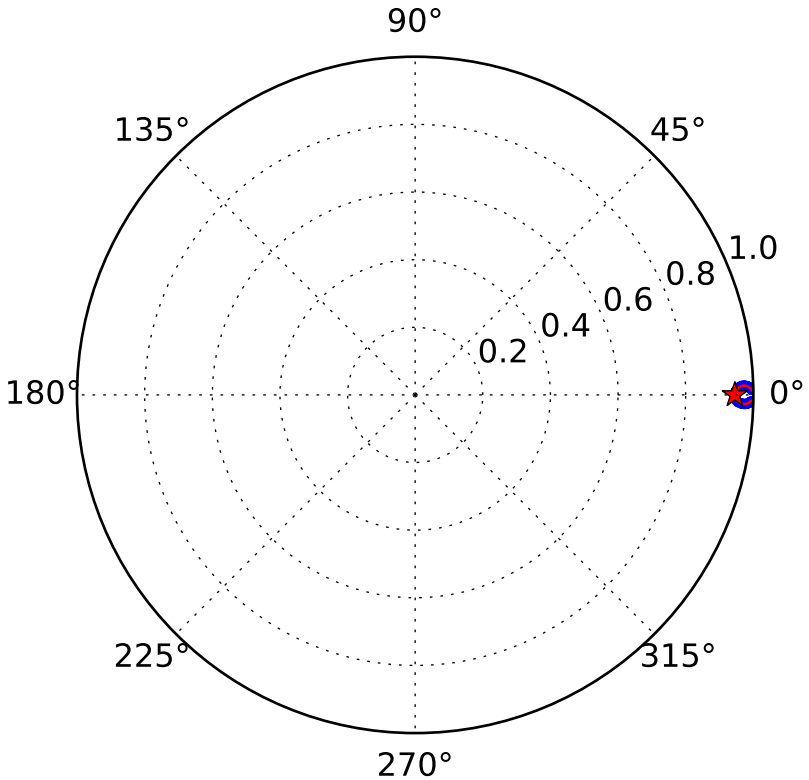


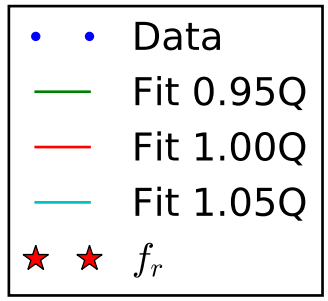
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.39555694996
Q_r = 7525.85156945
Q_c = 239181.764488
a = (0.00910348657599-0.00101216803398j)
ϕ_0 = -5.55757067872
τ = 40.2069040253



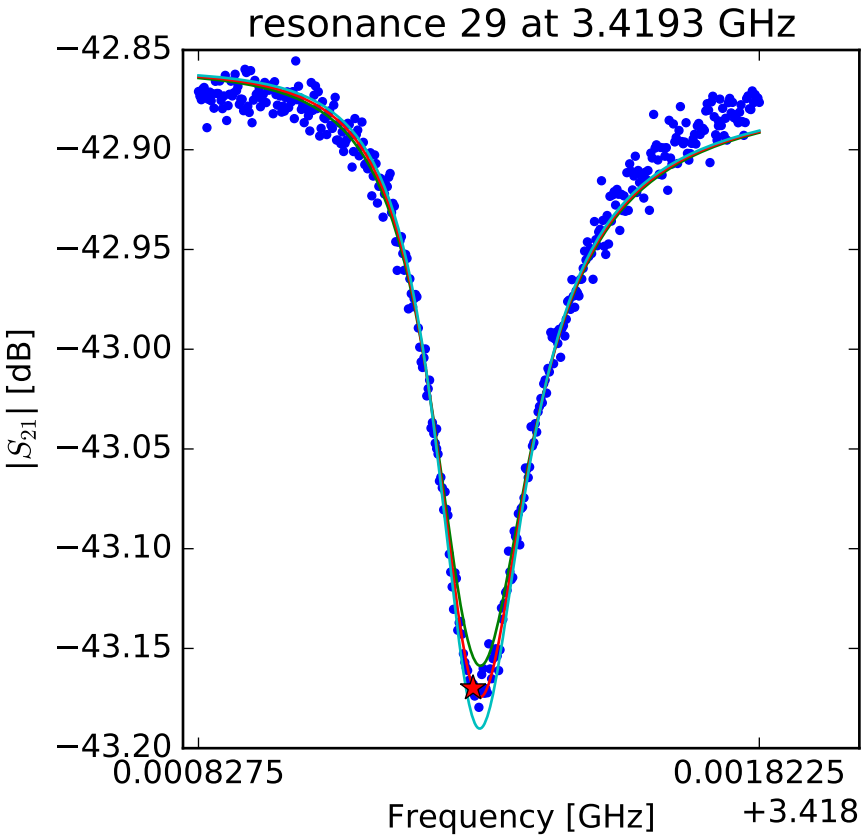


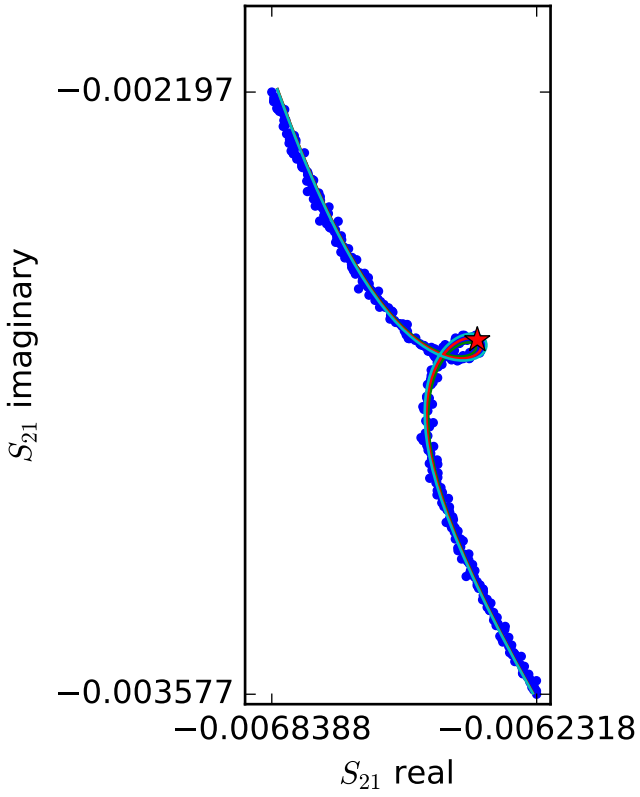


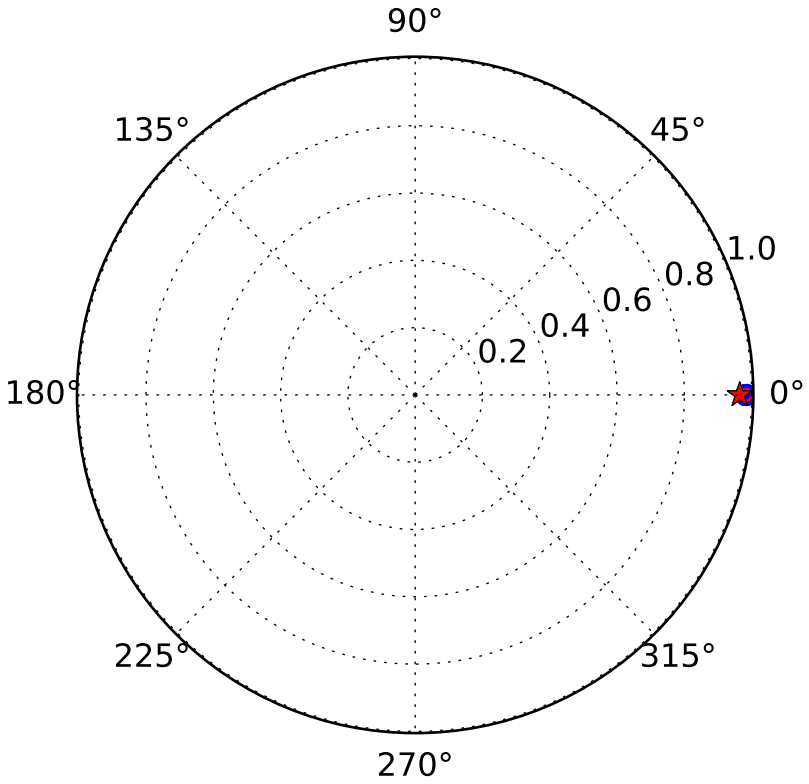


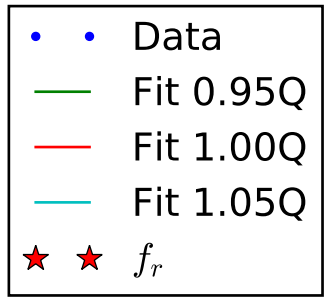
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.41554510092
Q_r = 10760.6802192
Q_c = 196760.923378
a = (-0.00314441672941+0.00650836405975j)
ϕ_0 = 0.995685127987
τ = 35.9007259251



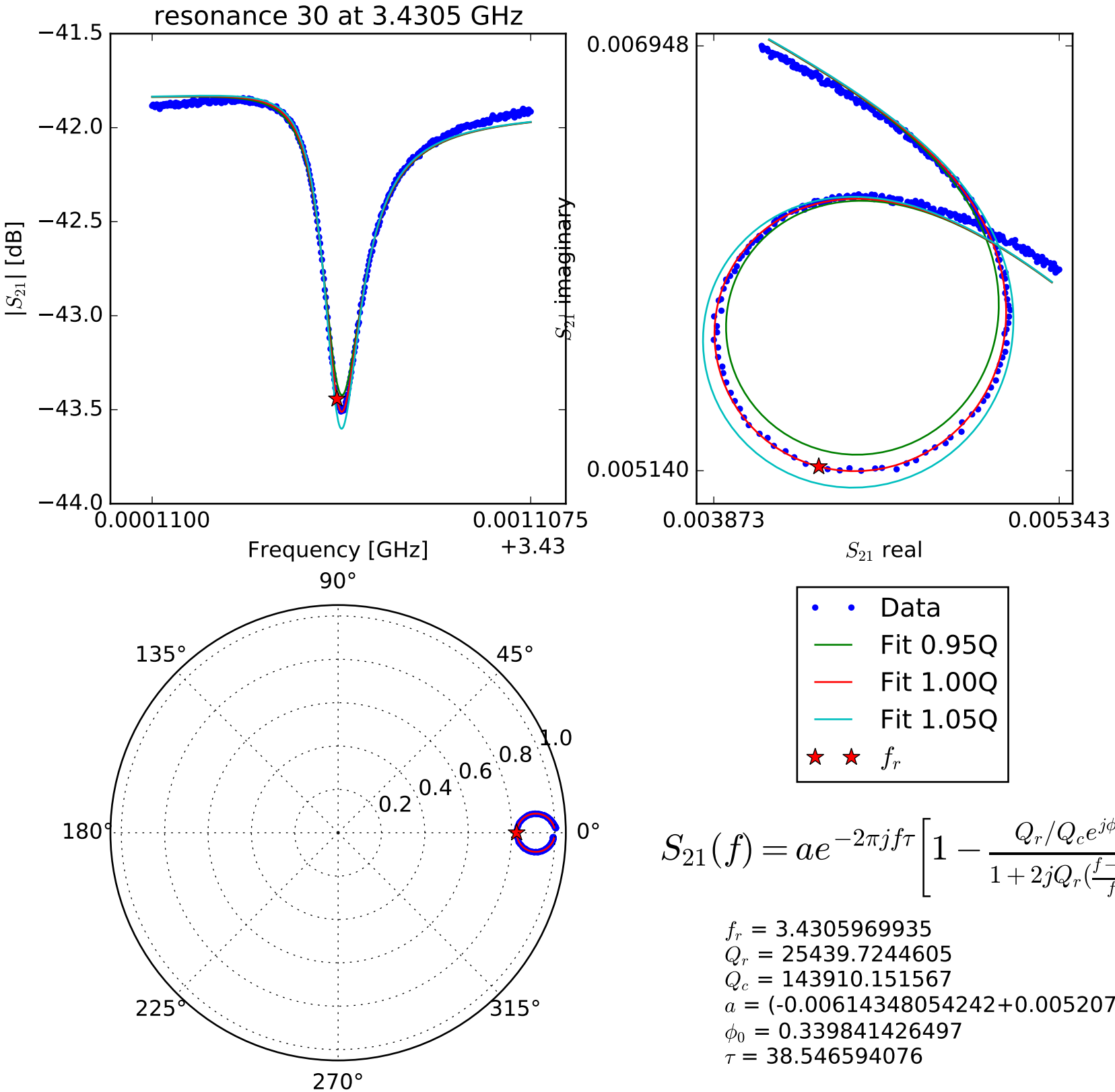






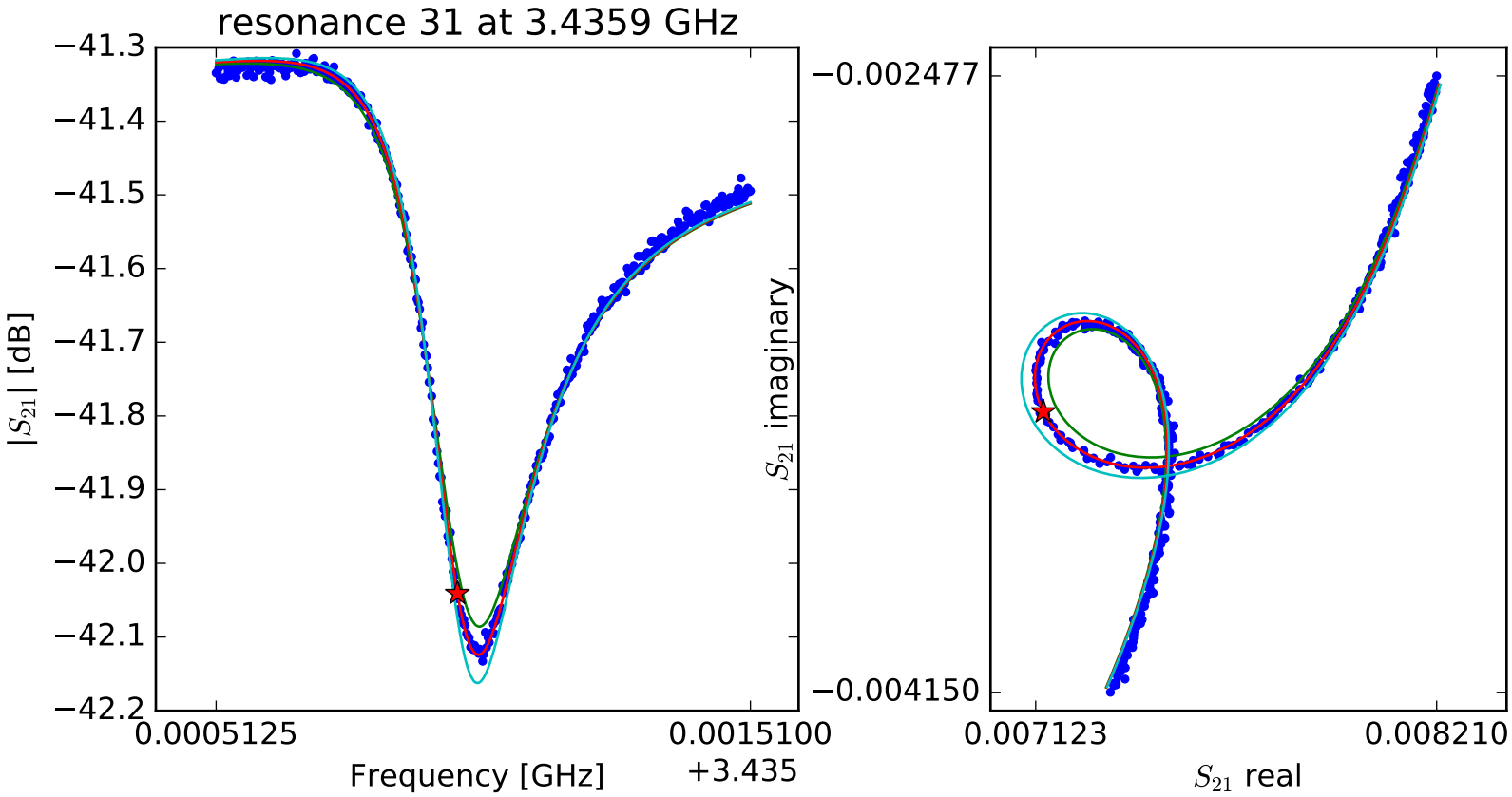
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

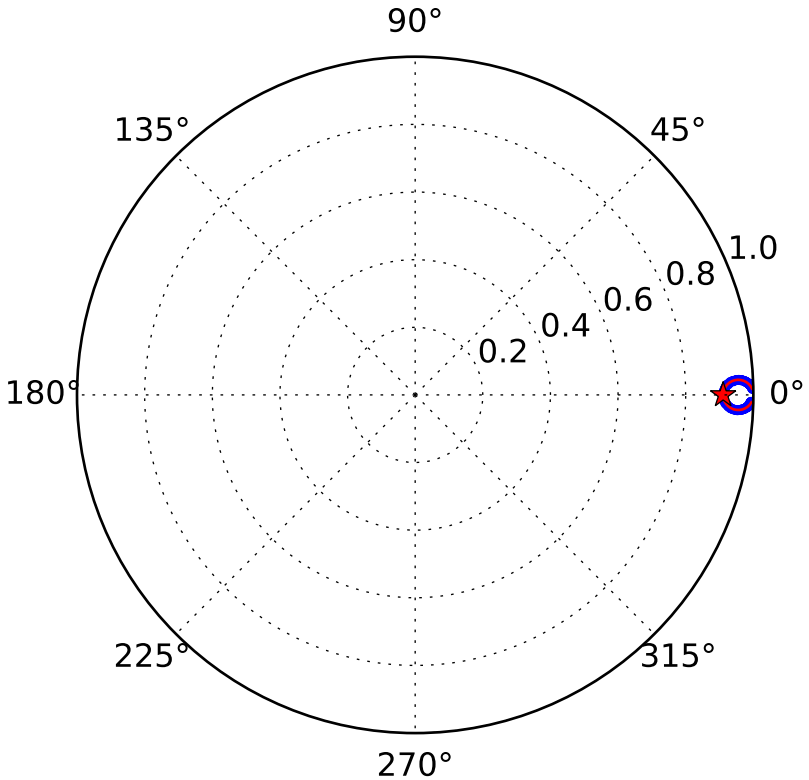
f_r = 3.41931464339
Q_r = 16567.3984487
Q_c = 467111.843817
a = (0.000692912380252-0.00715670055274j)
ϕ_0 = 0.23414117889
τ = 35.7378057476

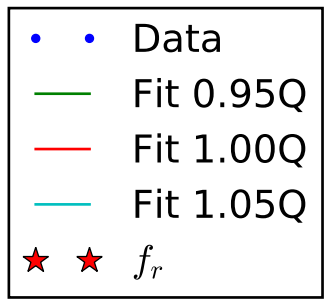


$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.4305969935
Q_r = 25439.7244605
Q_c = 143910.151567
a = (-0.00614348054242+0.00520732979851j)
ϕ_0 = 0.339841426497
τ = 38.546594076

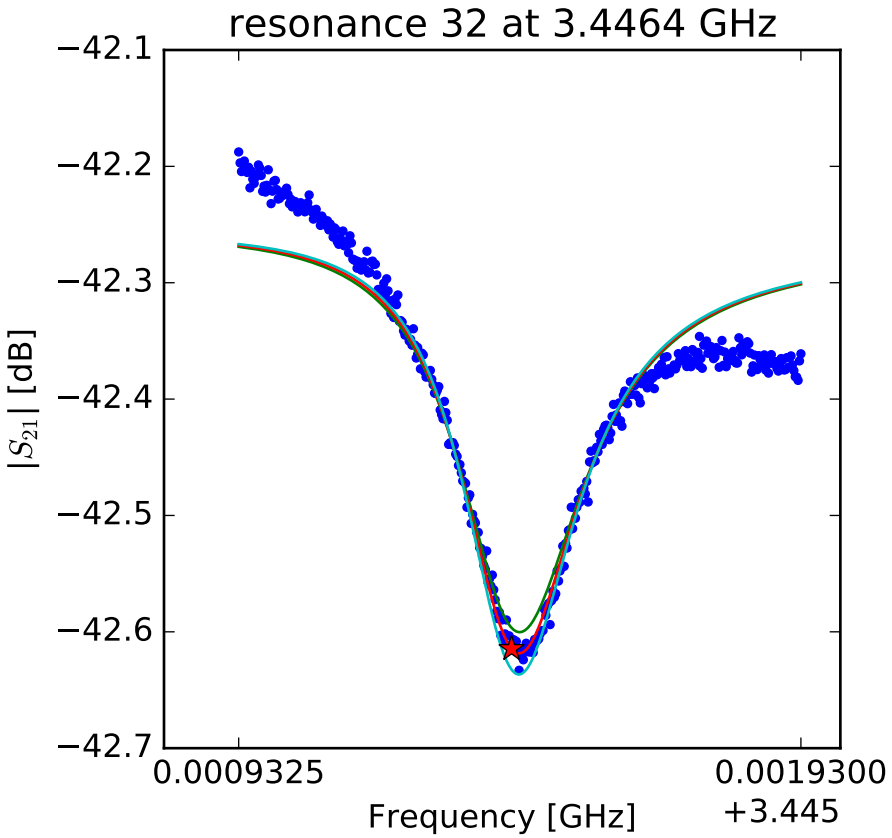


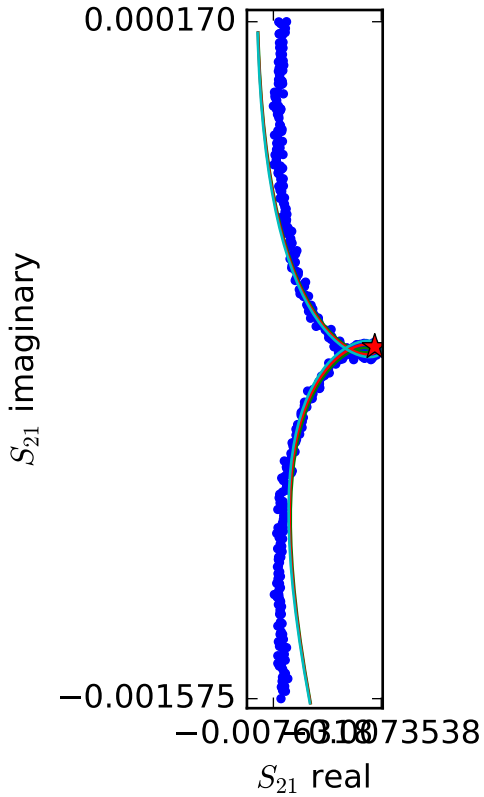


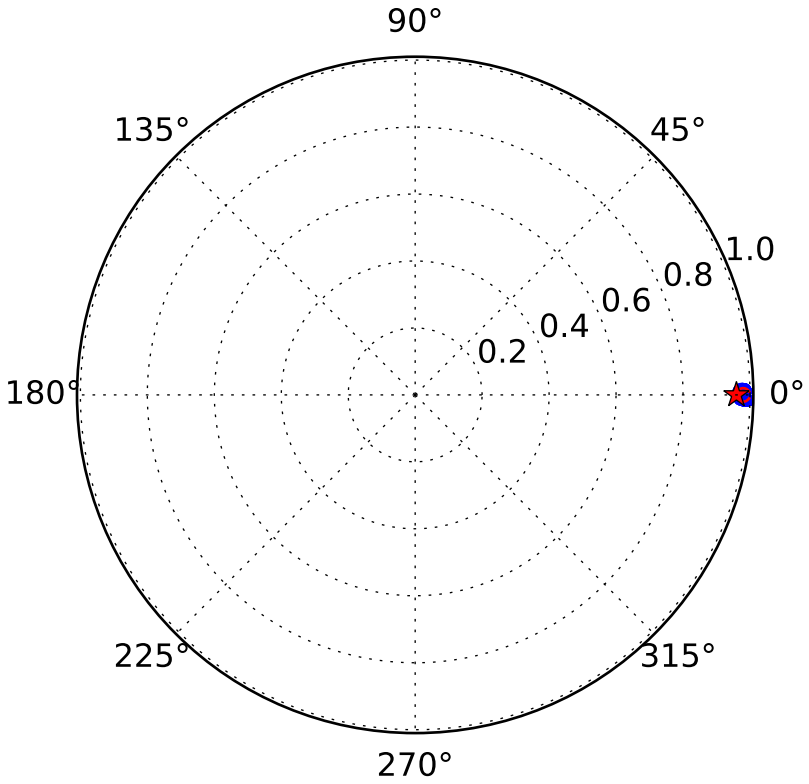


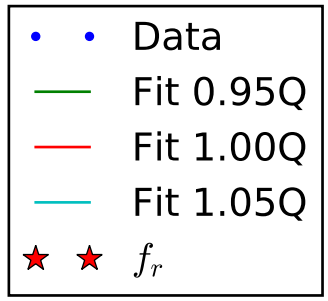
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.43596293726
Q_r = 14192.6819574
Q_c = 158853.765102
a = (-0.00439941449656+0.00729934870434j)
ϕ_0 = 0.600485322514
τ = 40.5703322678



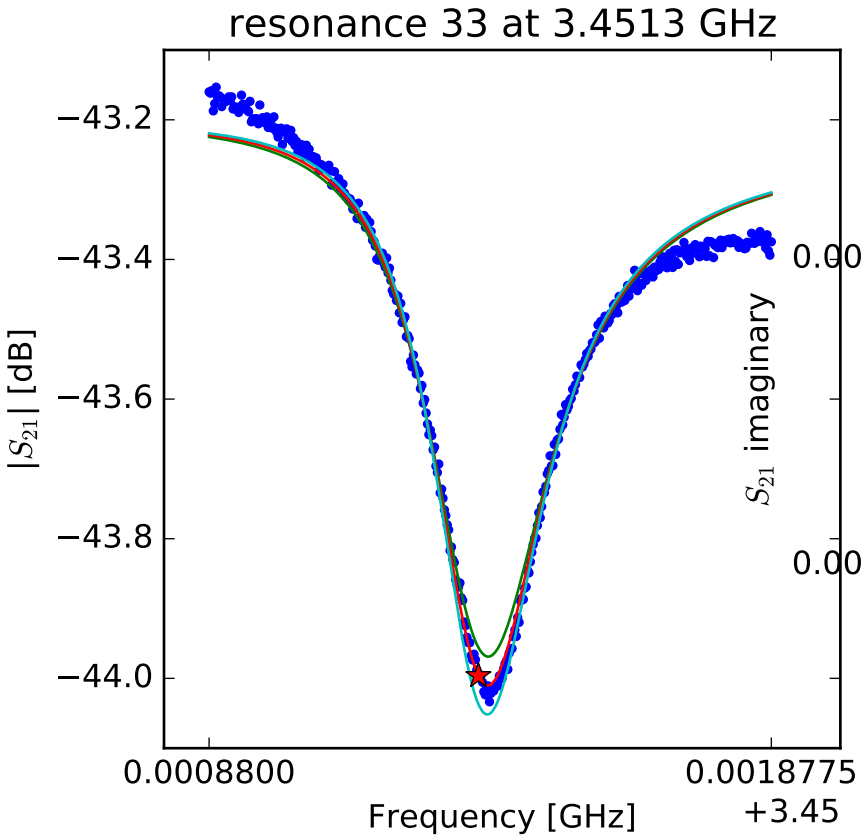


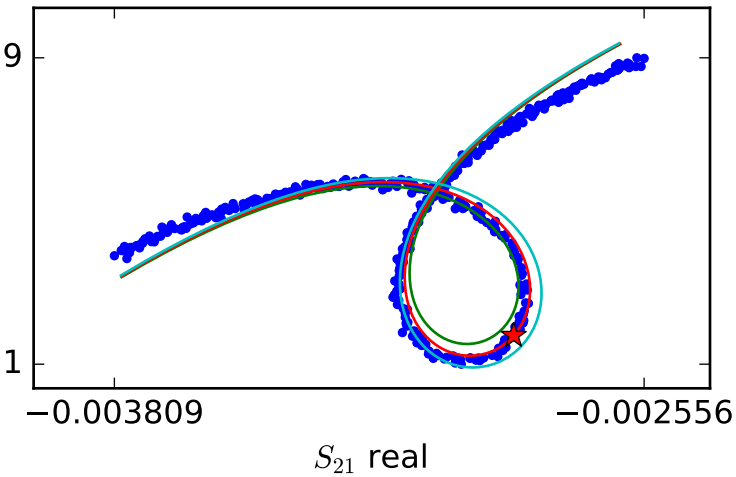


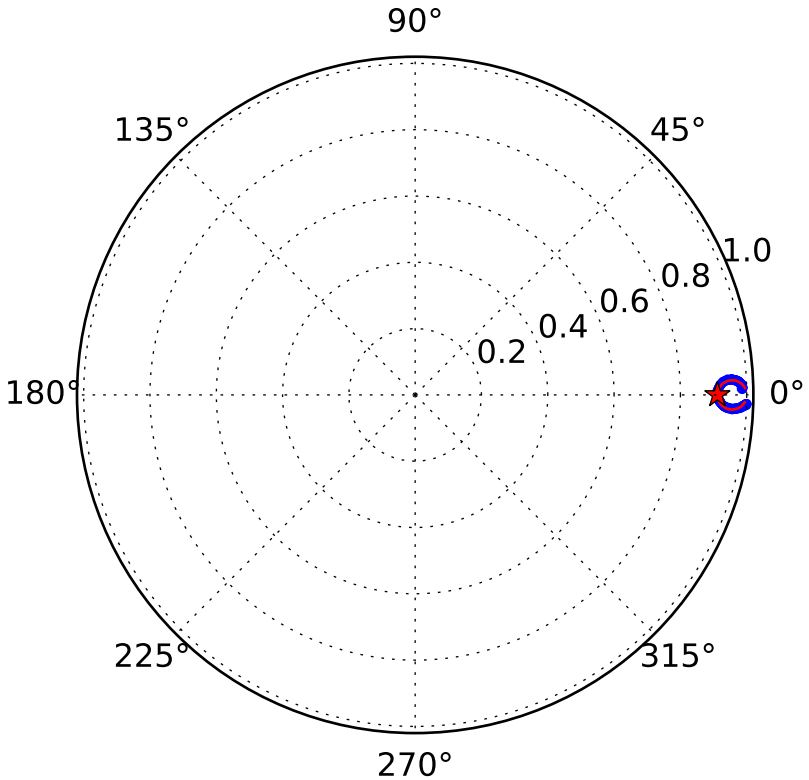


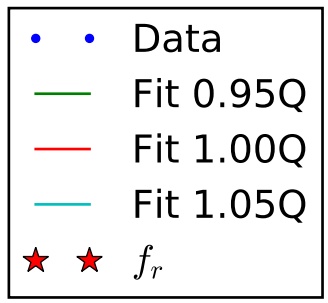
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.44641661763
Q_r = 13073.2195
Q_c = 322176.697257
a = (-0.00485463221612-0.00598564245142j)
ϕ_0 = 0.201653136972
τ = 39.2076235176



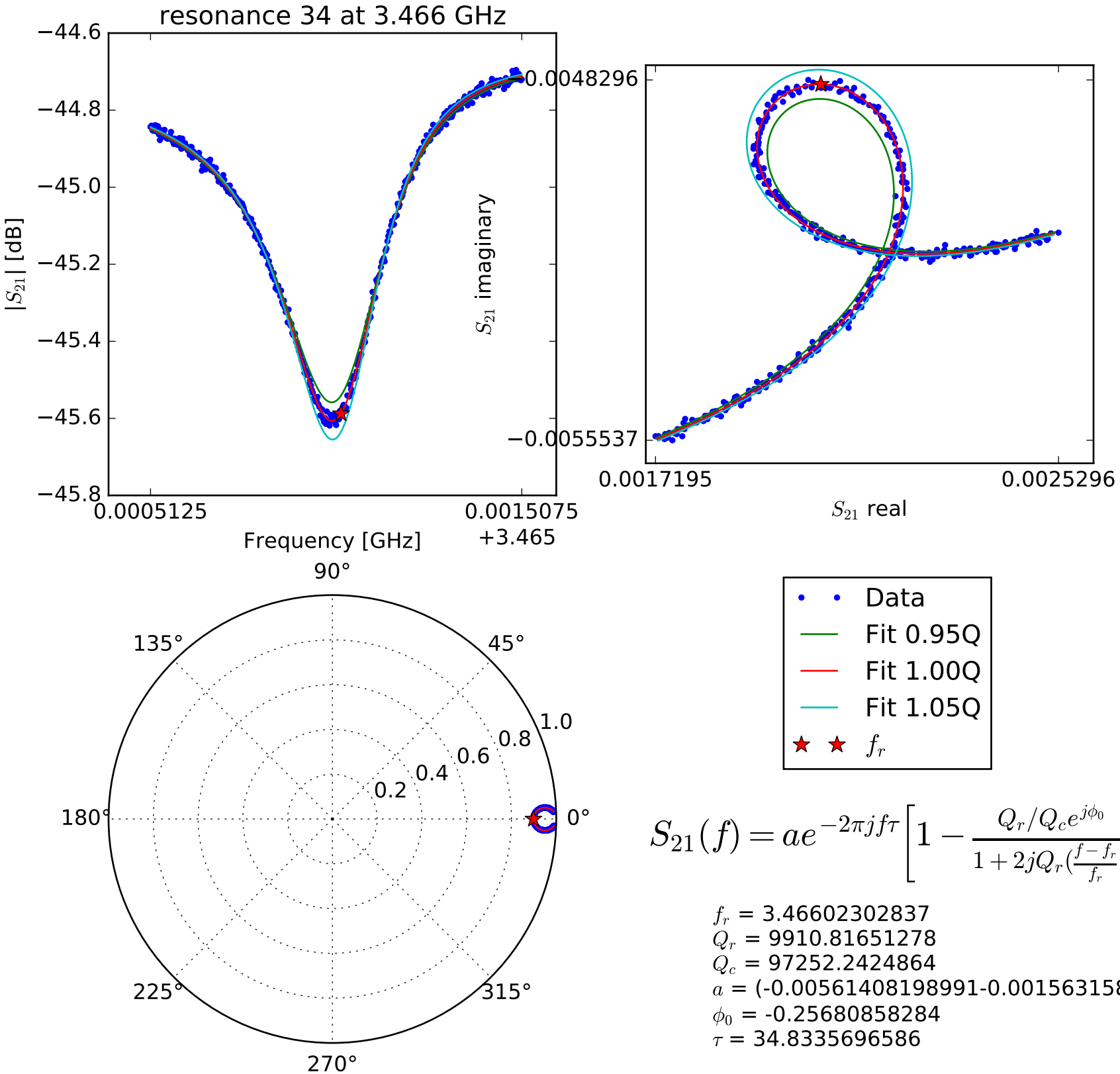






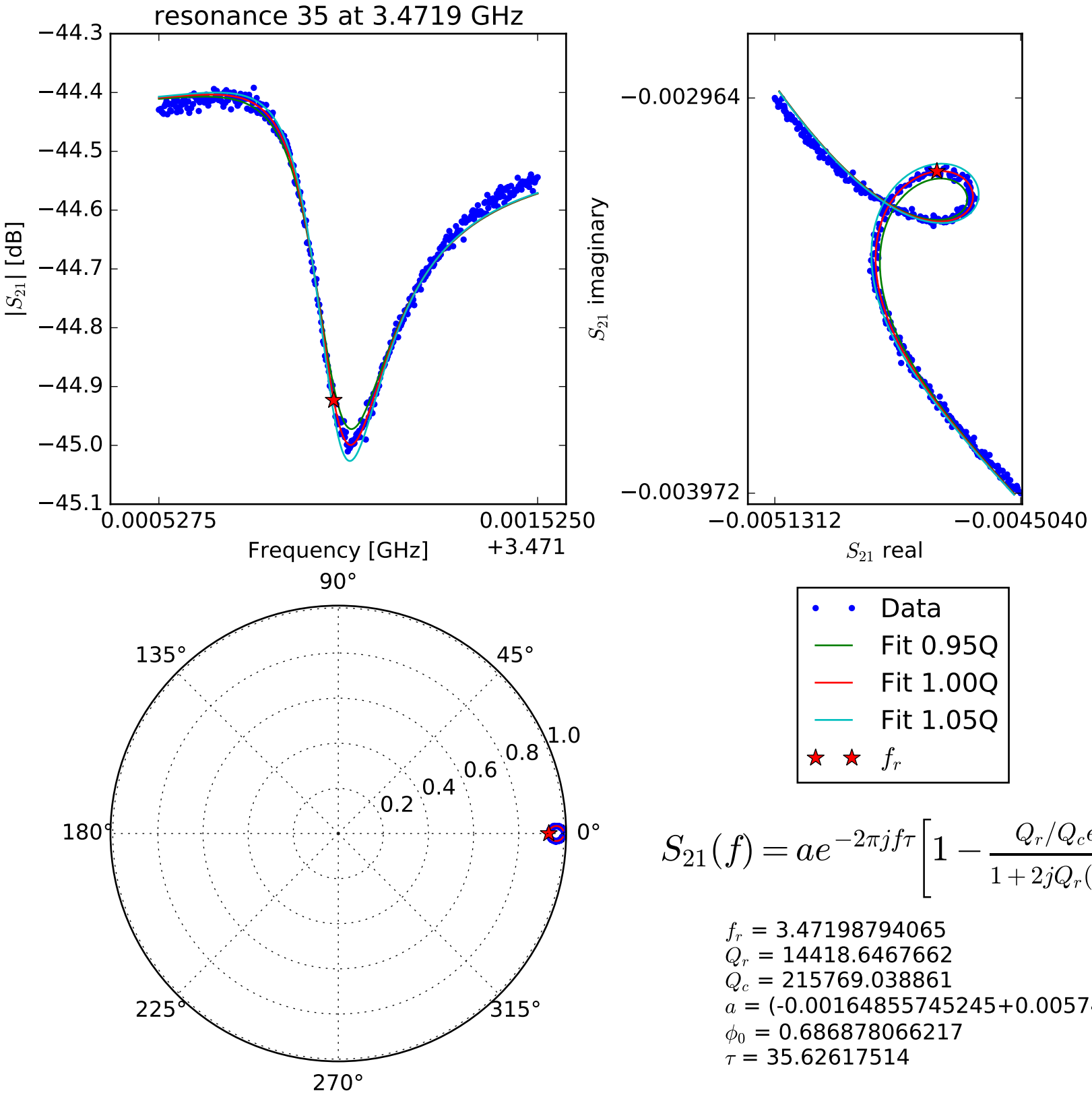
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.45135780948
Q_r = 13156.2040198
Q_c = 148772.036722
a = (0.00426588820464+0.00542765525909j)
ϕ_0 = 0.240786062393
τ = 37.033352036



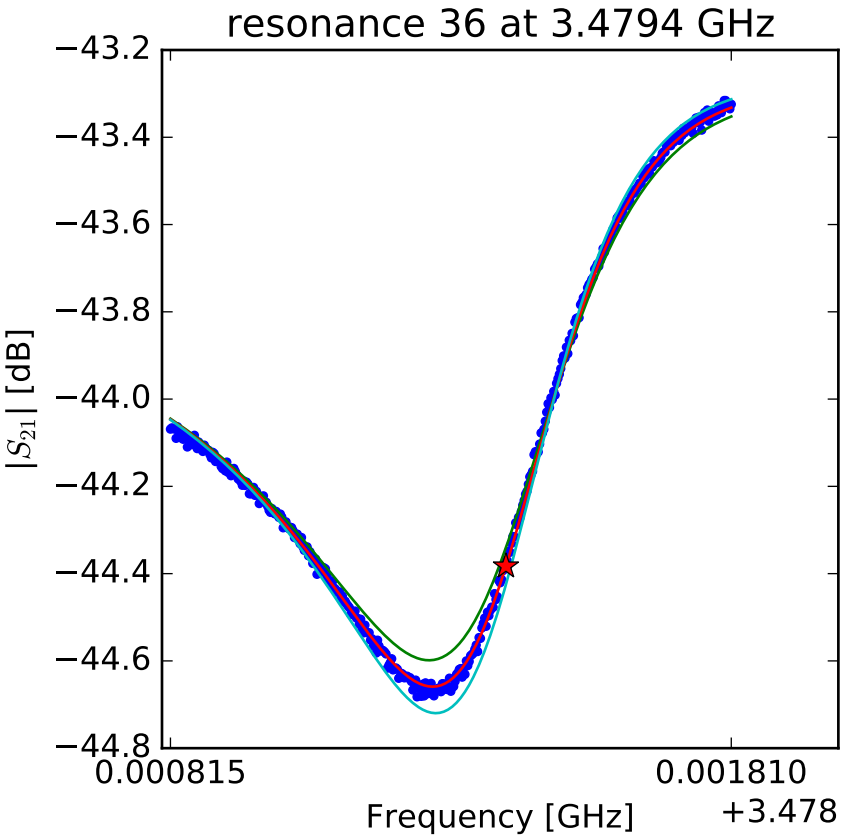
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

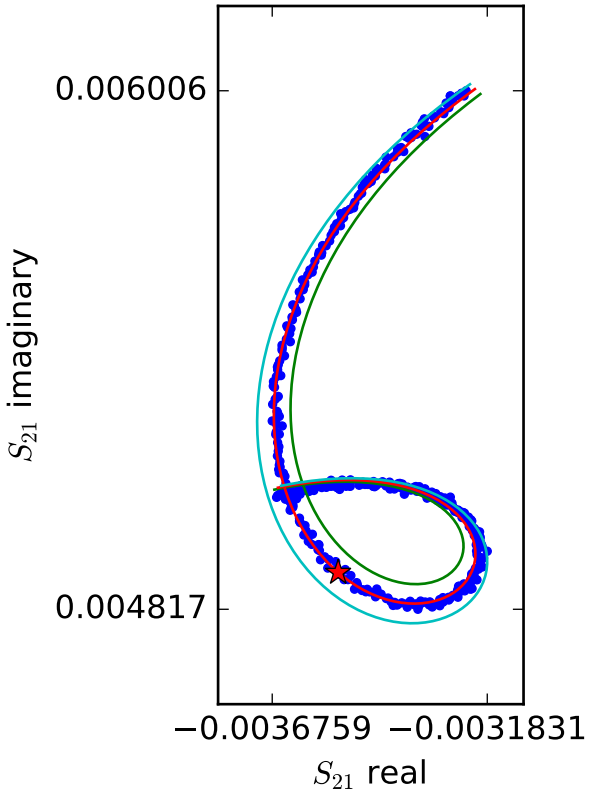
f_r = 3.46602302837
Q_r = 9910.81651278
Q_c = 97252.2424864
a = (-0.00561408198991-0.00156315896023j)
ϕ_0 = -0.25680858284
τ = 34.8335696586

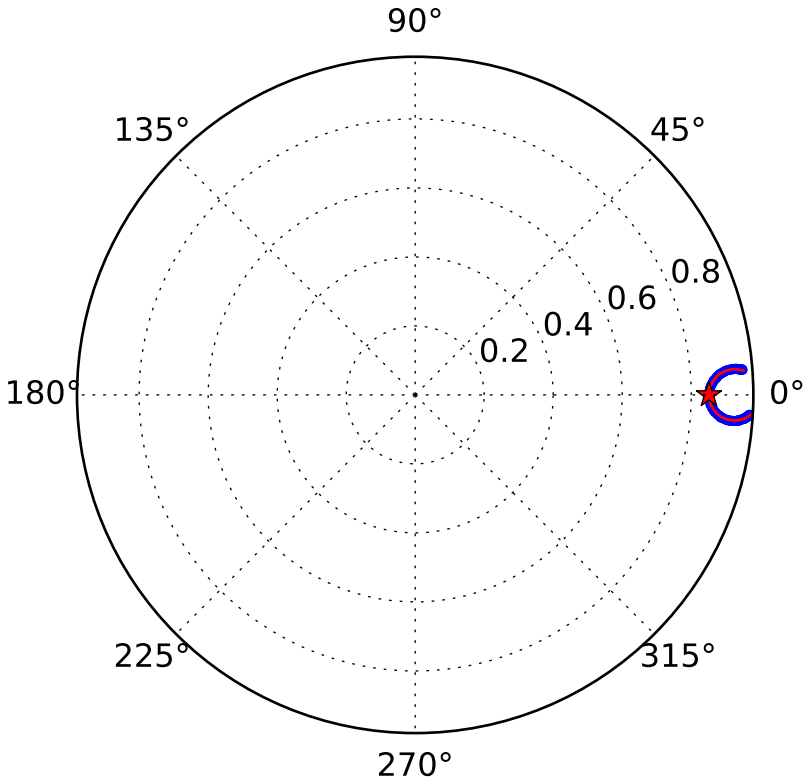


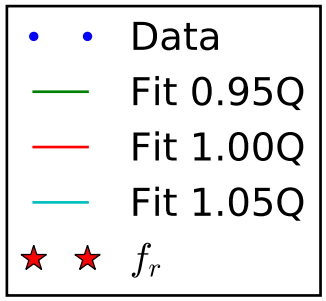
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.47198794065
Q_r = 14418.6467662
Q_c = 215769.038861
a = (-0.00164855745245+0.00574464516907j)
ϕ_0 = 0.686878066217
τ = 35.62617514



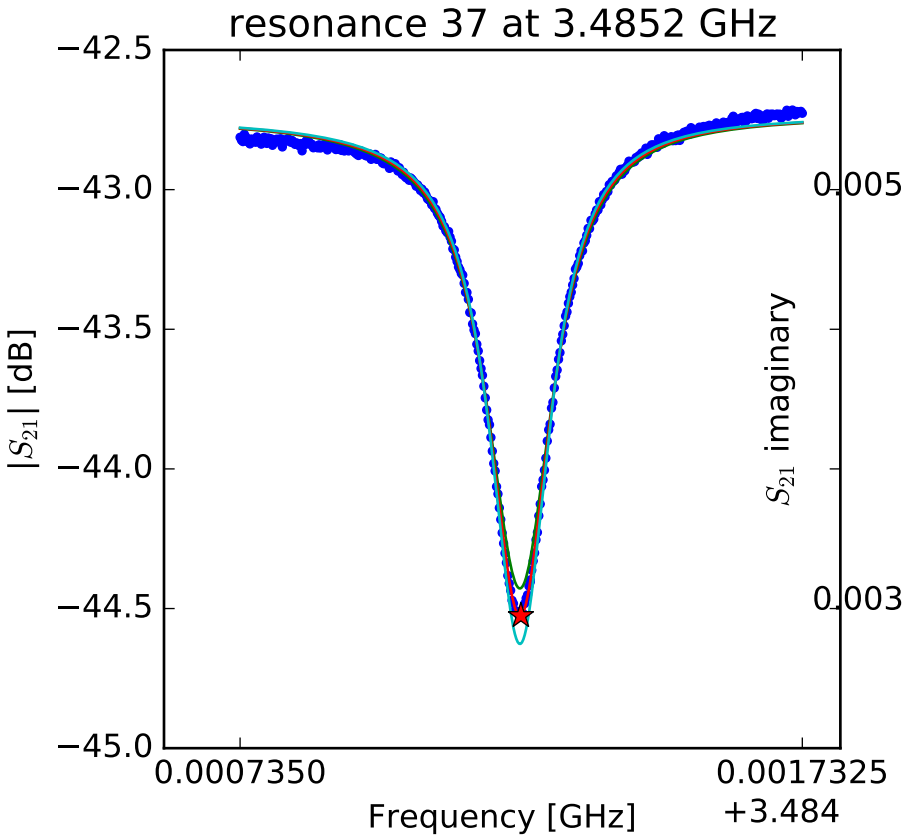


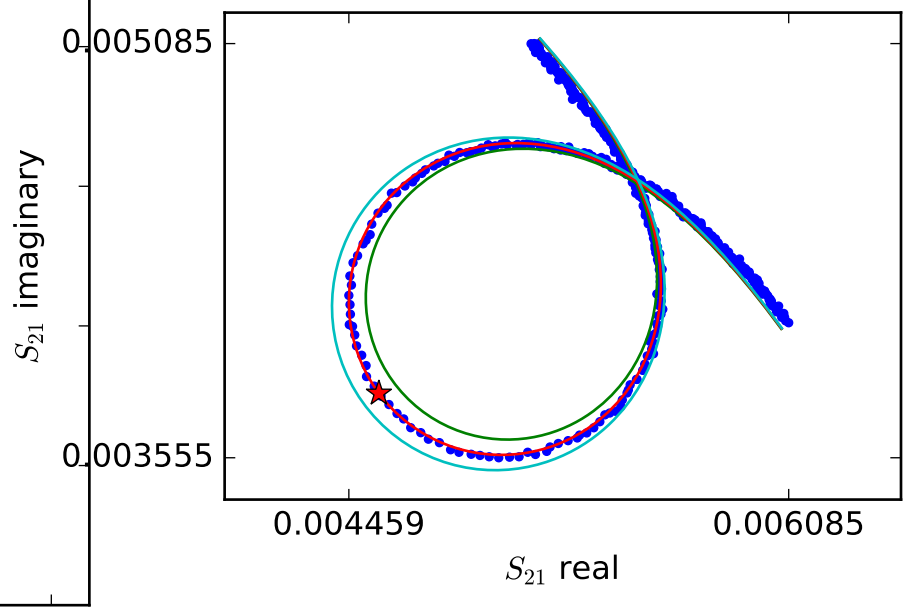


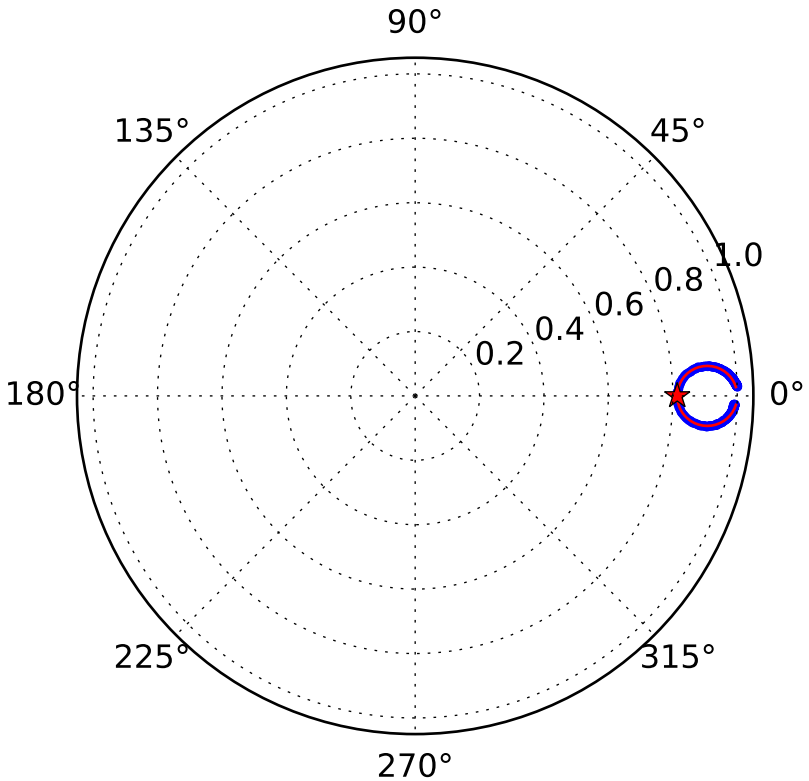


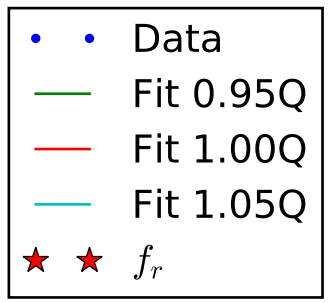
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.47941020059
Q_r = 6225.50547394
Q_c = 41850.235515
a = (0.000222530138557+0.00667173975086j)
ϕ_0 = -0.814644284799
τ = 37.6255045057



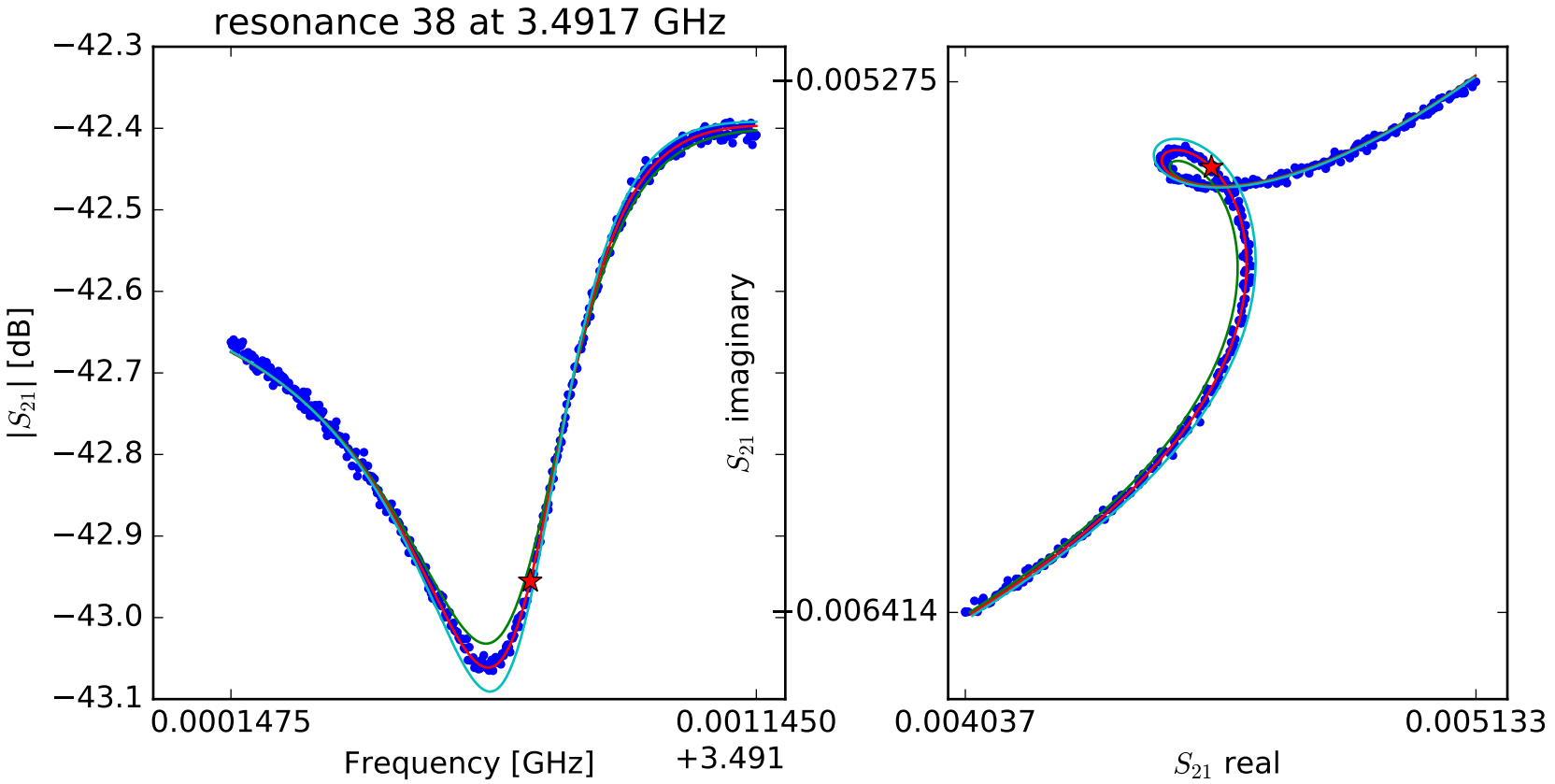


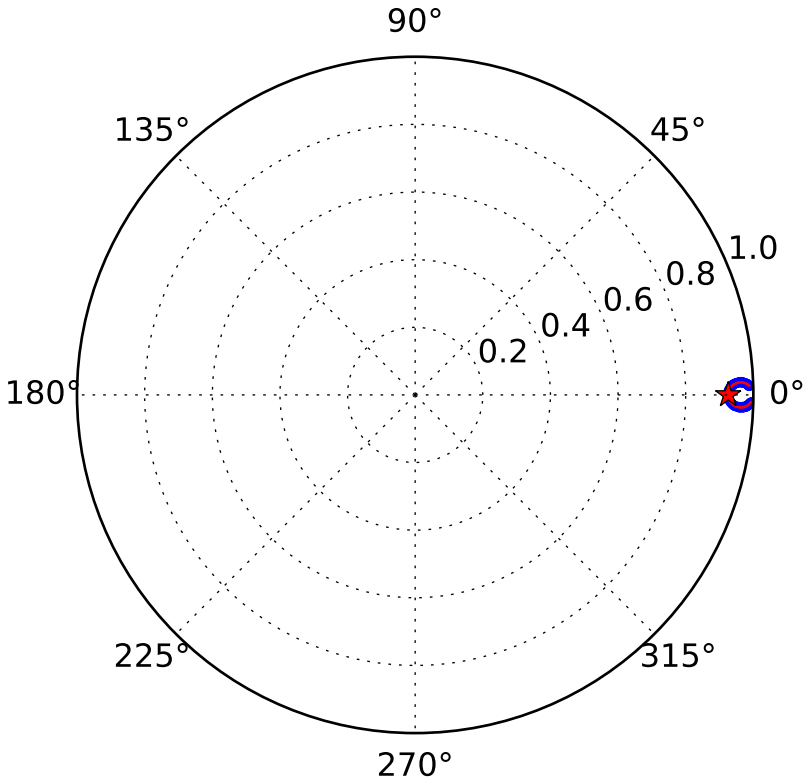


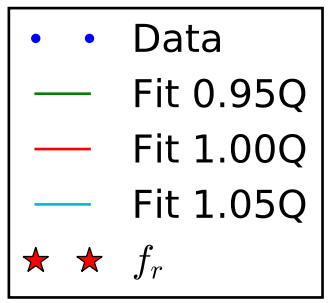


$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.48523315602
Q_r = 23009.2646624
Q_c = 123476.935031
a = (0.0020841614739-0.00699332947499j)
ϕ_0 = -0.0410495869339
τ = 39.5059207545

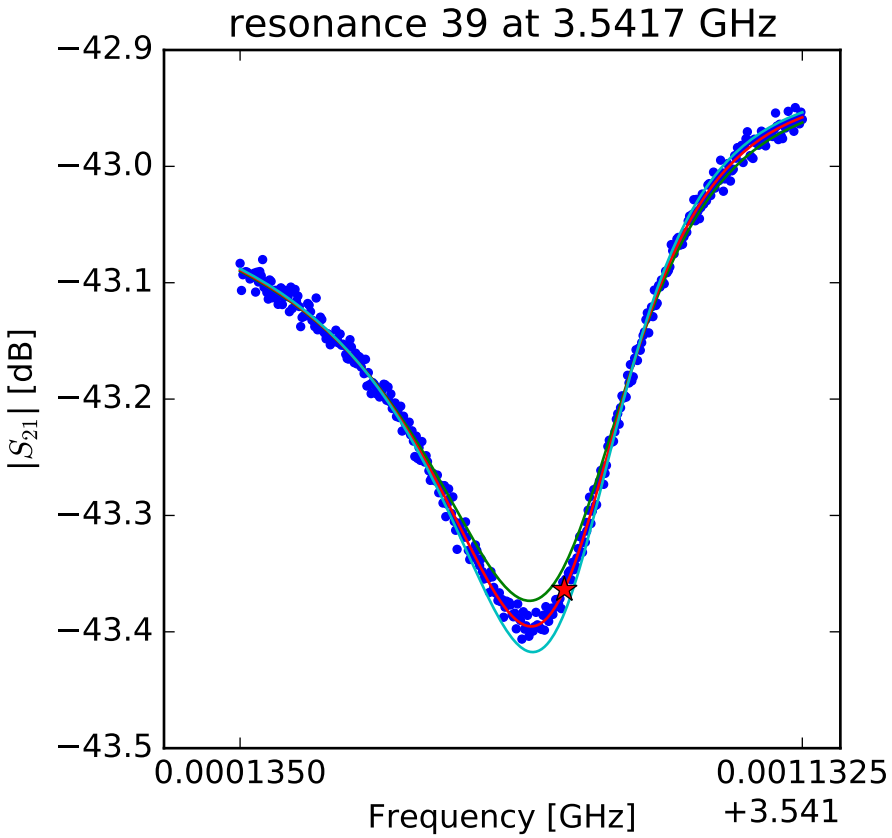


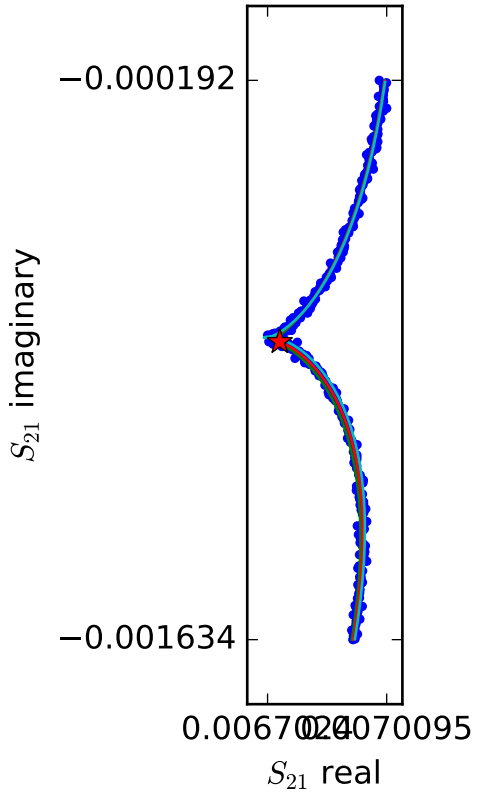


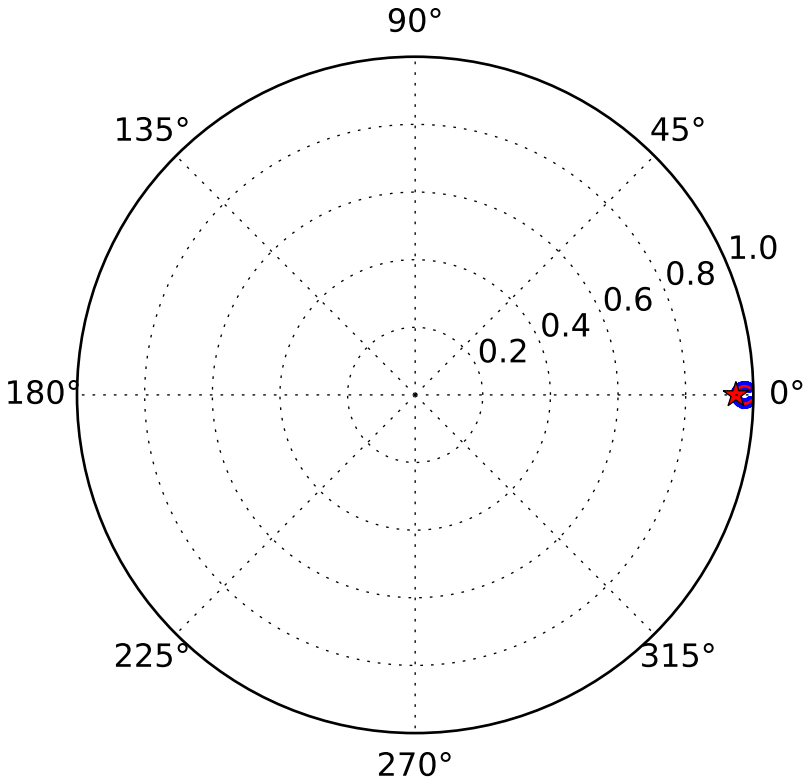


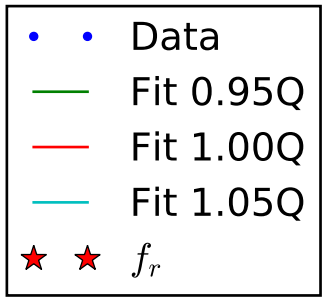
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.49171573605
Q_r = 9163.15806723
Q_c = 123092.825821
a = (-0.0070913236929+0.0024649086309j)
ϕ_0 = -0.767859518181
τ = 39.692406229



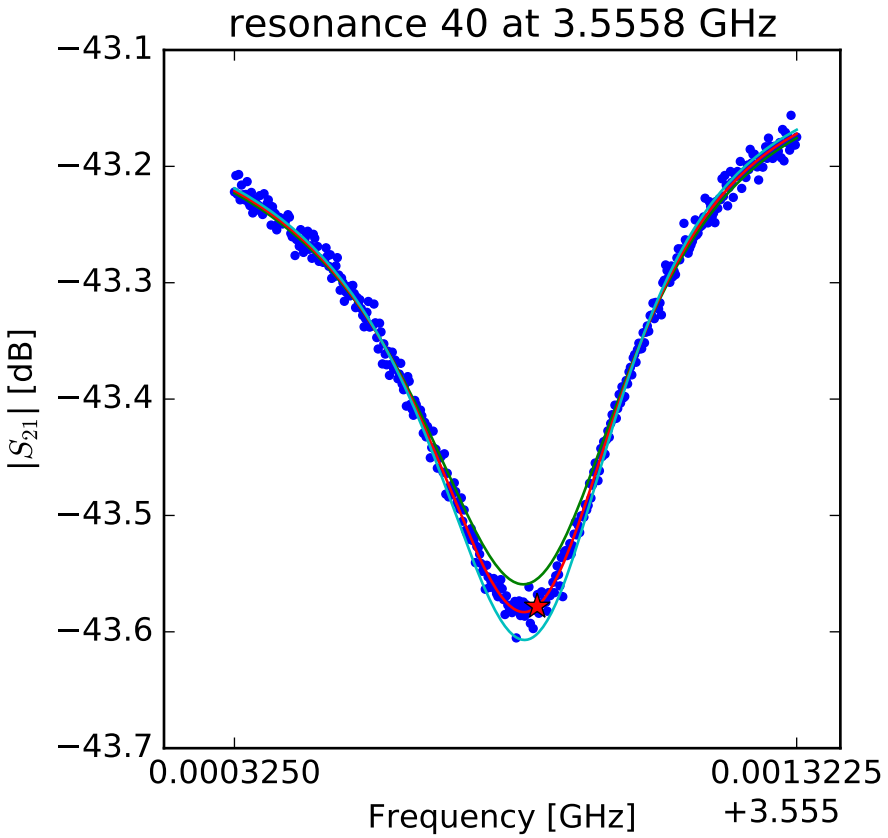


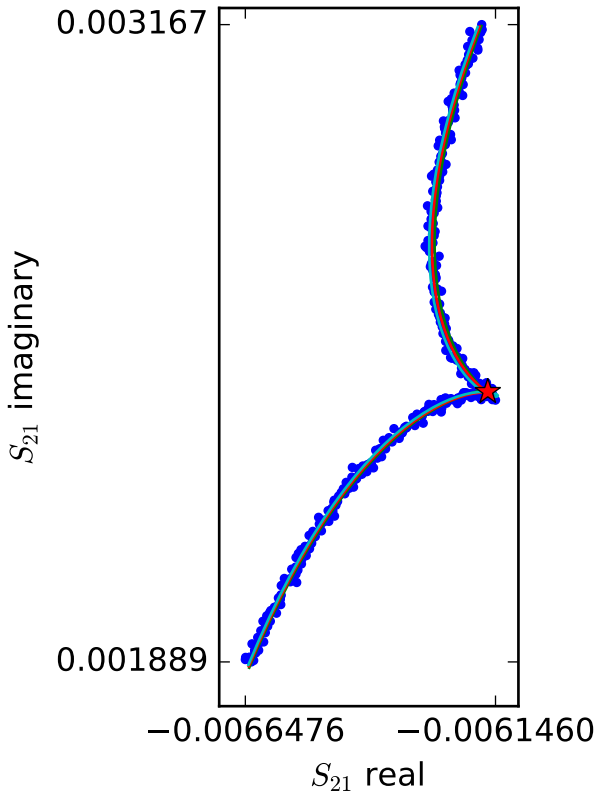


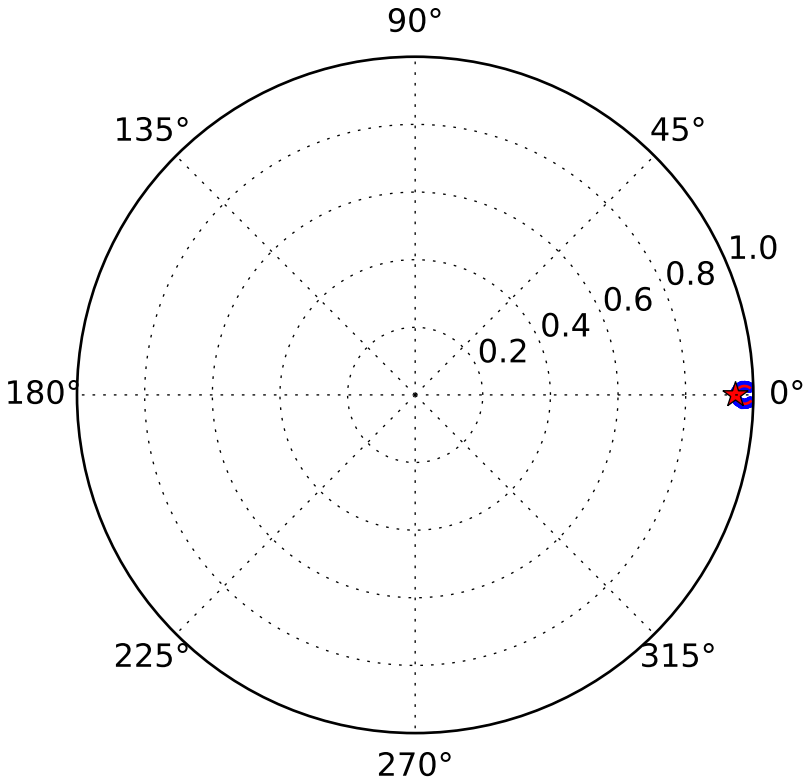


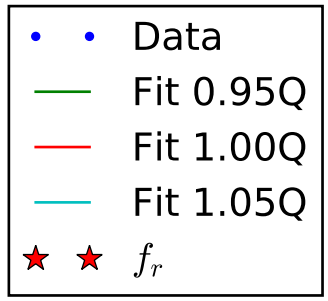
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.54171033836
Q_r = 7974.21572626
Q_c = 154318.550974
a = (-0.00483005601619-0.00521504828369j)
ϕ_0 = -0.505640887233
τ = 38.3022896092



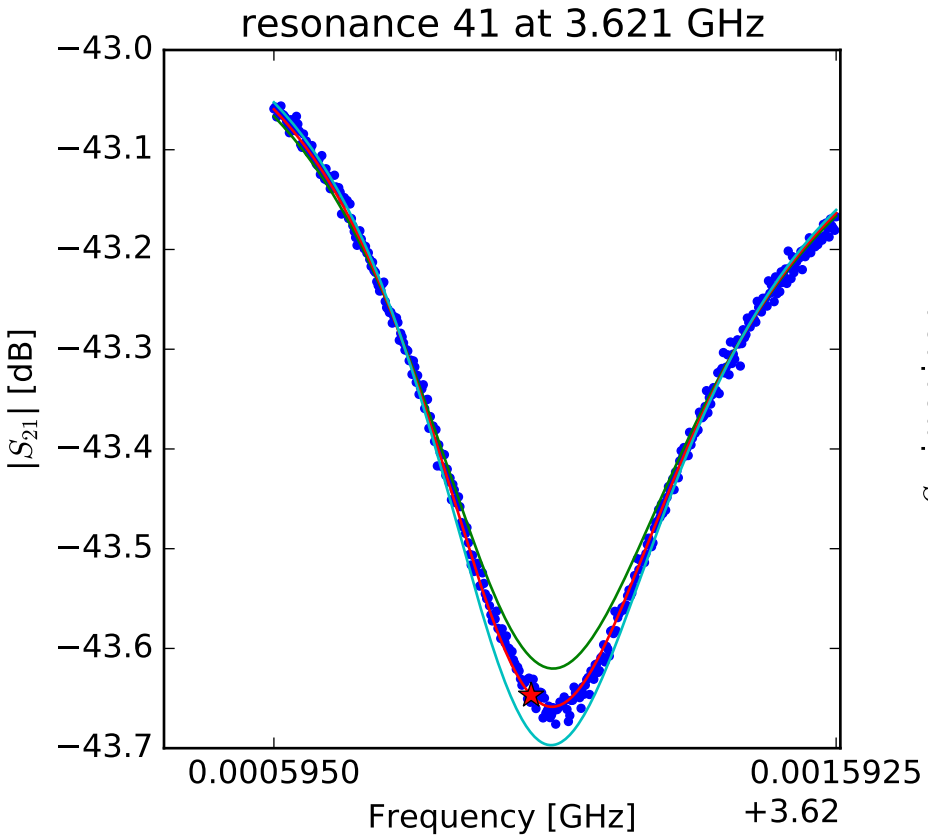


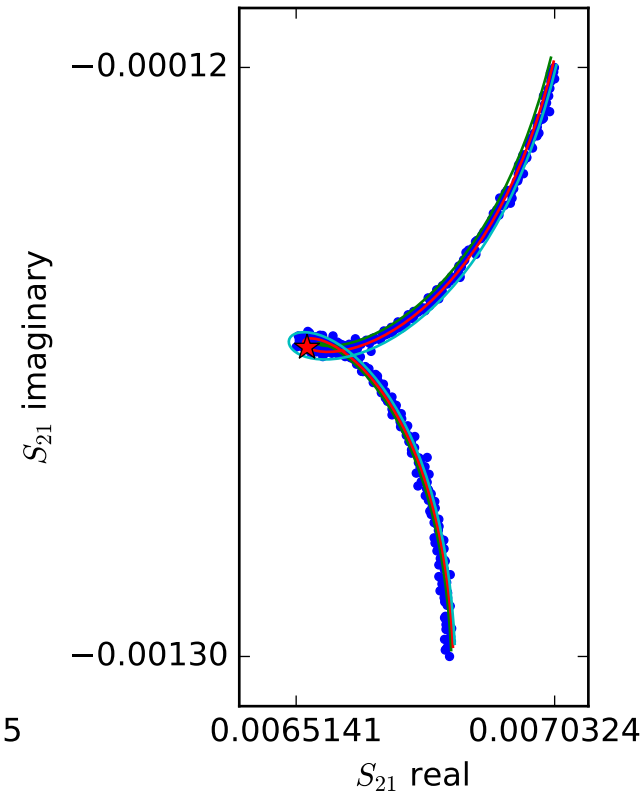


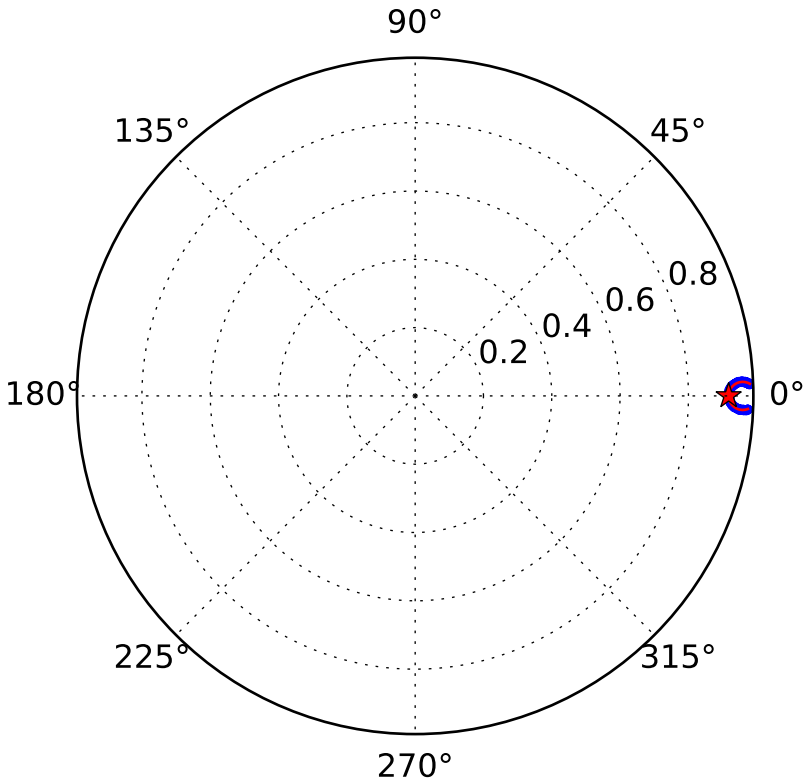


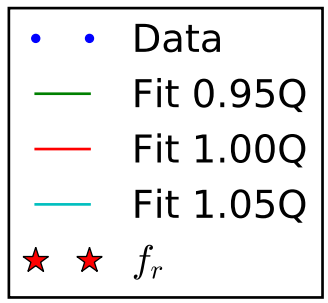
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.55586208782
Q_r = 7590.89493793
Q_c = 144051.940262
a = (-0.00611813774419+0.00336883762895j)
ϕ_0 = -0.194156854875
τ = 37.9602466599



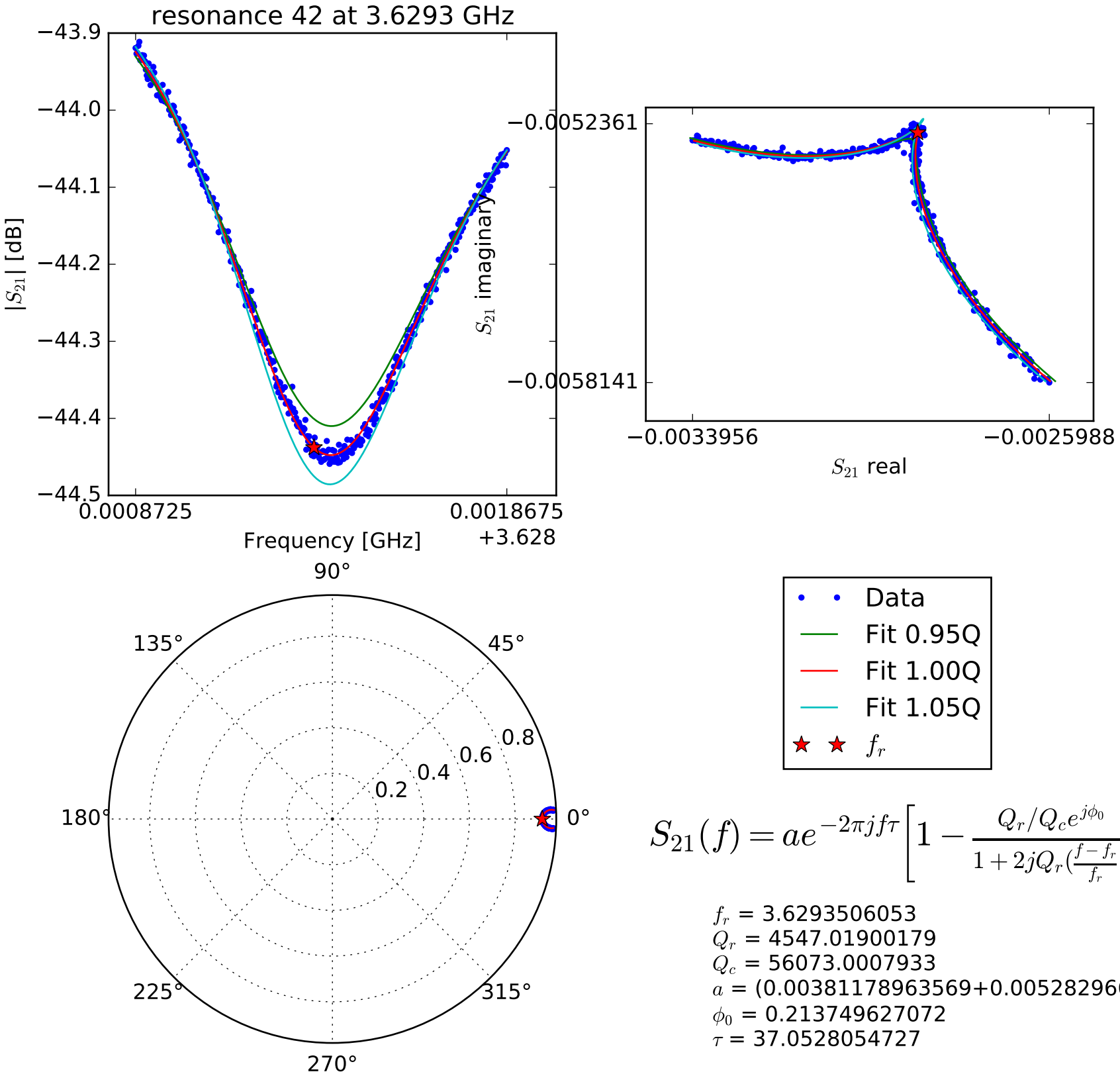






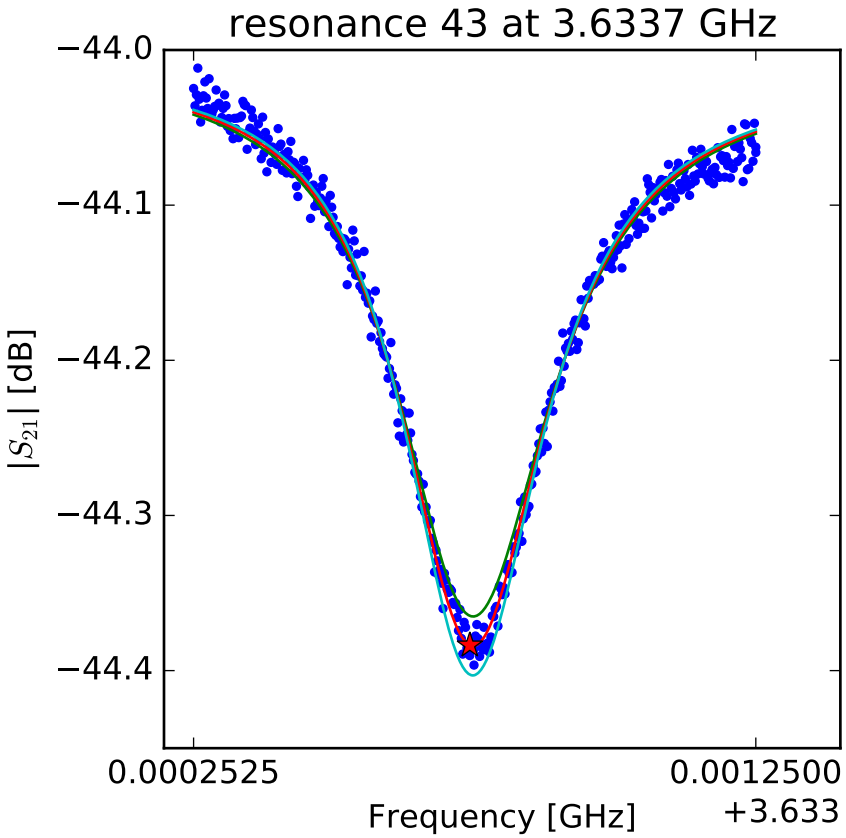
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

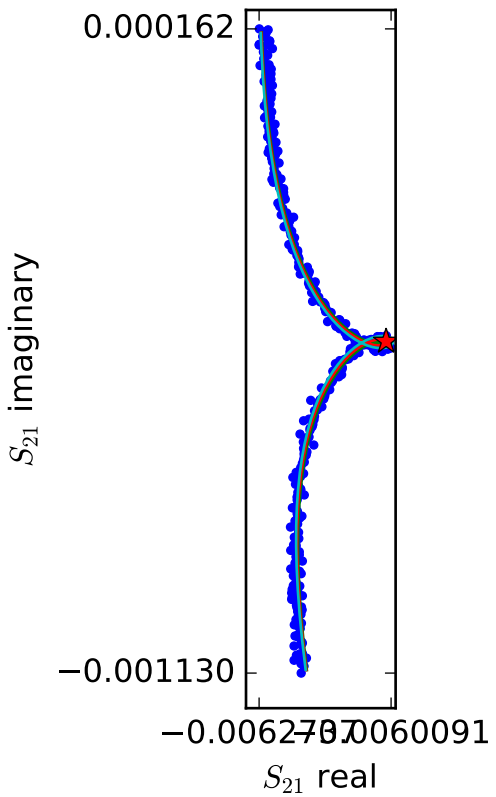
f_r = 3.62105138968
Q_r = 5852.03087846
Q_c = 71053.6397097
a = (-0.00569853672952+0.00430665693452j)
ϕ_0 = 0.228846807751
τ = 39.0522715053

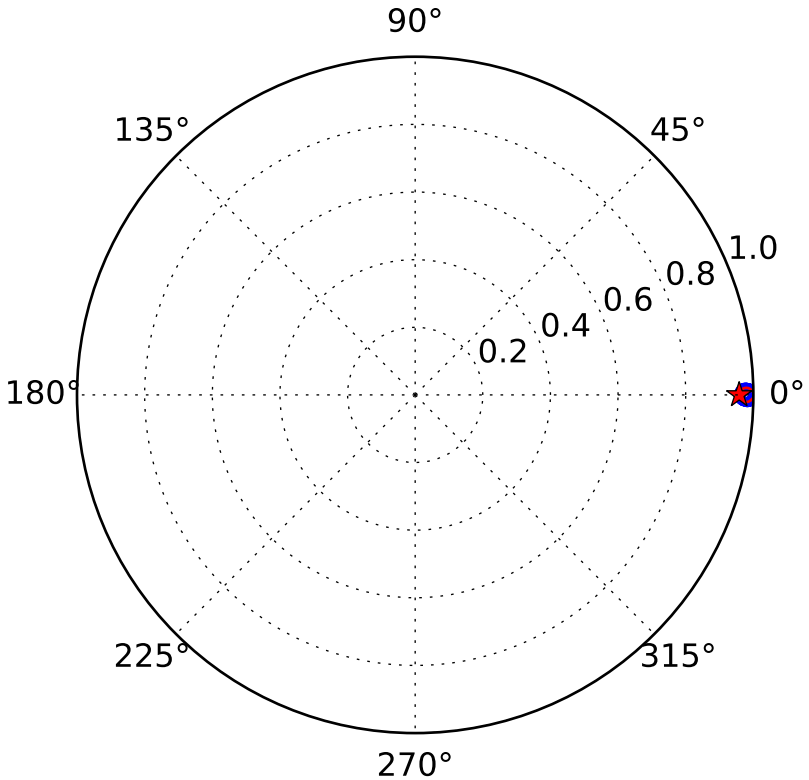


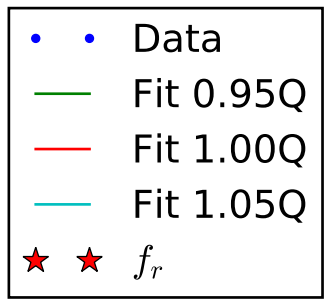
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.6293506053
Q_r = 4547.01900179
Q_c = 56073.0007933
a = (0.00381178963569+0.00528296600941j)
ϕ_0 = 0.213749627072
τ = 37.0528054727



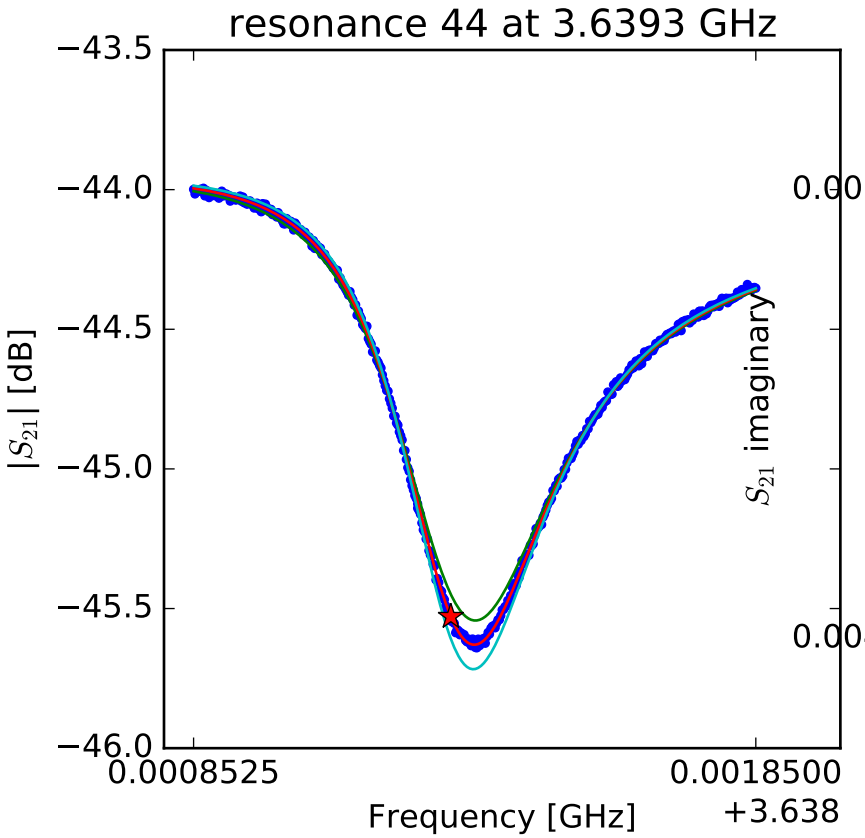


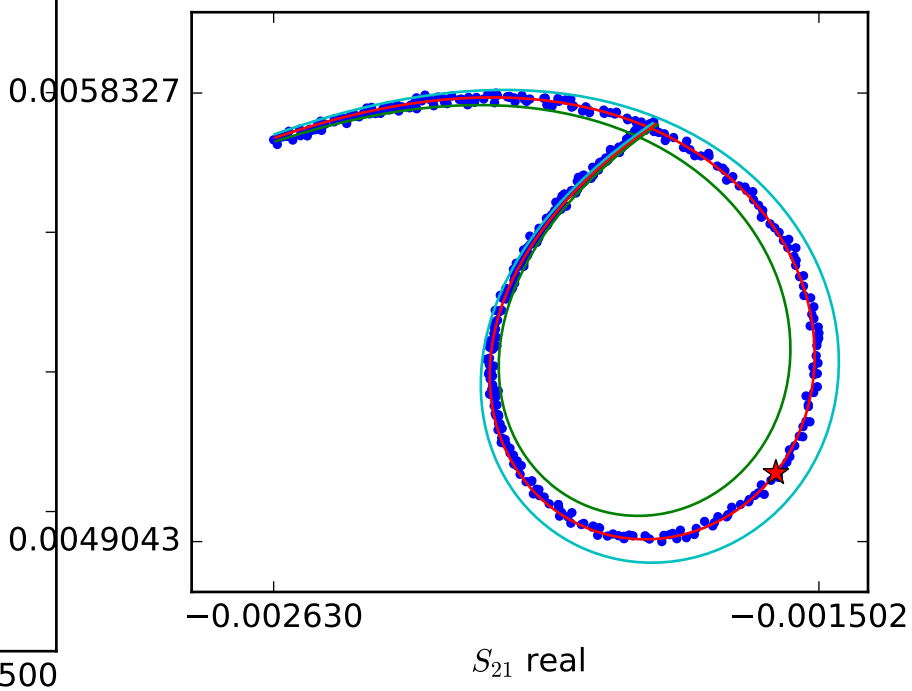


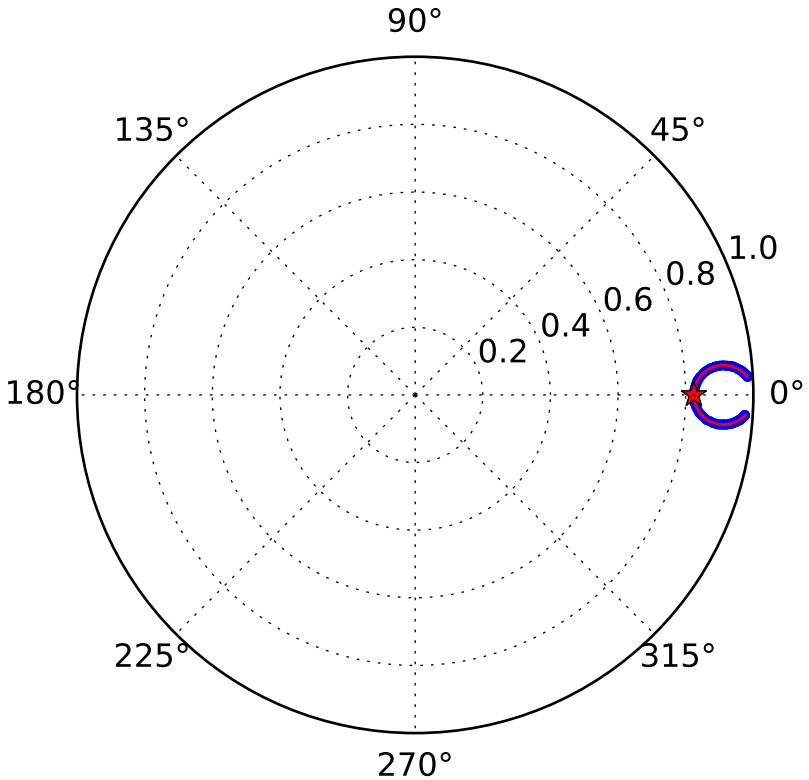


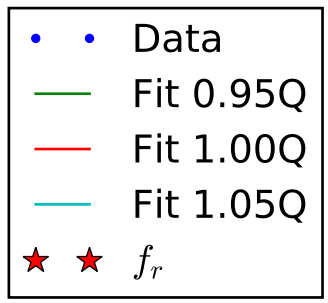
$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.63374256504
Q_r = 11264.4631971
Q_c = 268727.004572
a = (-0.00251466314034+0.00577683021446j)
ϕ_0 = 0.0682727914506
τ = 36.5470605319









$$S_{21}(f) = ae^{-2\pi jf\tau}\left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})}\right]$$

f_r = 3.63930889954
Q_r = 10076.0366535
Q_c = 57279.7245323
a = (-0.00584592370107+0.00230716093519j)
ϕ_0 = 0.413889658511
τ = 36.3058456919