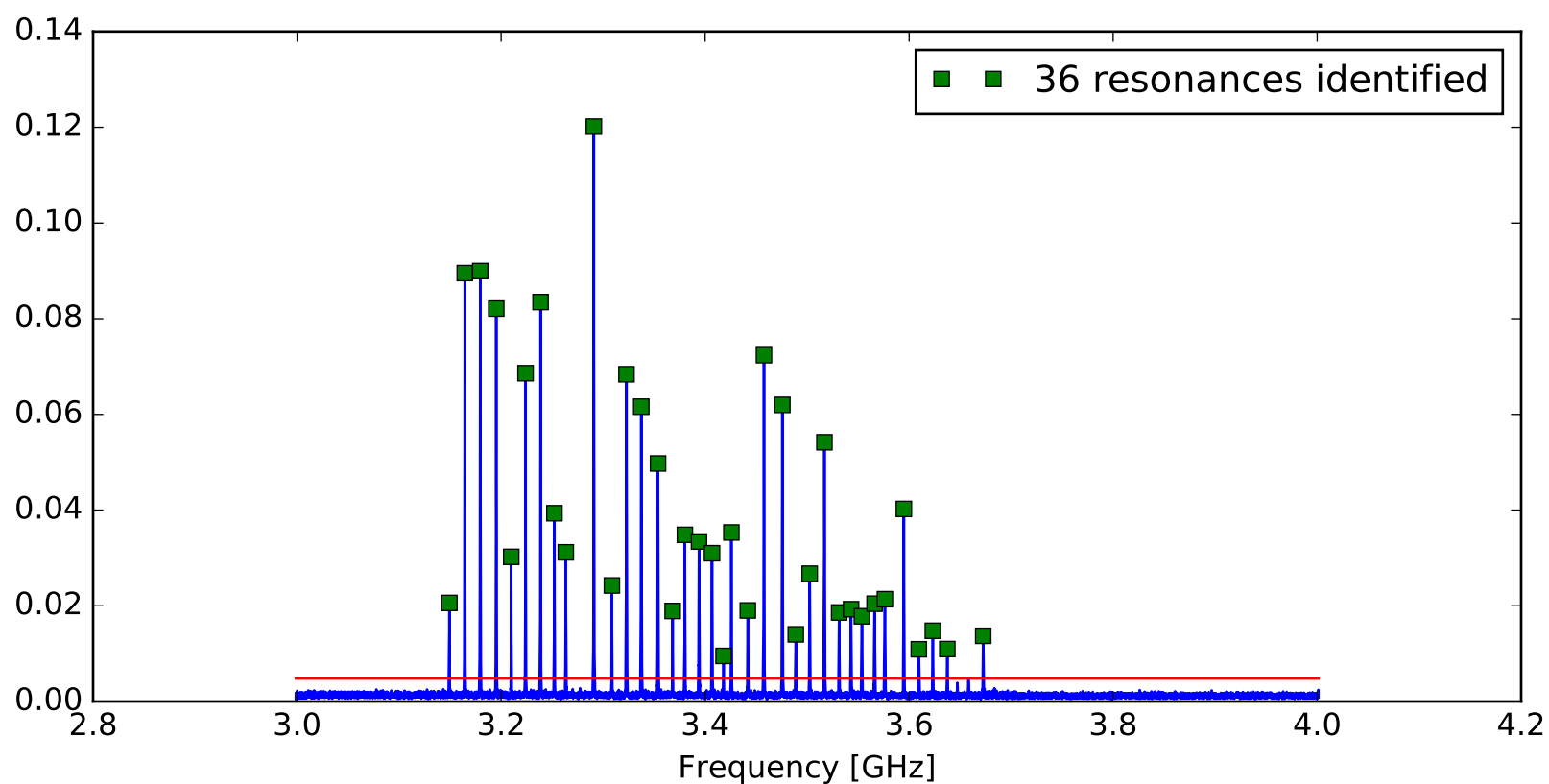
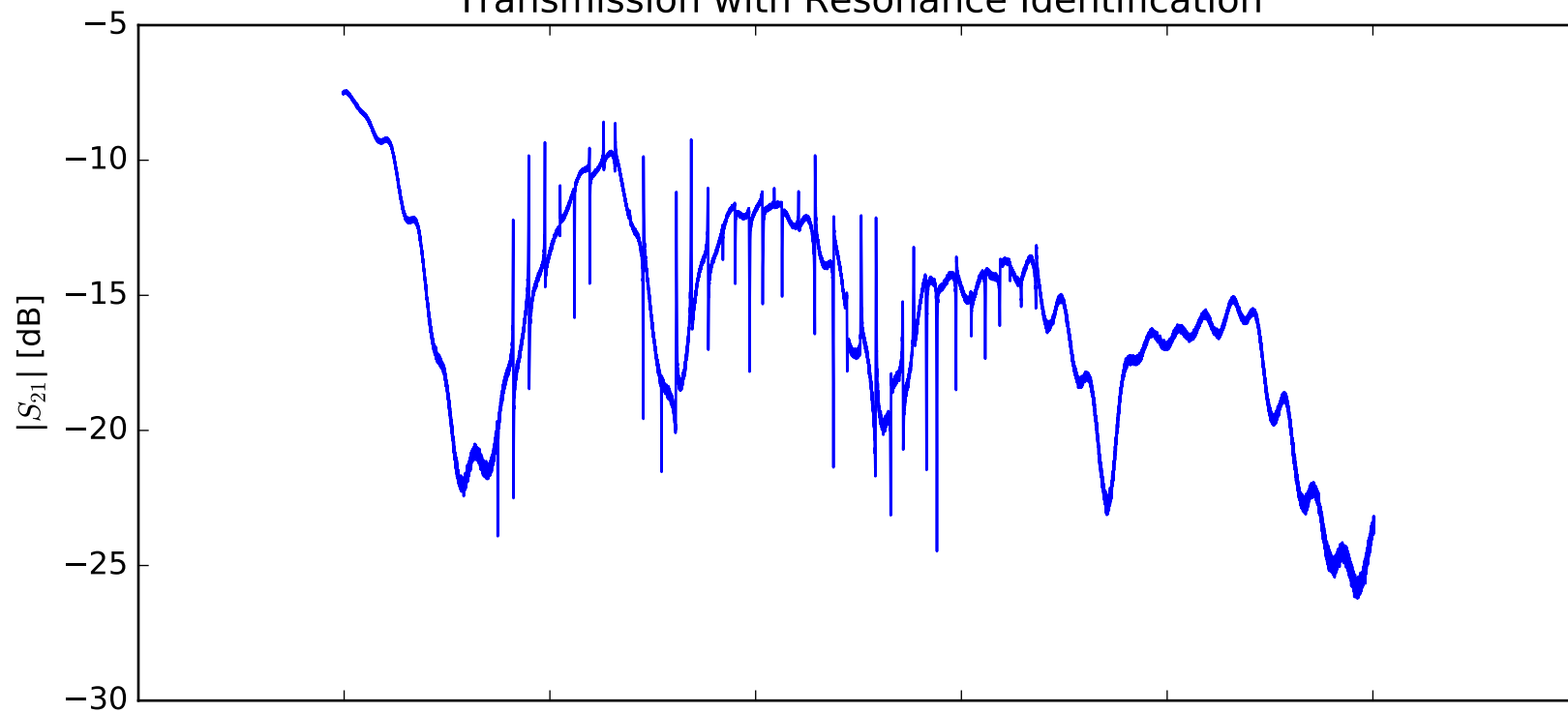
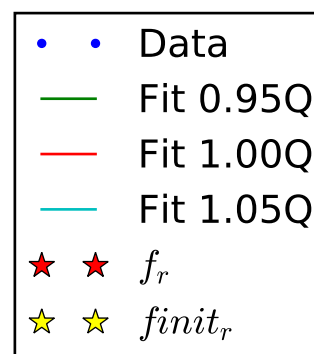
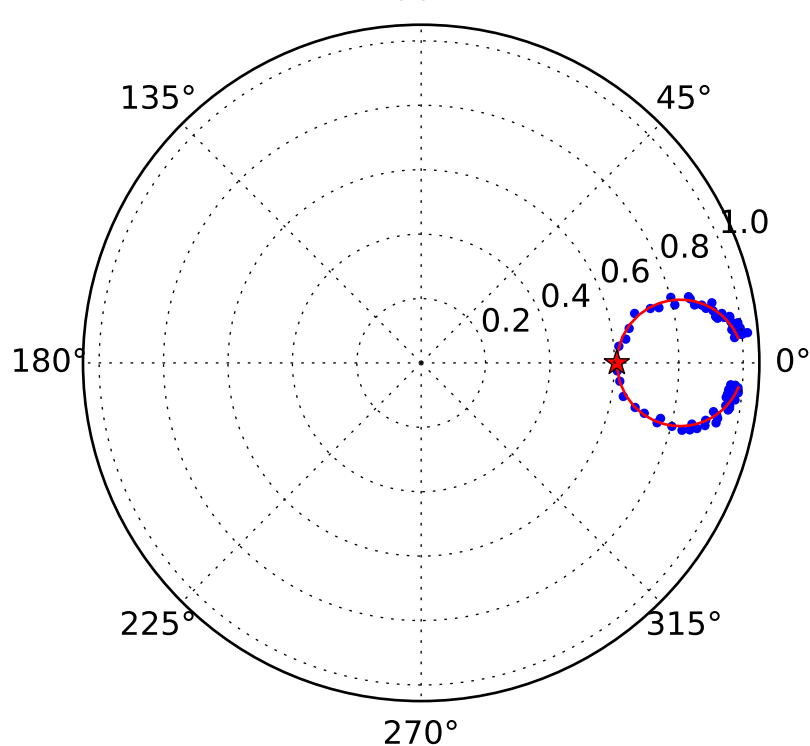
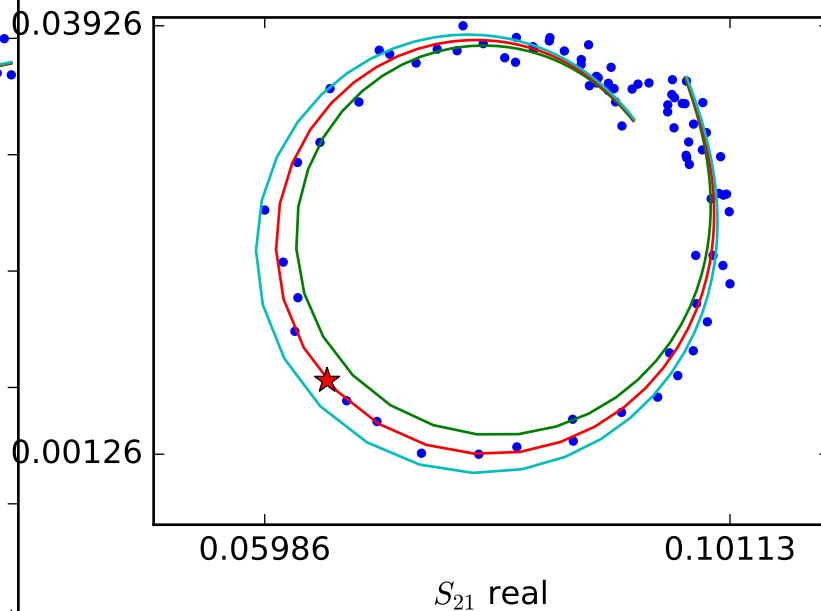
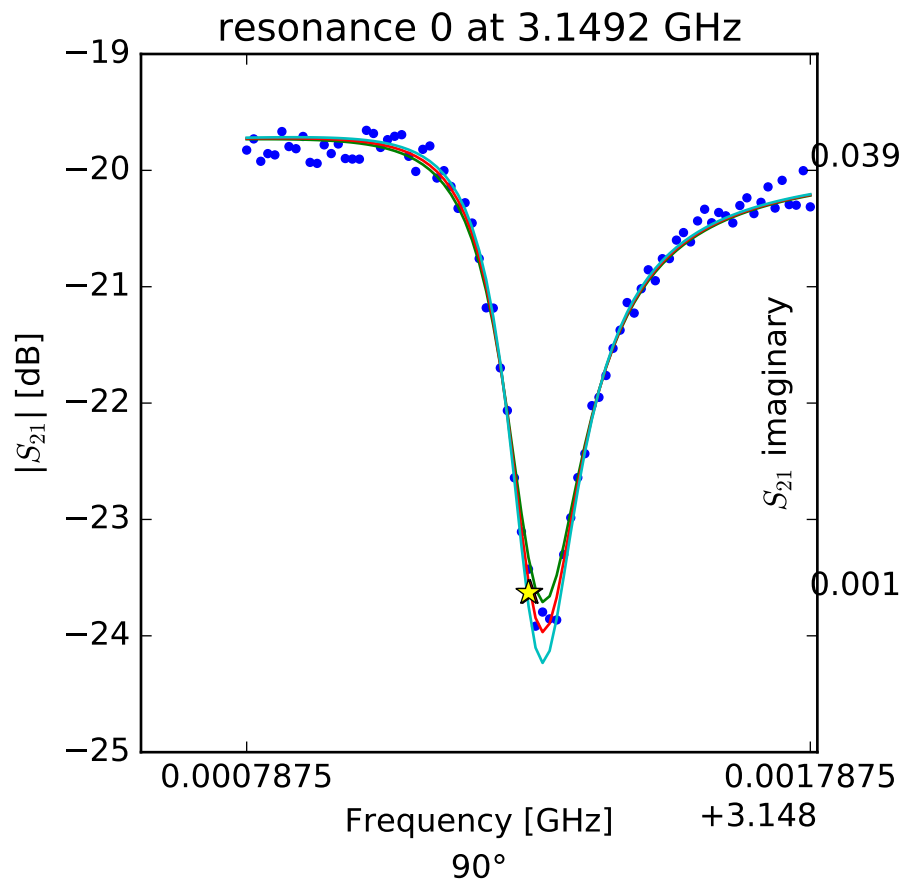


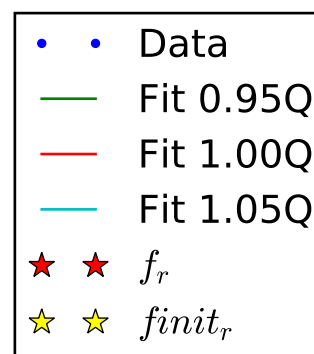
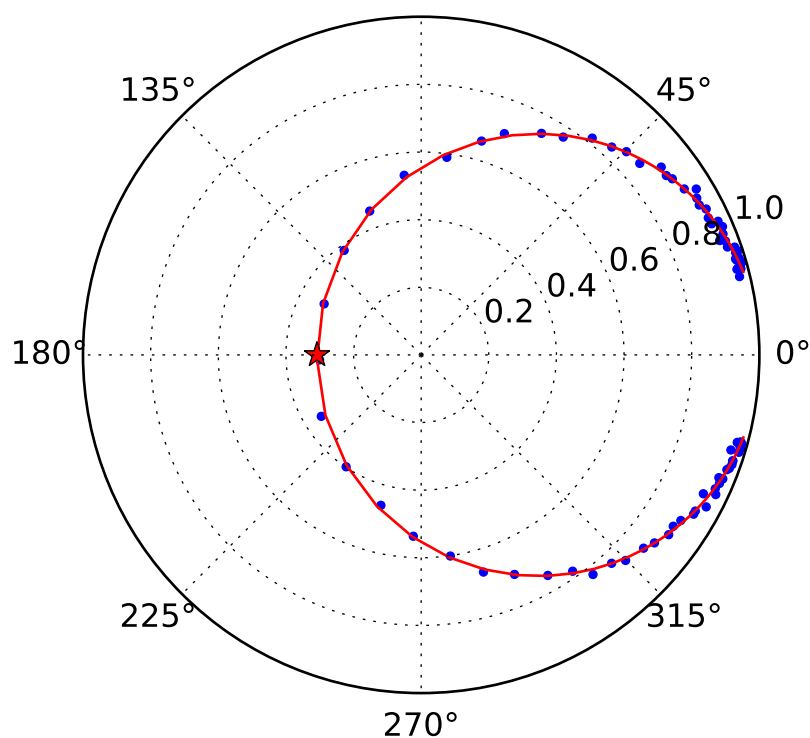
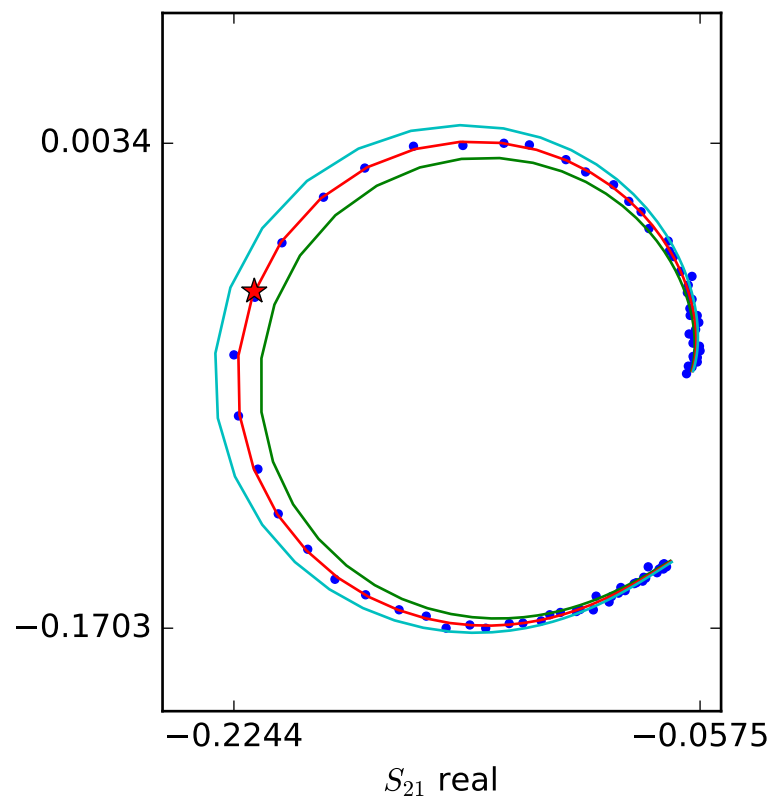
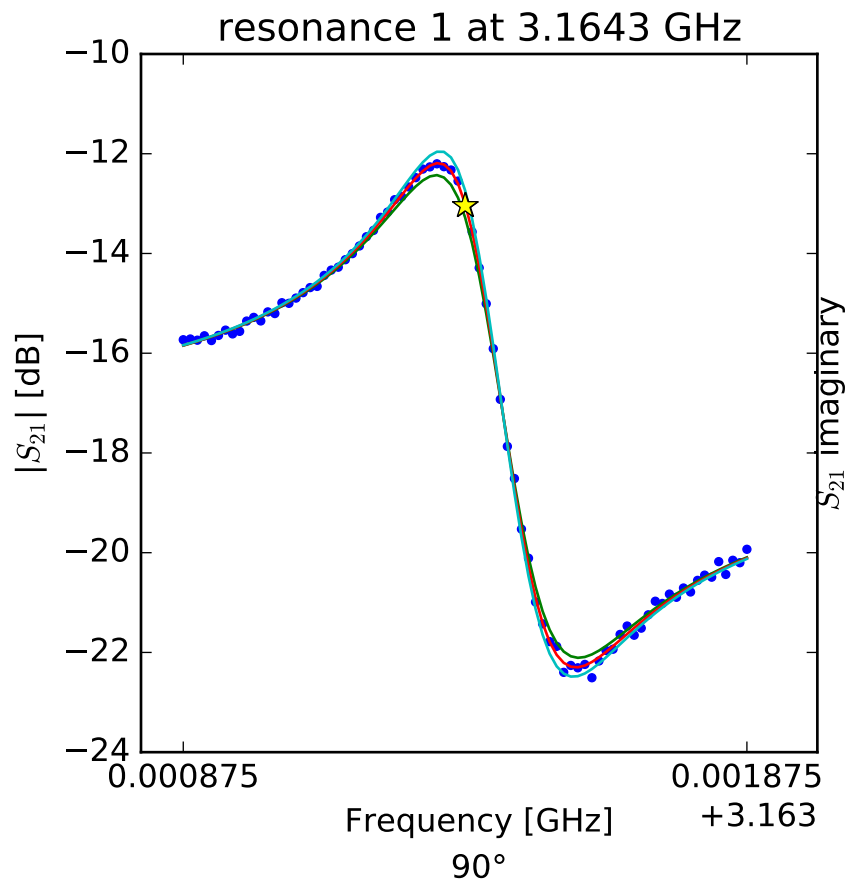
Transmission with Resonance Identification





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

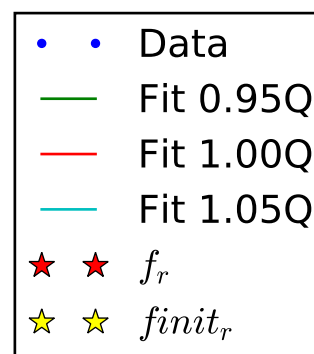
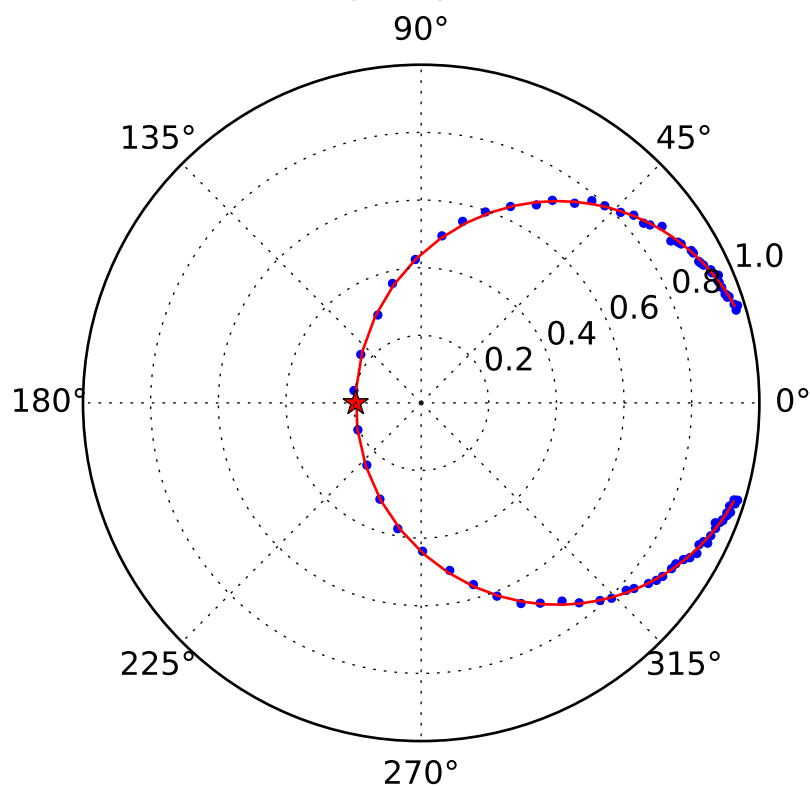
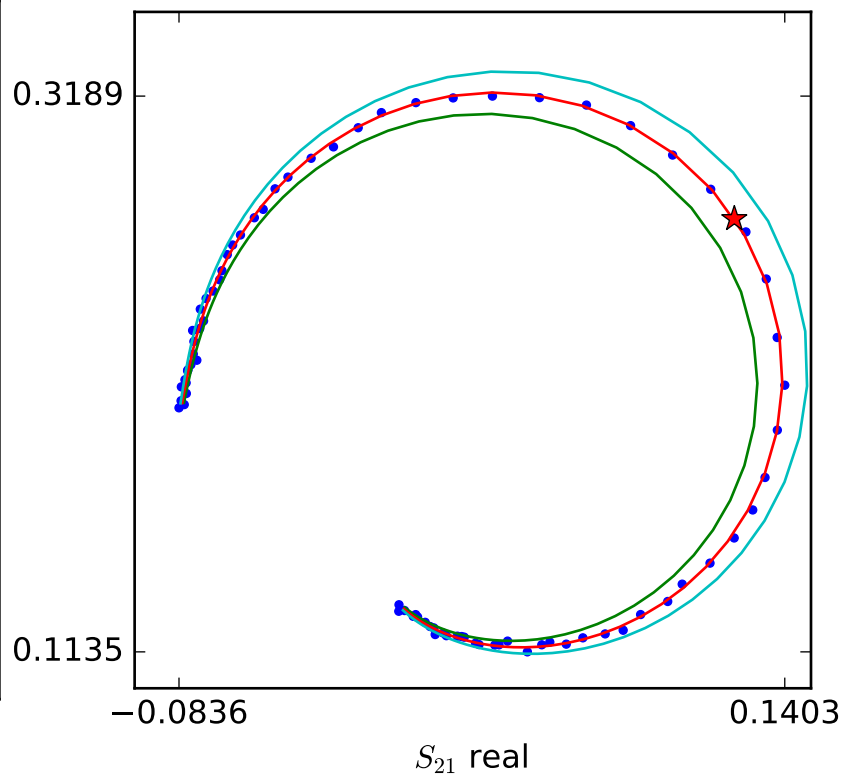
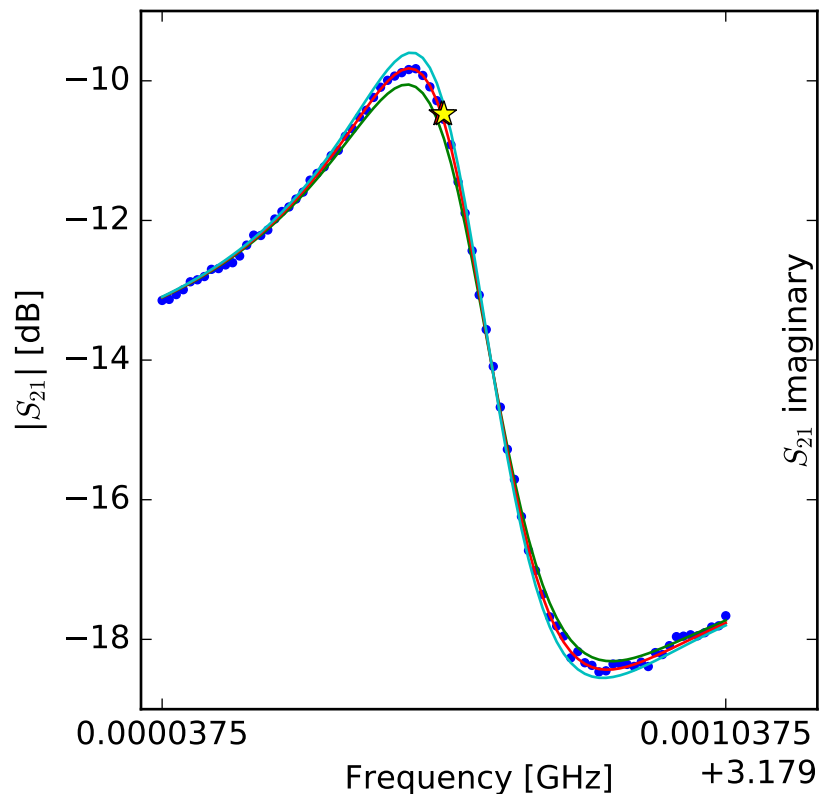
$$\begin{aligned} f_r &= 3.14929065808 \\ Q_r &= 15524.951718 \\ Q_c &= 39537.0322325 \\ a &= (0.0937021652033 - 0.0393703944745j) \\ \phi_0 &= 0.362075069166 \\ \tau &= 26.3181086414 \end{aligned}$$



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

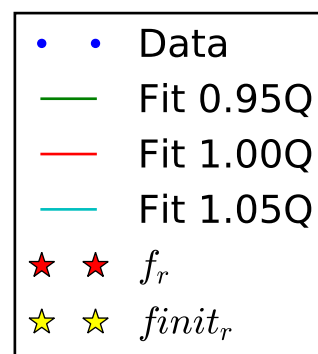
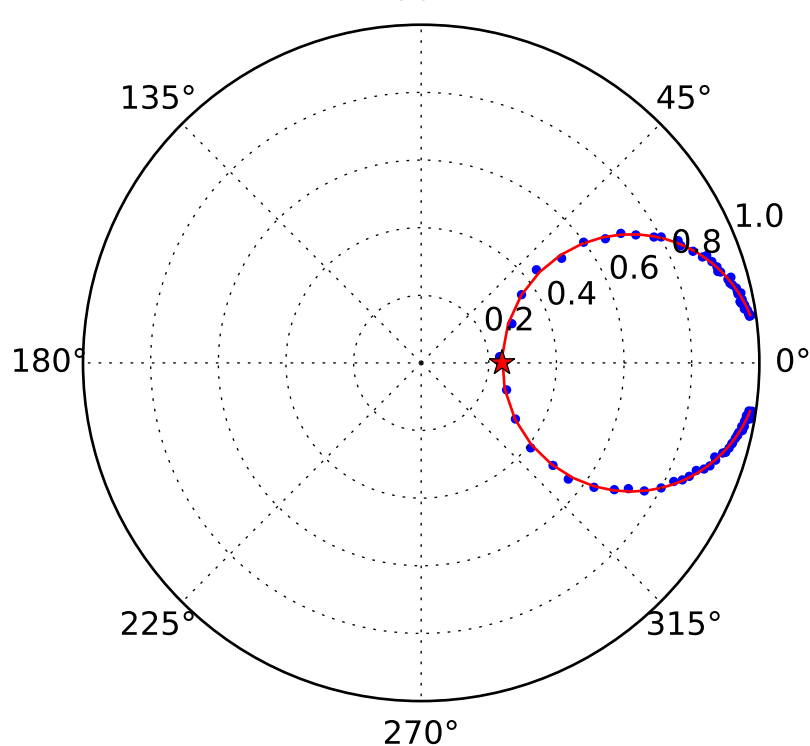
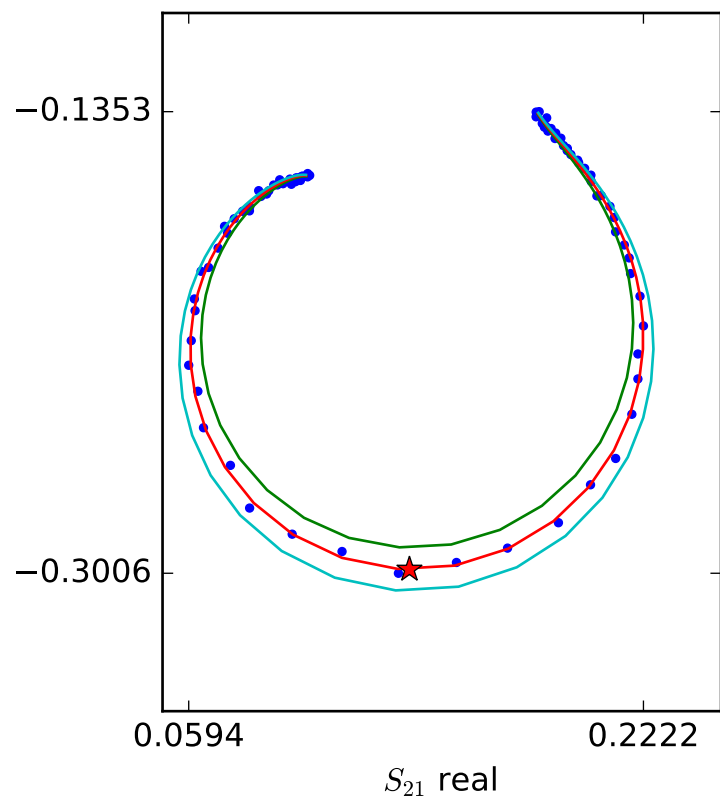
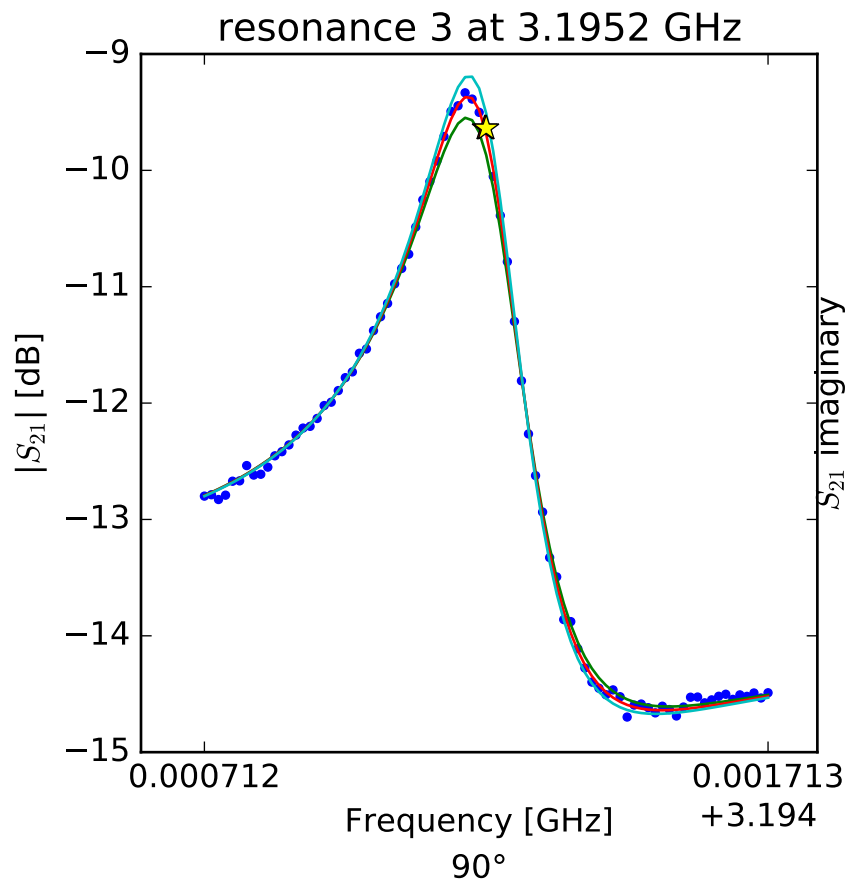
$$\begin{aligned} f_r &= 3.16437605079 \\ Q_r &= 16275.4191965 \\ Q_c &= 12442.8960421 \\ a &= (0.100306006364 - 0.0815809933927j) \\ \phi_0 &= 1.66923341194 \\ \tau &= 23.4546218902 \end{aligned}$$

resonance 2 at 3.1795 GHz



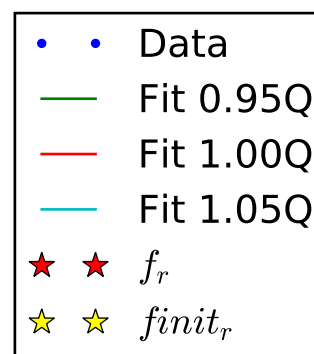
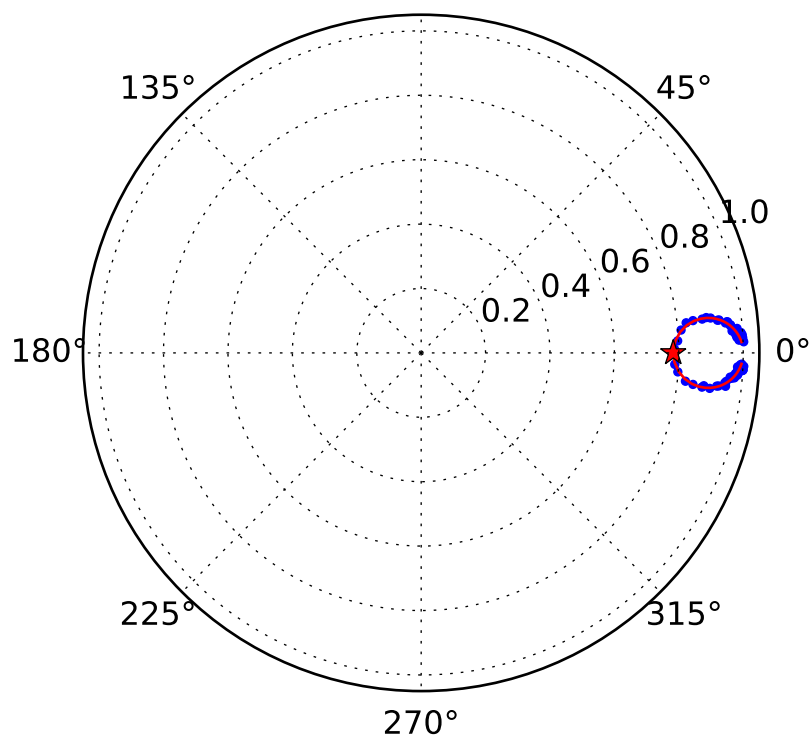
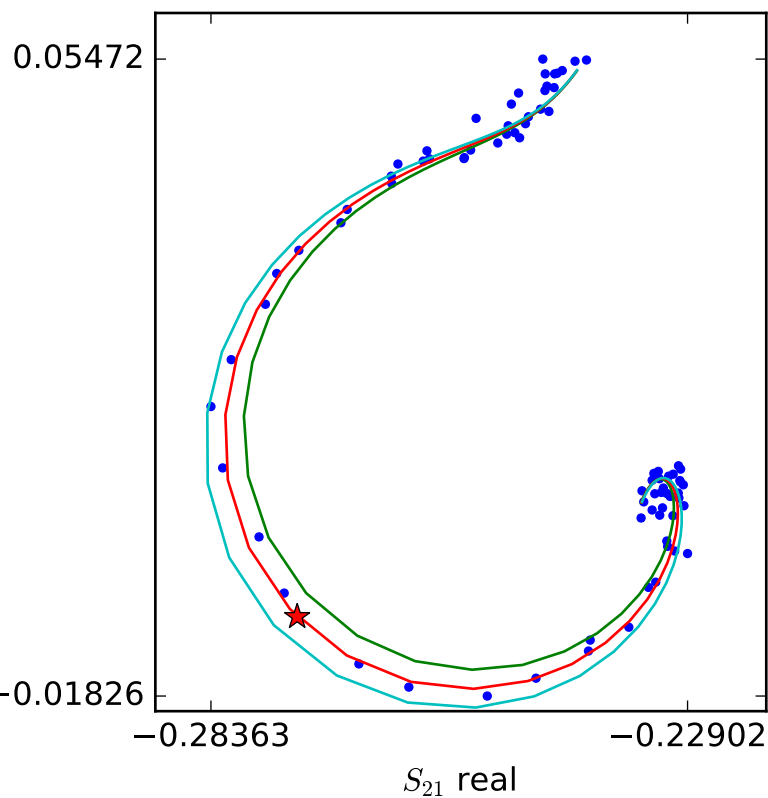
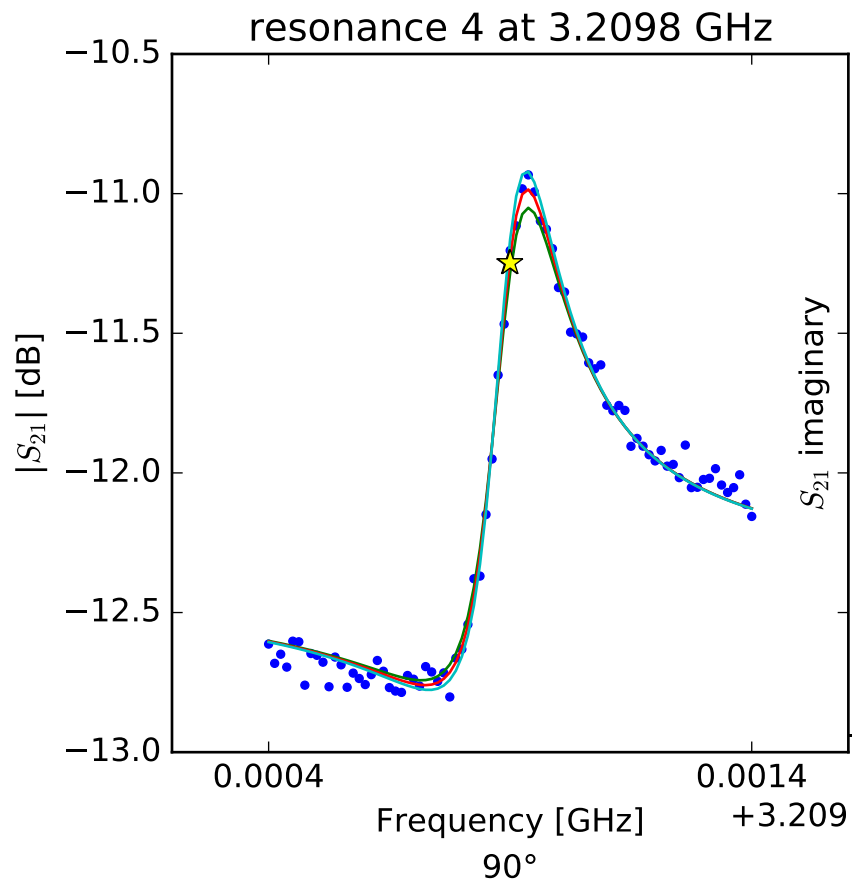
$$S_{21}(f) = ae^{-2\pi jf\tau} \left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r \left(\frac{f-f_r}{f_r} \right)} \right]$$

$$\begin{aligned} f_r &= 3.17953327647 \\ Q_r &= 12290.4997548 \\ Q_c &= 10295.2844939 \\ a &= (-0.129793823308 + 0.109946844879j) \\ \phi_0 &= 1.85609079844 \\ \tau &= 27.0769129824 \end{aligned}$$



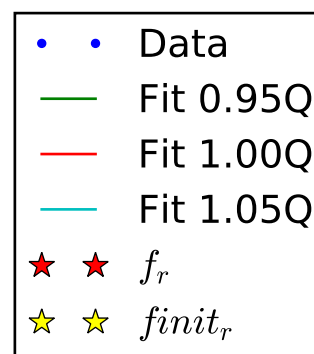
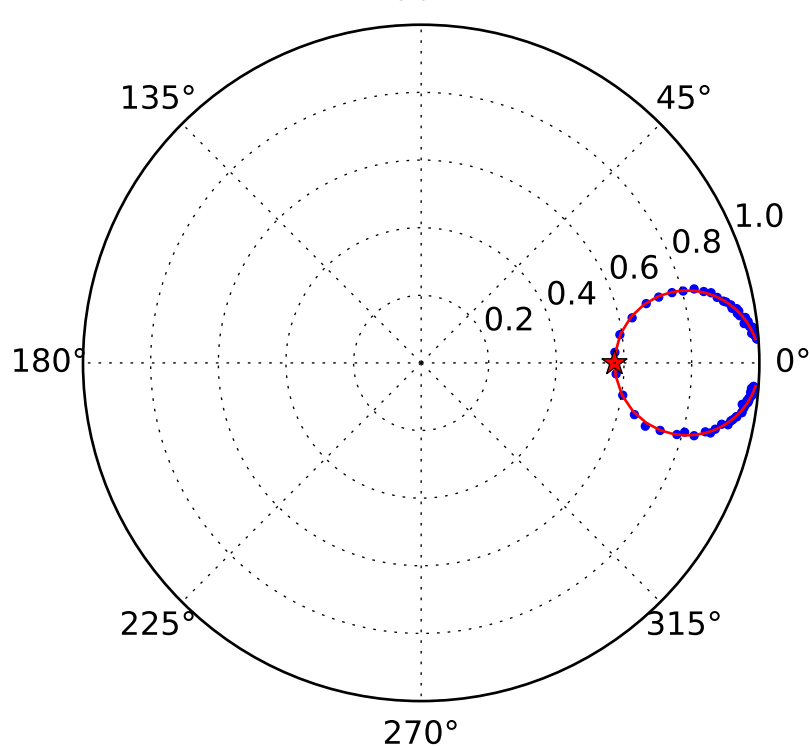
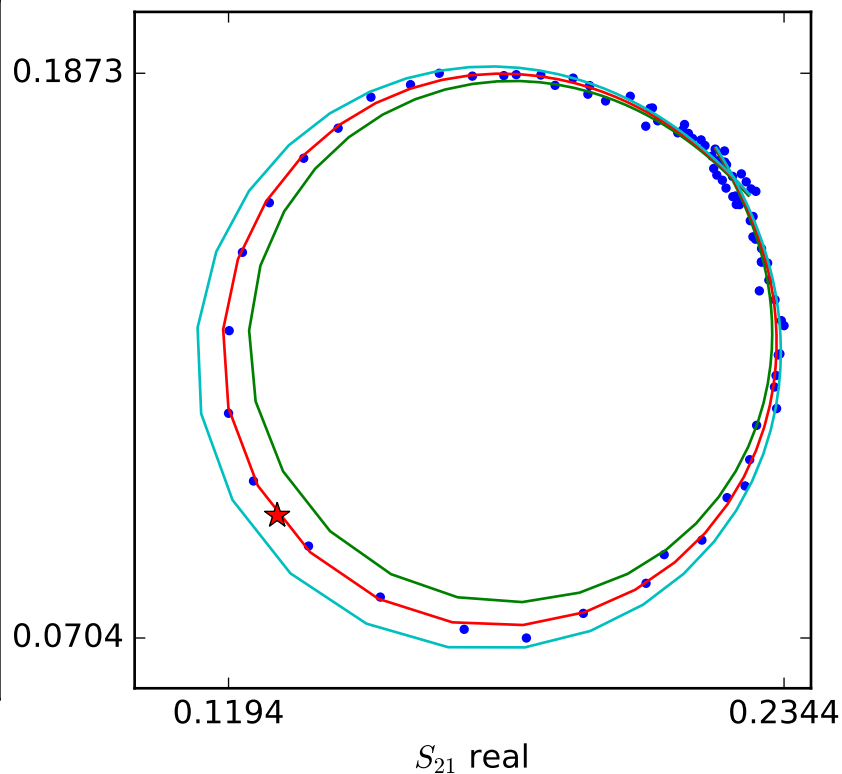
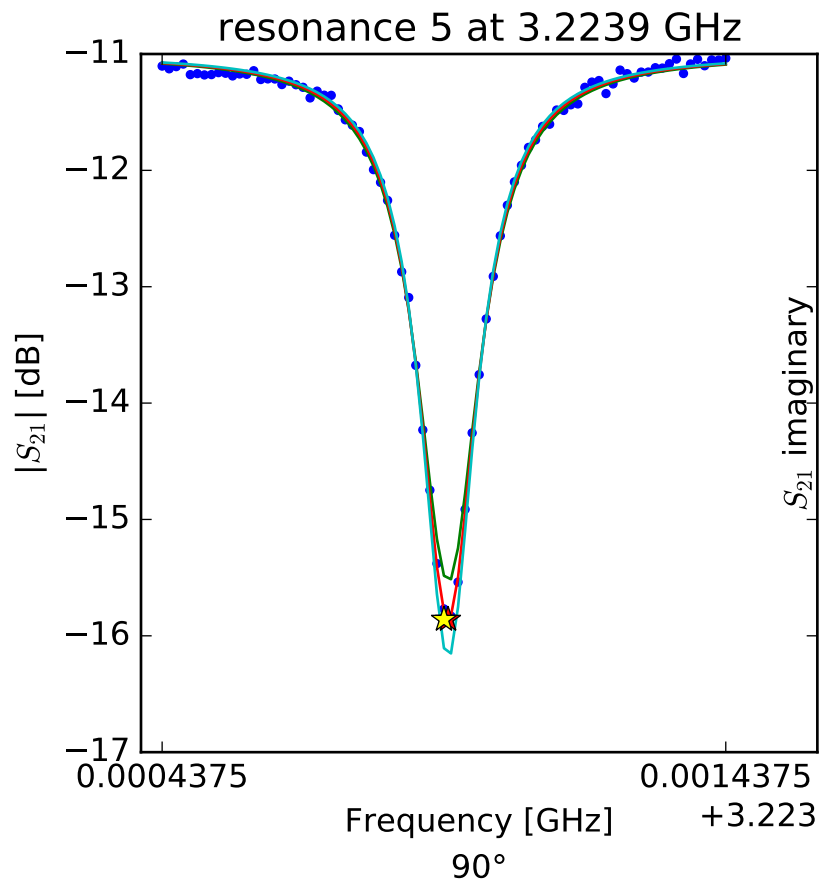
$$S_{21}(f) = ae^{-2\pi jf\tau} \left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})} \right]$$

$f_r = 3.19520991972$
 $Q_r = 16471.5361582$
 $Q_c = 21645.7840746$
 $a = (0.180546819333 - 0.0940161285188j)$
 $\phi_0 = 2.32689943232$
 $\tau = 26.9306620309$



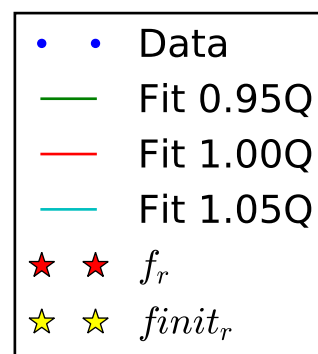
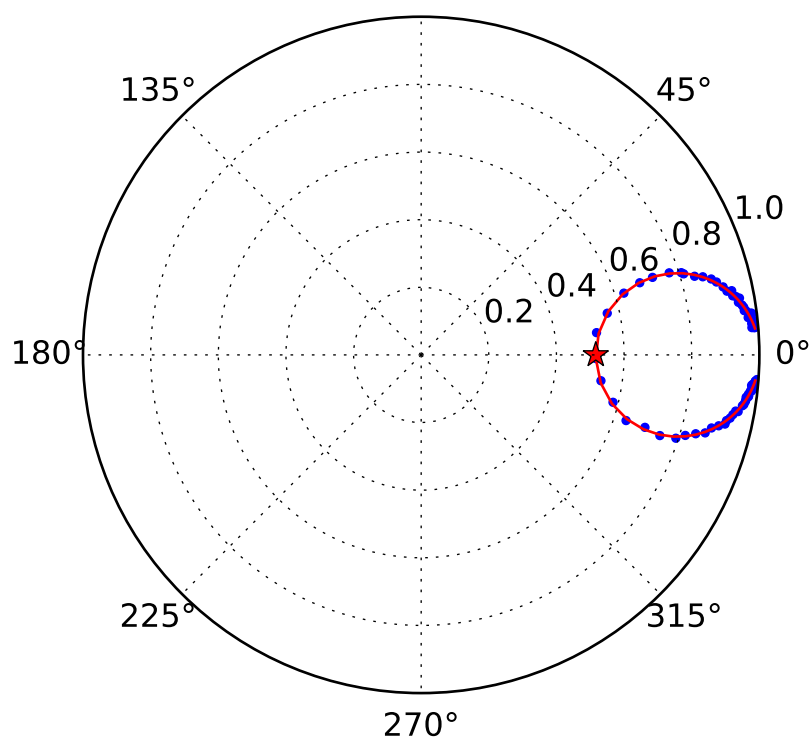
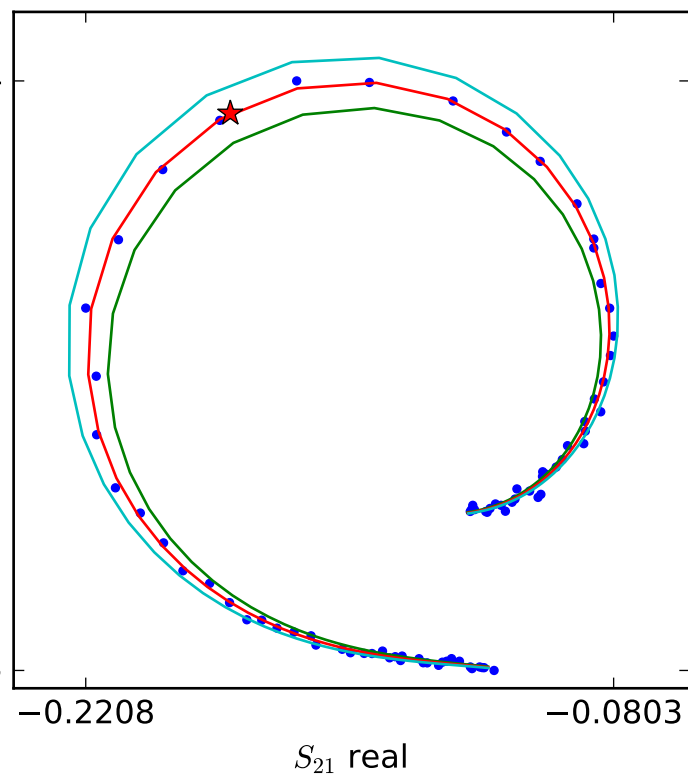
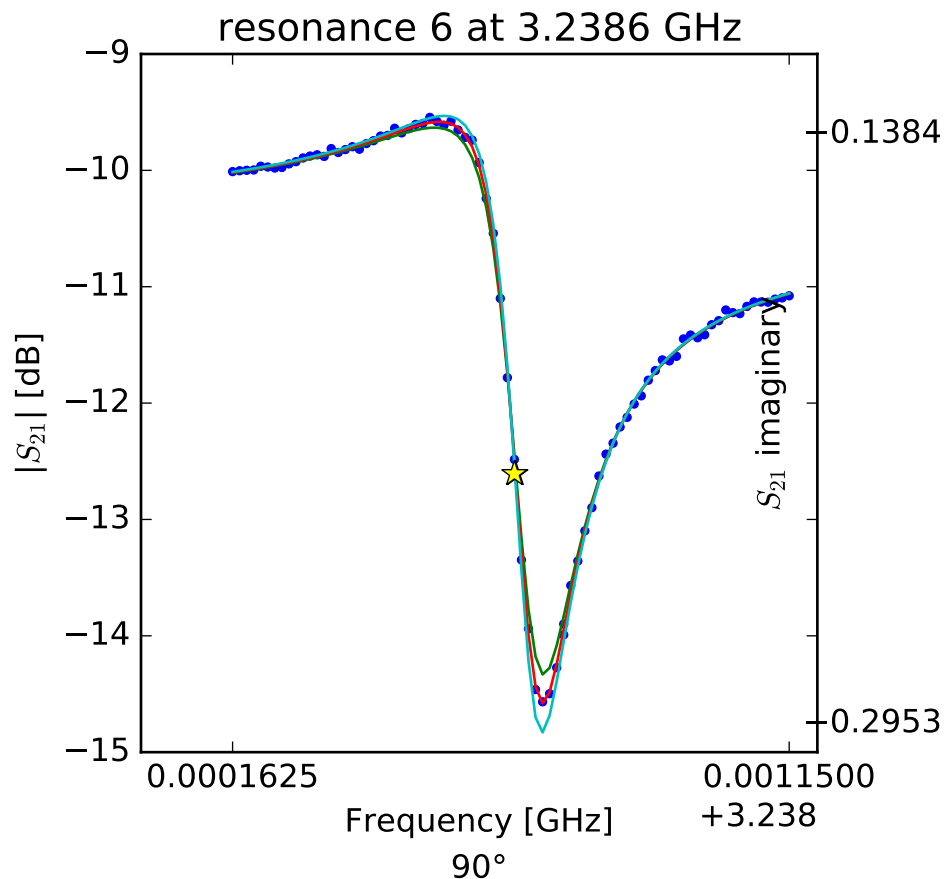
$$S_{21}(f) = ae^{-2\pi jf\tau} \left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r \left(\frac{f-f_r}{f_r} \right)} \right]$$

$$\begin{aligned} f_r &= 3.20989824457 \\ Q_r &= 1998.2822706 \\ Q_c &= 91994.9070434 \\ a &= (-0.23313745599 - 0.05753672338j) \\ \phi_0 &= -2.19408860962 \\ \tau &= 25.5640195669 \end{aligned}$$



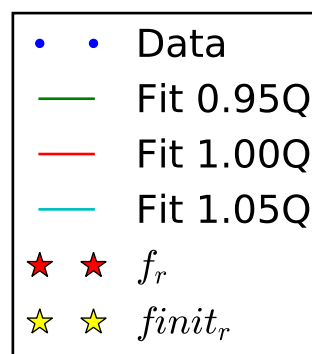
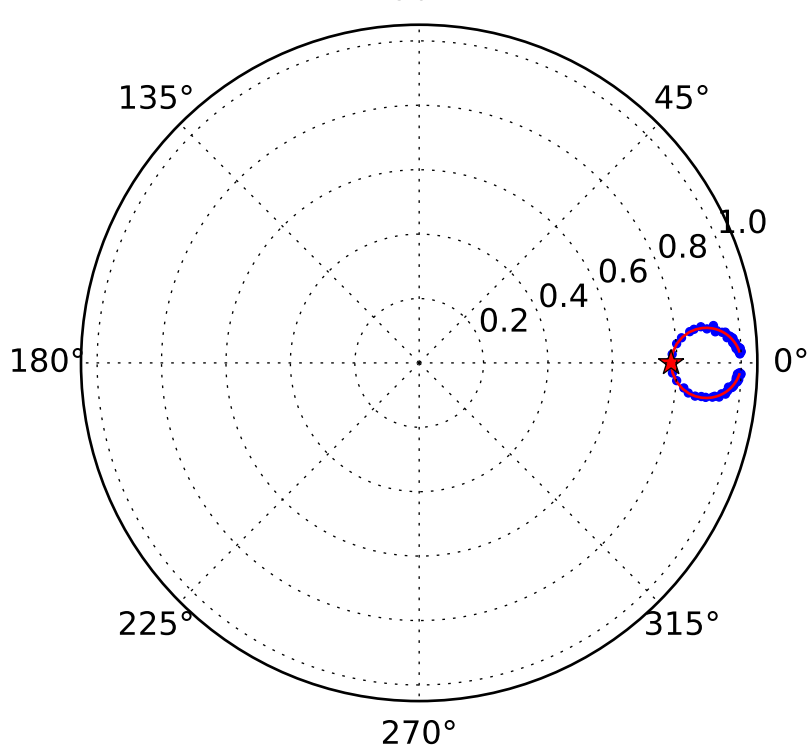
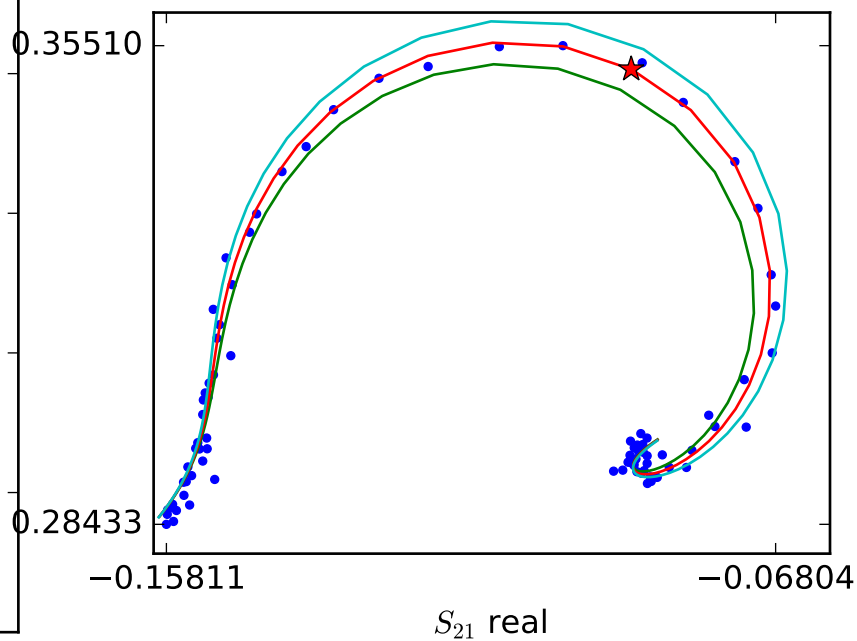
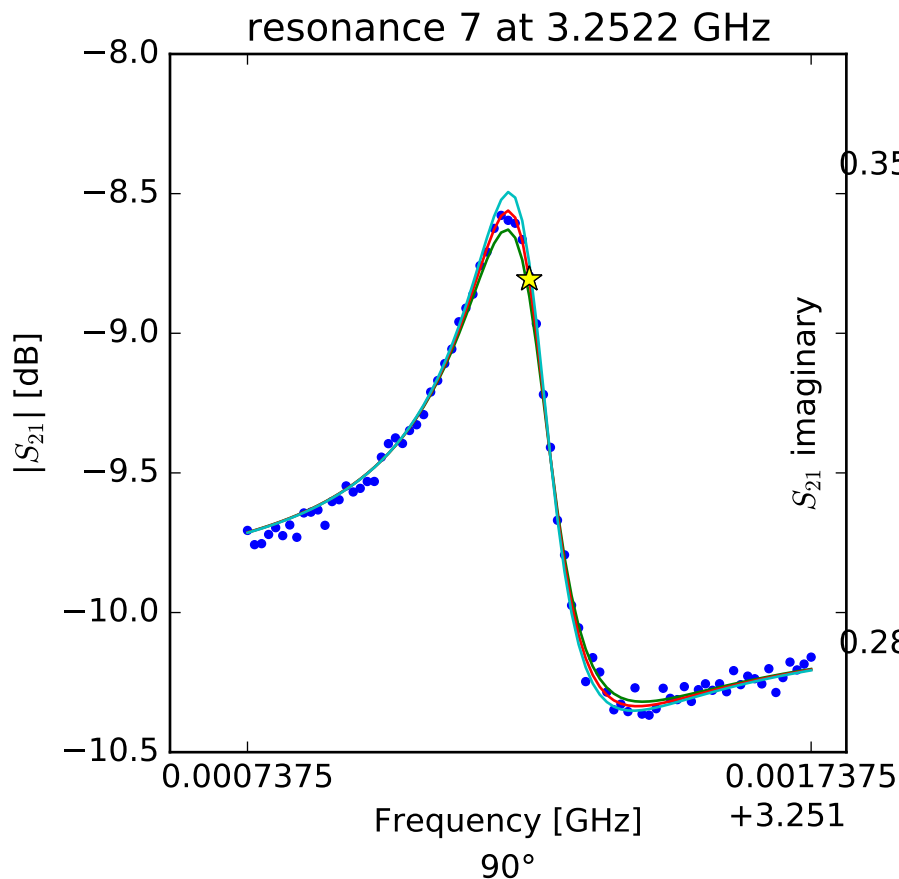
$$S_{21}(f) = ae^{-2\pi jf\tau} \left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r \left(\frac{f-f_r}{f_r} \right)} \right]$$

$$\begin{aligned} f_r &= 3.22394477378 \\ Q_r &= 19224.3383616 \\ Q_c &= 44869.1986527 \\ a &= (-0.208963237595 + 0.18908912025j) \\ \phi_0 &= 0.00280241034119 \\ \tau &= 29.2440706798 \end{aligned}$$



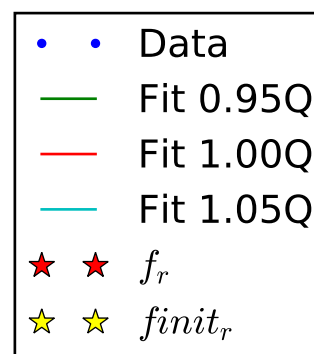
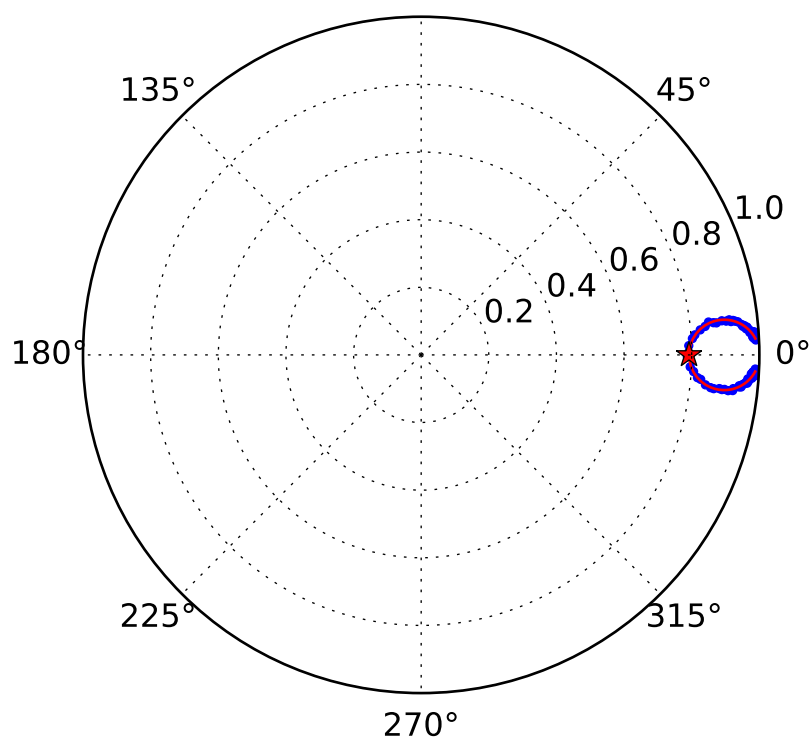
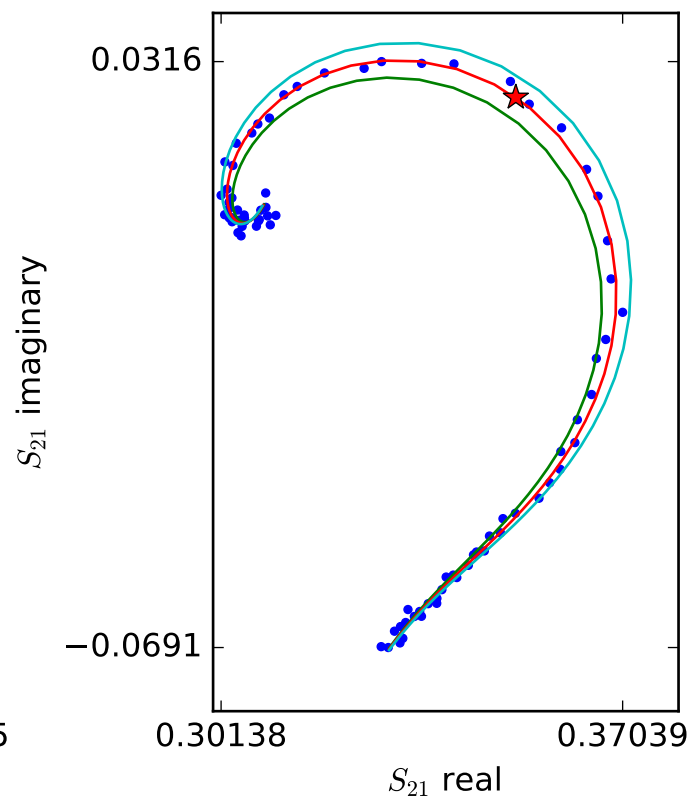
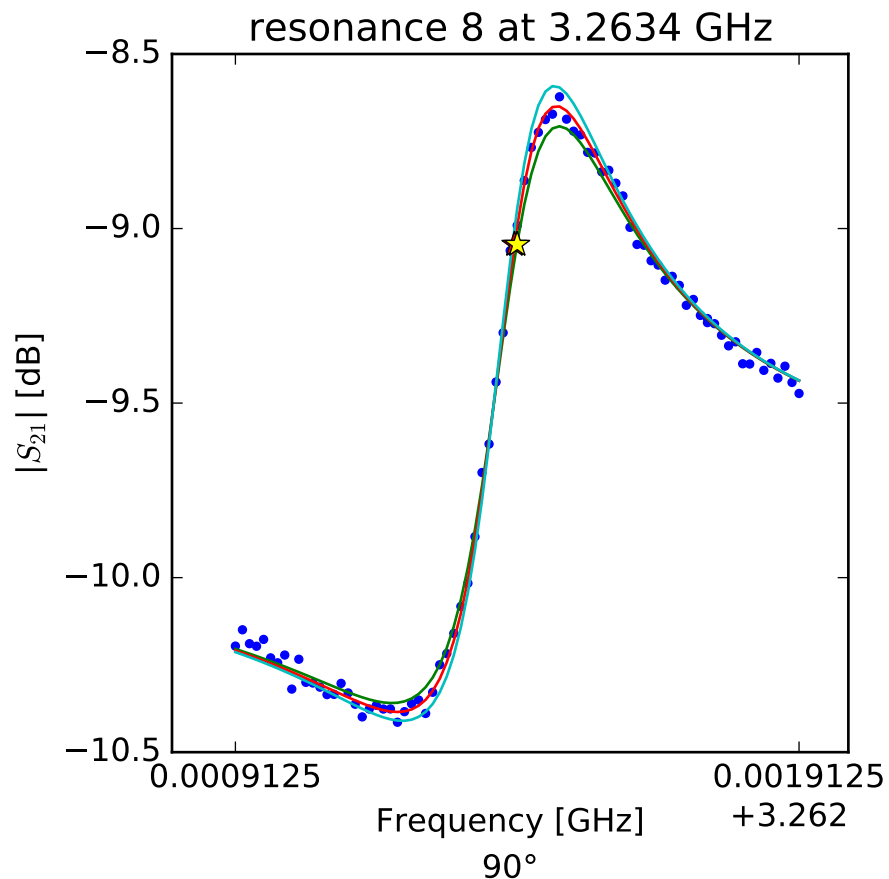
$$S_{21}(f) = ae^{-2\pi jf\tau} \left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r \left(\frac{f-f_r}{f_r} \right)} \right]$$

$$\begin{aligned} f_r &= 3.23866425247 \\ Q_r &= 20054.631171 \\ Q_c &= 41455.0031778 \\ a &= (-0.23785037243 + 0.183016611526j) \\ \phi_0 &= 0.868529265222 \\ \tau &= 27.3906697435 \end{aligned}$$



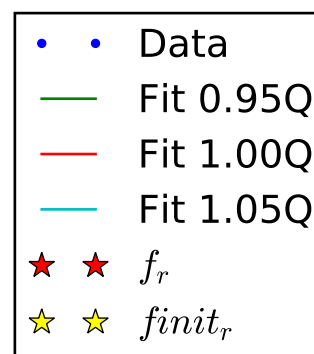
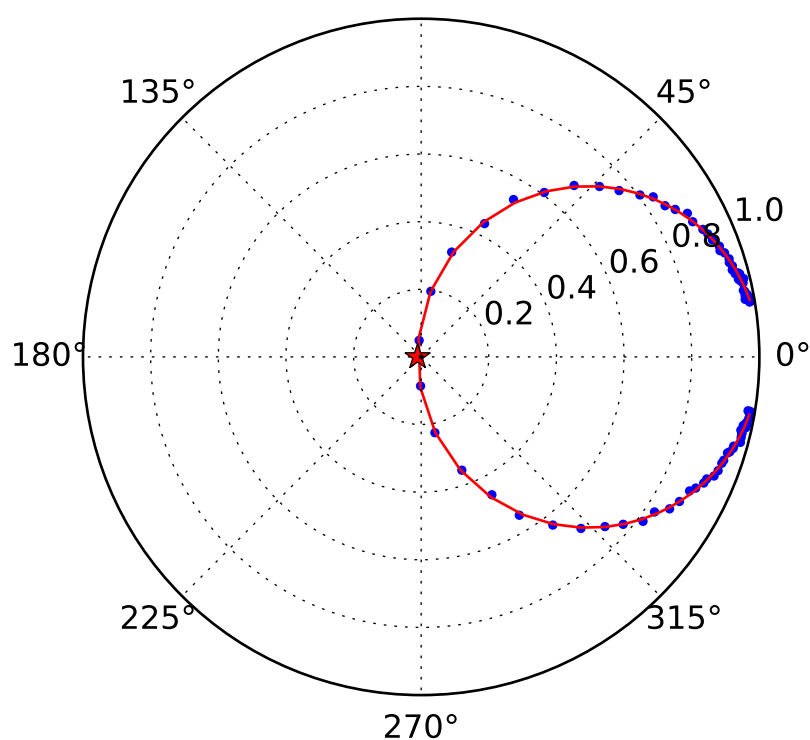
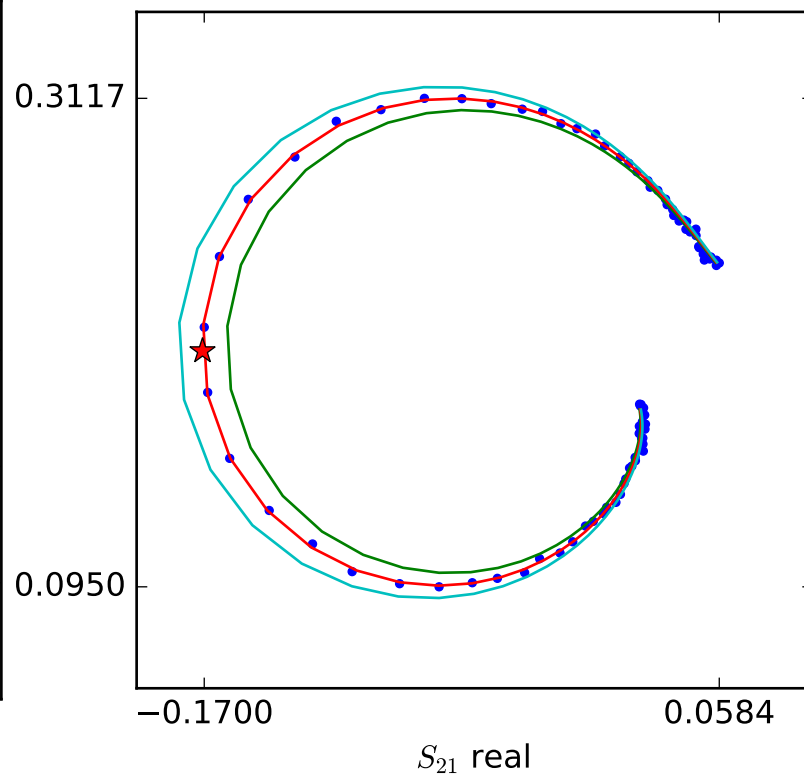
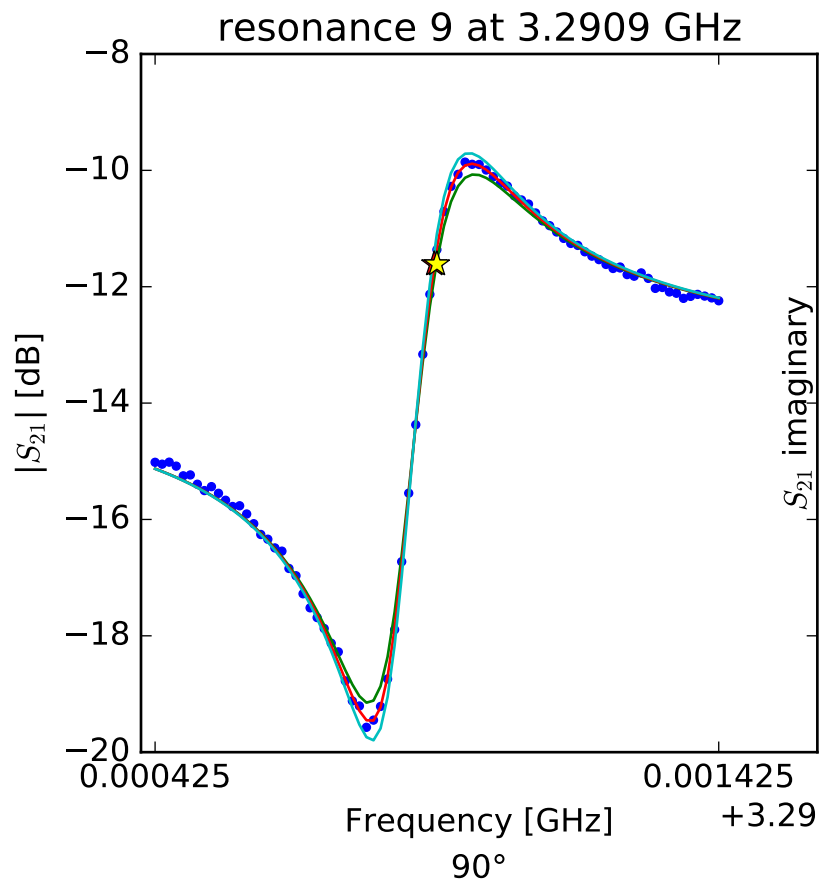
$$S_{21}(f) = ae^{-2\pi jf\tau} \left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r \left(\frac{f-f_r}{f_r} \right)} \right]$$

$$\begin{aligned} f_r &= 3.25223735836 \\ Q_r &= 19147.516319 \\ Q_c &= 87887.7891629 \\ a &= (-0.234538766981 - 0.212639989374j) \\ \phi_0 &= 2.22729892452 \\ \tau &= 29.303990592 \end{aligned}$$



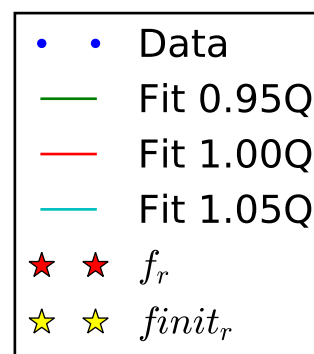
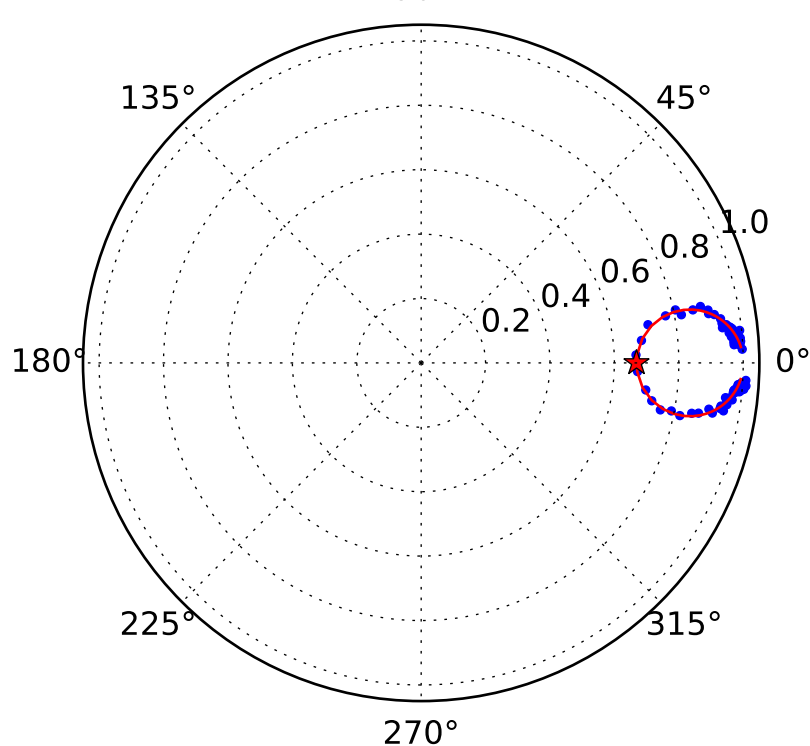
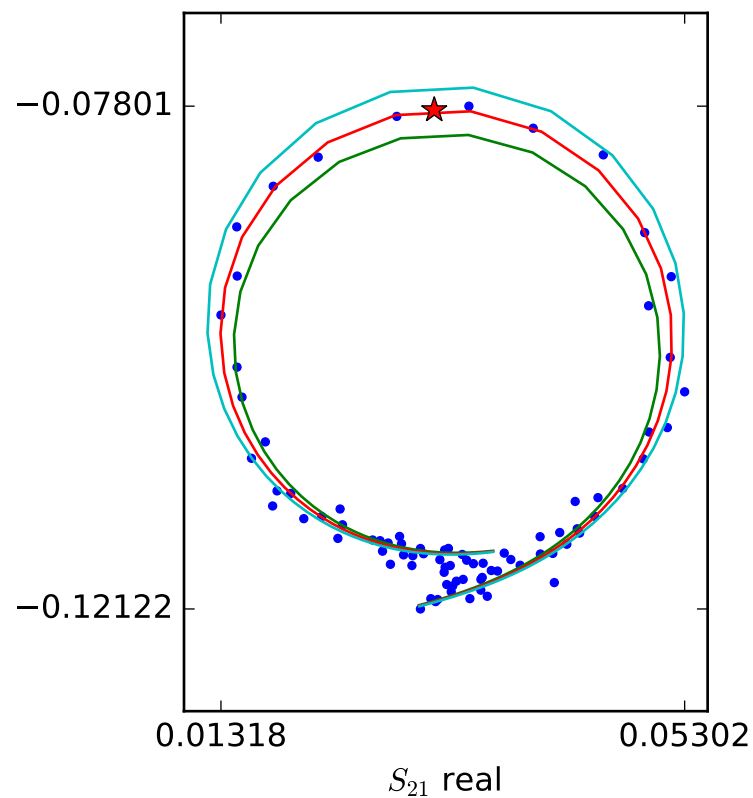
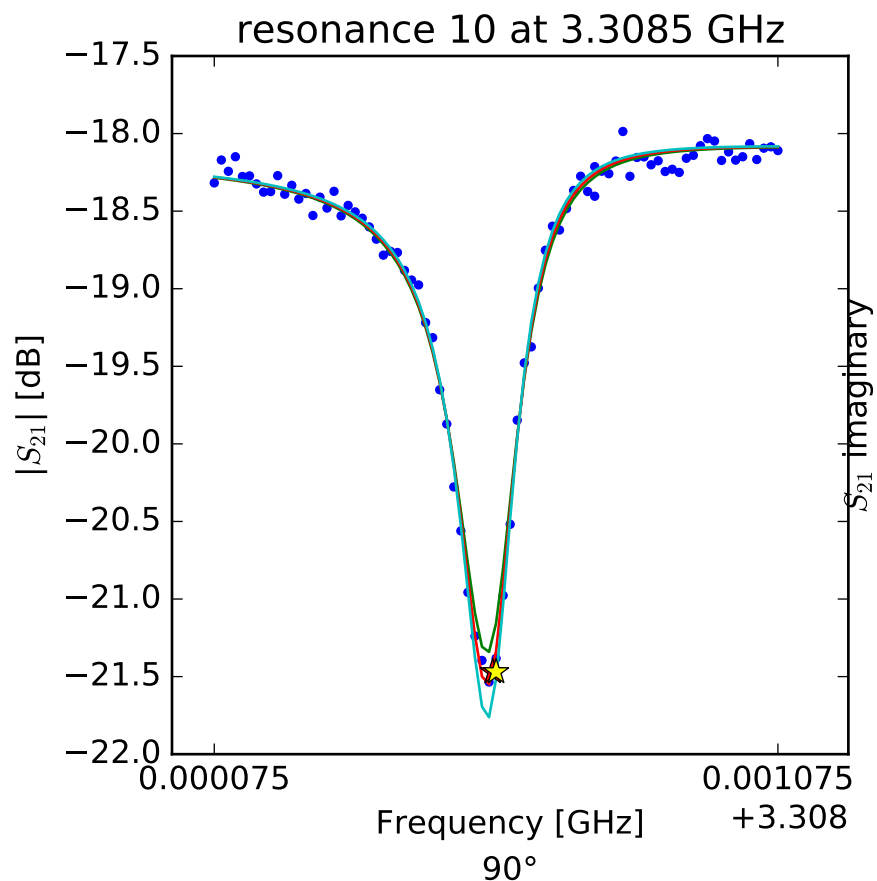
$$S_{21}(f) = ae^{-2\pi jf\tau} \left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r \left(\frac{f-f_r}{f_r} \right)} \right]$$

$$\begin{aligned} f_r &= 3.2634075488 \\ Q_r &= 13091.8258687 \\ Q_c &= 62918.7619624 \\ a &= (0.178906105851 - 0.267260503406j) \\ \phi_0 &= -1.9681912695 \\ \tau &= 30.2935942301 \end{aligned}$$



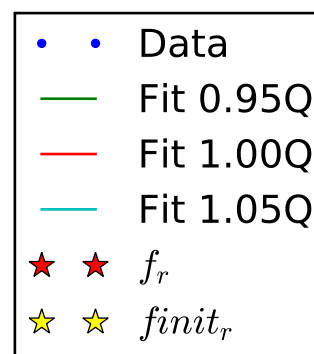
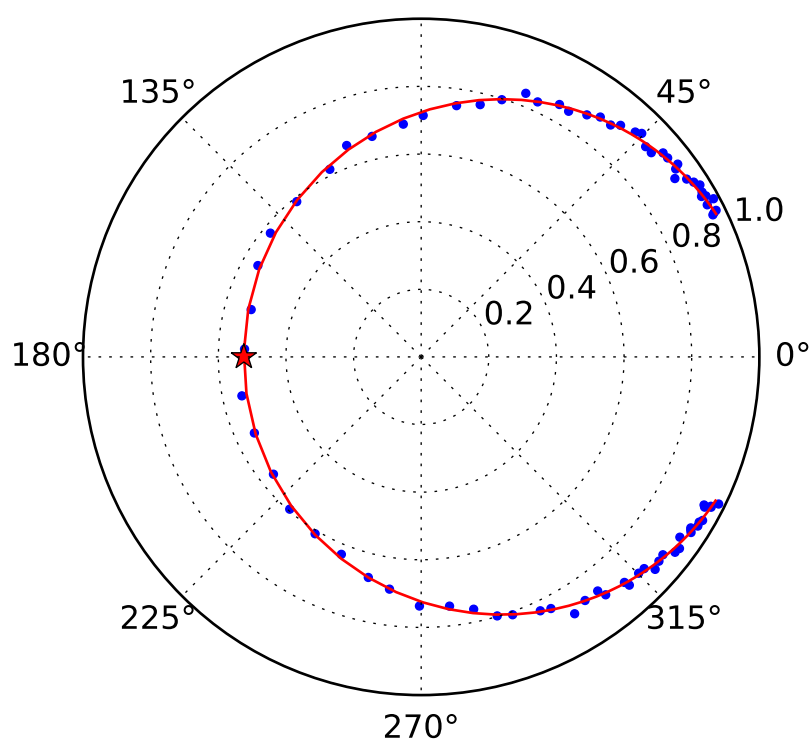
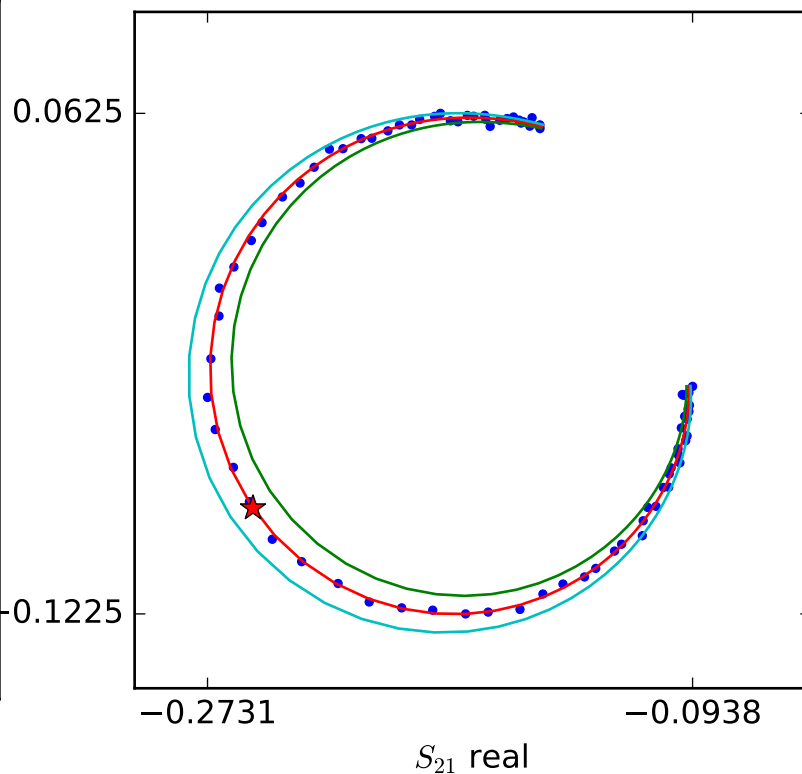
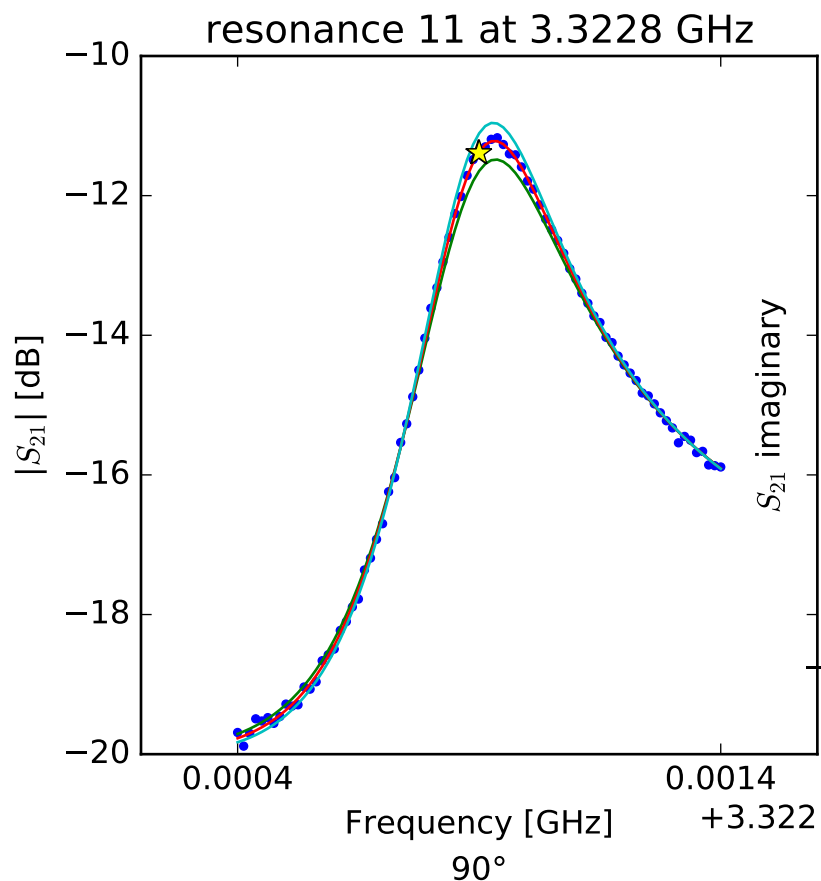
$$S_{21}(f) = ae^{-2\pi jf\tau} \left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r \left(\frac{f-f_r}{f_r} \right)} \right]$$

$$\begin{aligned} f_r &= 3.29092028939 \\ Q_r &= 18999.4125209 \\ Q_c &= 18799.6093063 \\ a &= (0.180021320296 - 0.11195455427j) \\ \phi_0 &= -1.32806713204 \\ \tau &= 27.8627852473 \end{aligned}$$



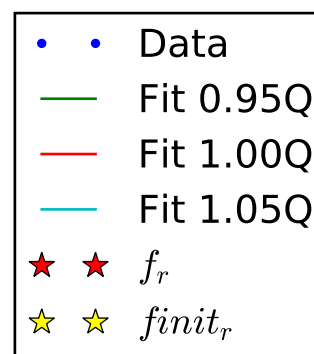
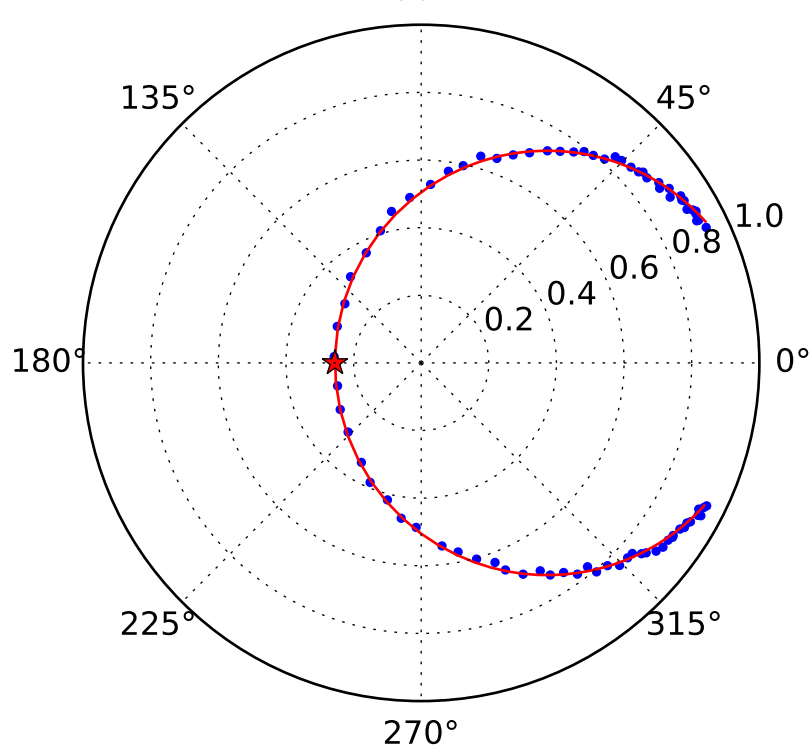
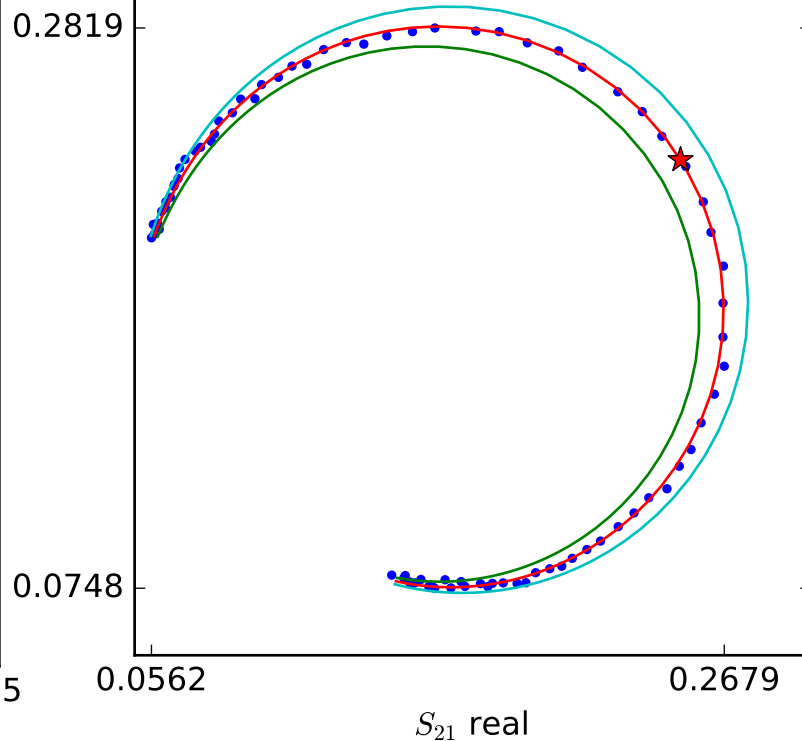
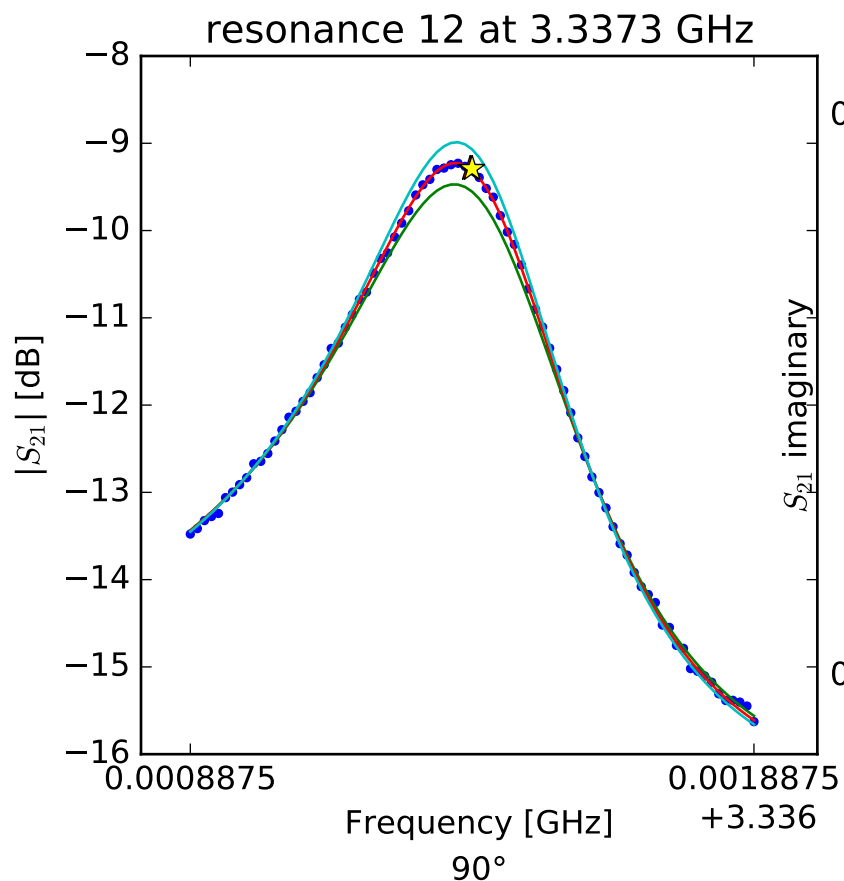
$$S_{21}(f) = ae^{-2\pi jf\tau} \left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r \left(\frac{f-f_r}{f_r} \right)} \right]$$

$$\begin{aligned} f_r &= 3.30856895916 \\ Q_r &= 21463.7959544 \\ Q_c &= 64751.4013924 \\ a &= (0.0815982955003 - 0.0934583018267j) \\ \phi_0 &= -0.221724934846 \\ \tau &= 25.1076682444 \end{aligned}$$



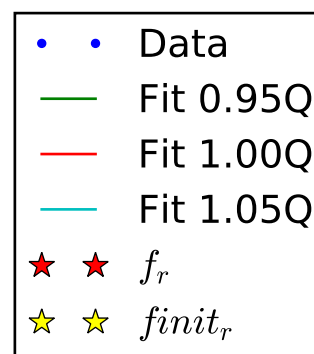
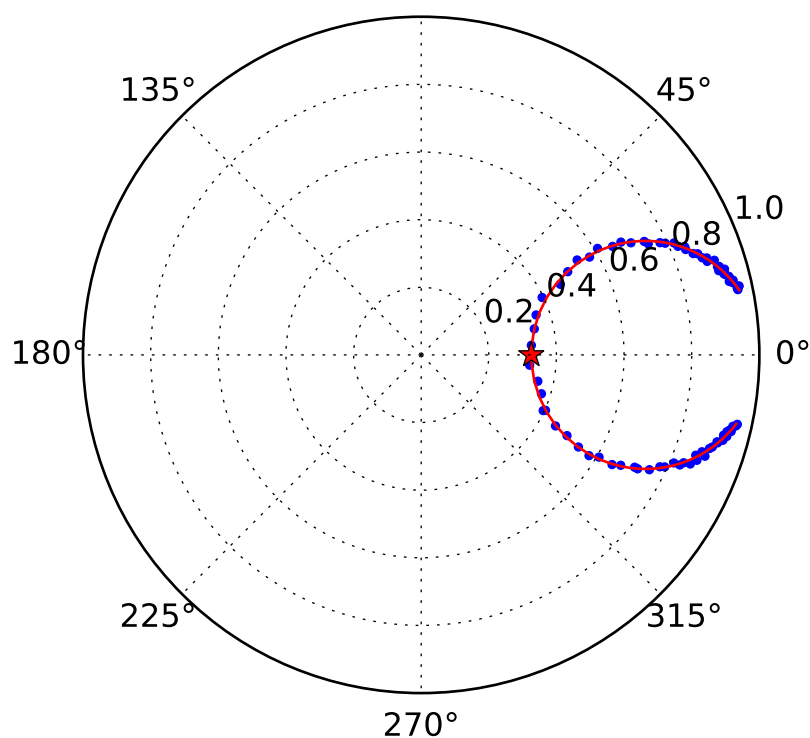
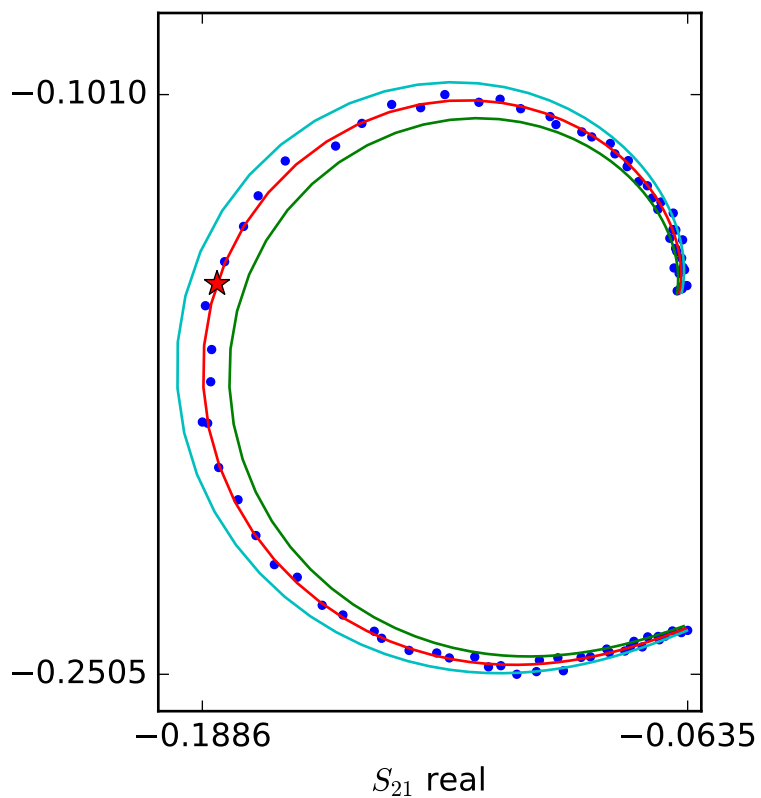
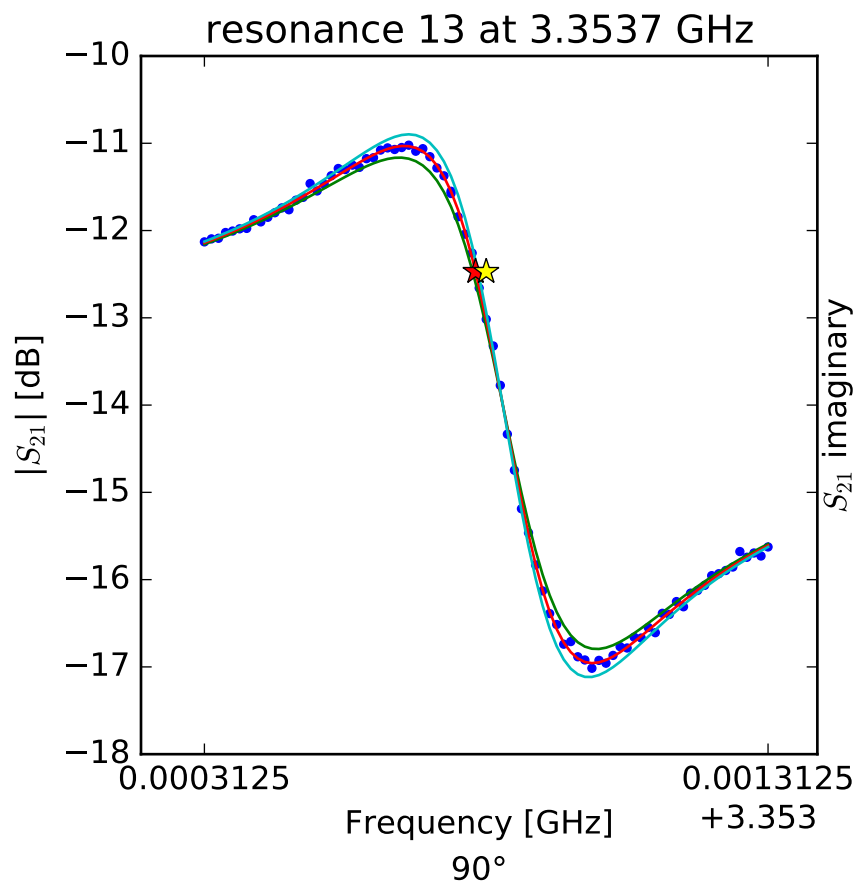
$$S_{21}(f) = ae^{-2\pi jf\tau} \left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r \left(\frac{f-f_r}{f_r} \right)} \right]$$

$$\begin{aligned} f_r &= 3.32289835558 \\ Q_r &= 10939.0328117 \\ Q_c &= 7175.87130672 \\ a &= (-0.0832963115348 + 0.078411726948j) \\ \phi_0 &= -2.38889375212 \\ \tau &= 21.0366561613 \end{aligned}$$



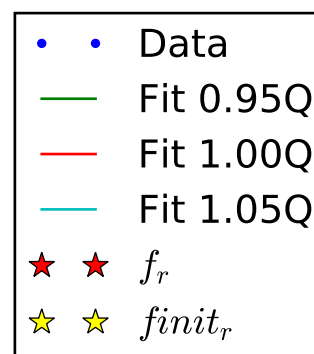
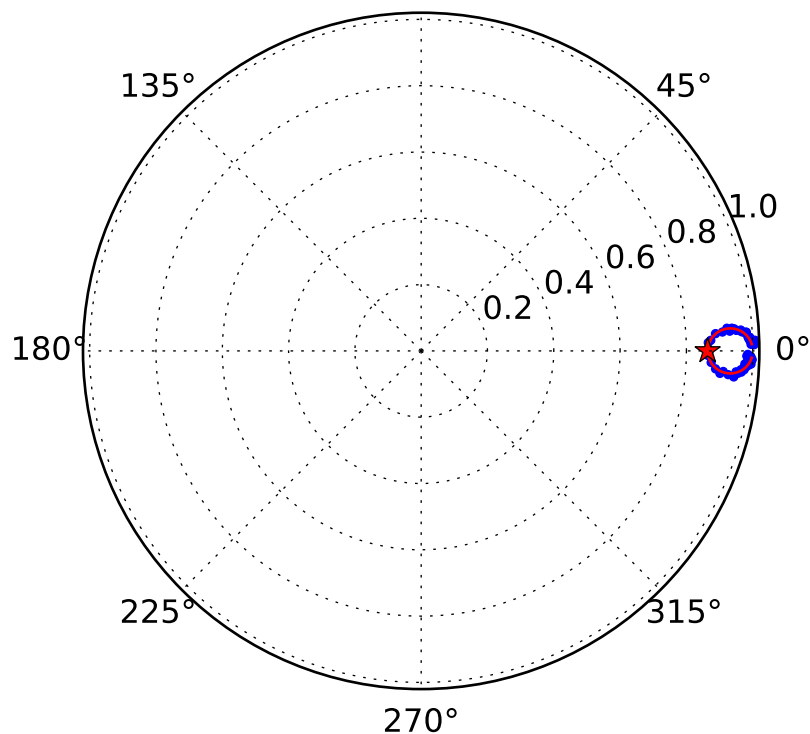
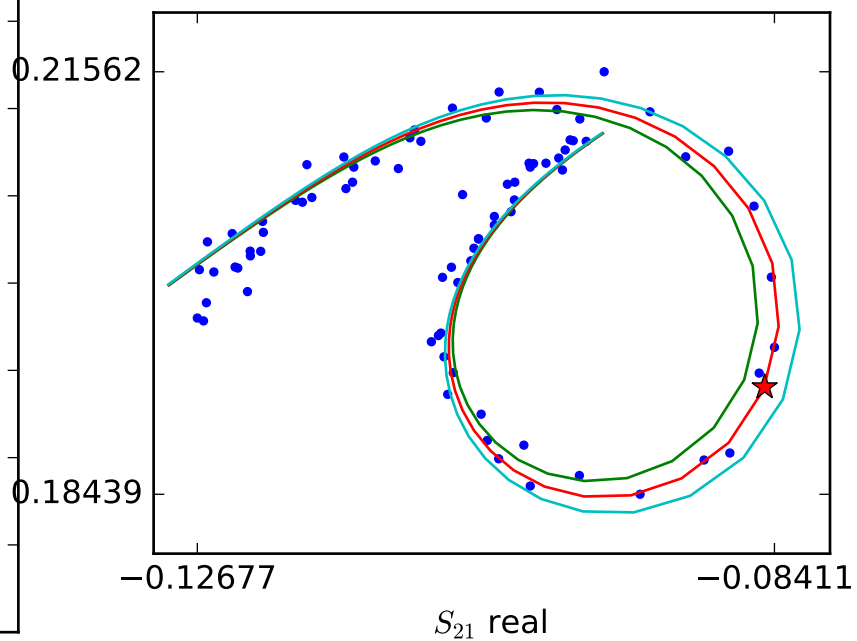
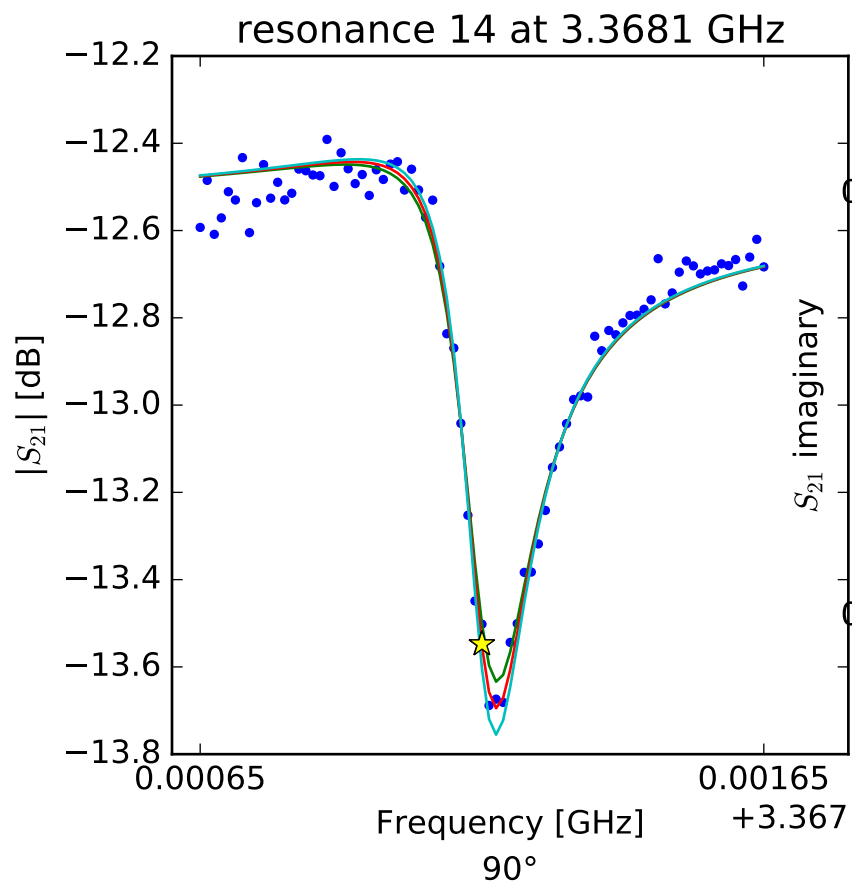
$$S_{21}(f) = ae^{-2\pi jf\tau} \left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r \left(\frac{f-f_r}{f_r} \right)} \right]$$

$$\begin{aligned} f_r &= 3.337384141 \\ Q_r &= 8688.18770475 \\ Q_c &= 6922.50870962 \\ a &= (-0.125688615993 - 0.0922688417937j) \\ \phi_0 &= 2.6984592002 \\ \tau &= 23.8038501944 \end{aligned}$$



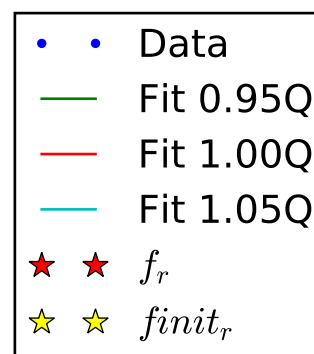
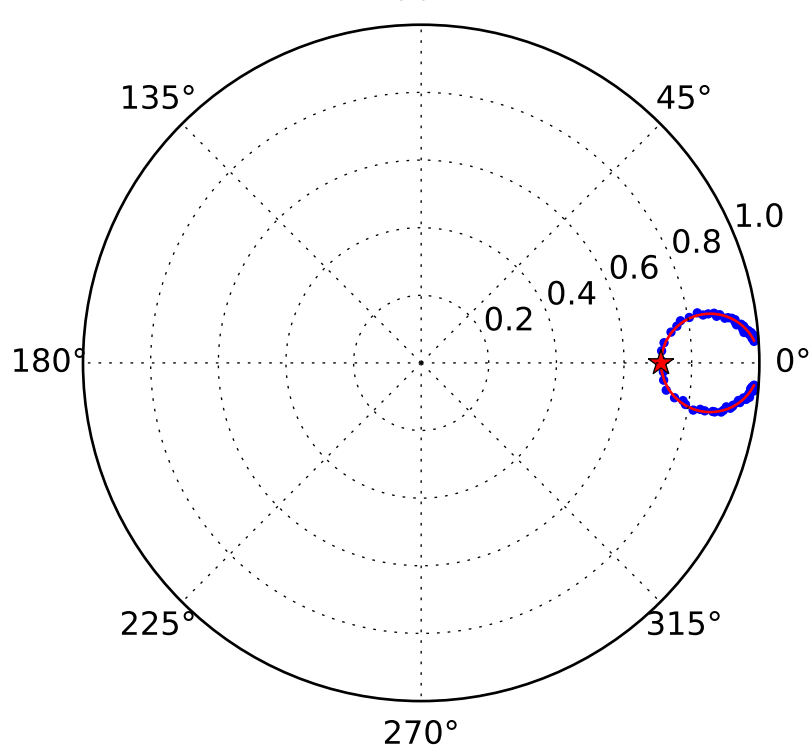
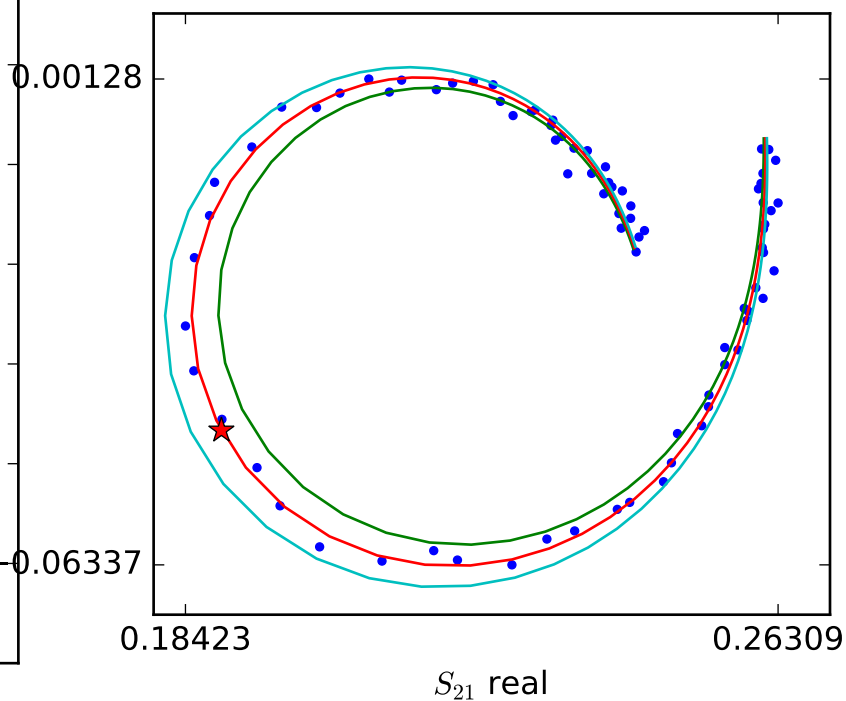
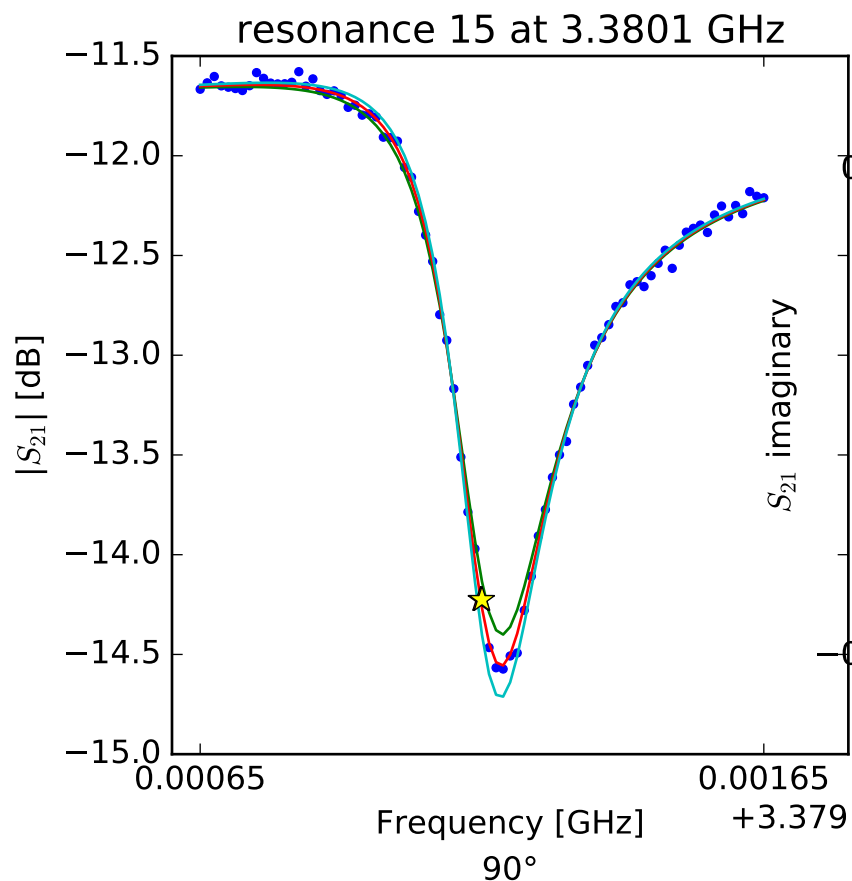
$$S_{21}(f) = ae^{-2\pi jf\tau} \left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r \left(\frac{f-f_r}{f_r} \right)} \right]$$

$$\begin{aligned} f_r &= 3.35379355189 \\ Q_r &= 10361.398677 \\ Q_c &= 15363.9393878 \\ a &= (-0.117444585513 + 0.169191397977j) \\ \phi_0 &= 1.48154058554 \\ \tau &= 26.1314334487 \end{aligned}$$



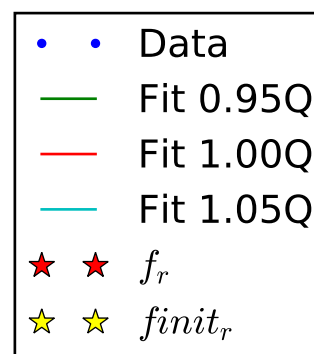
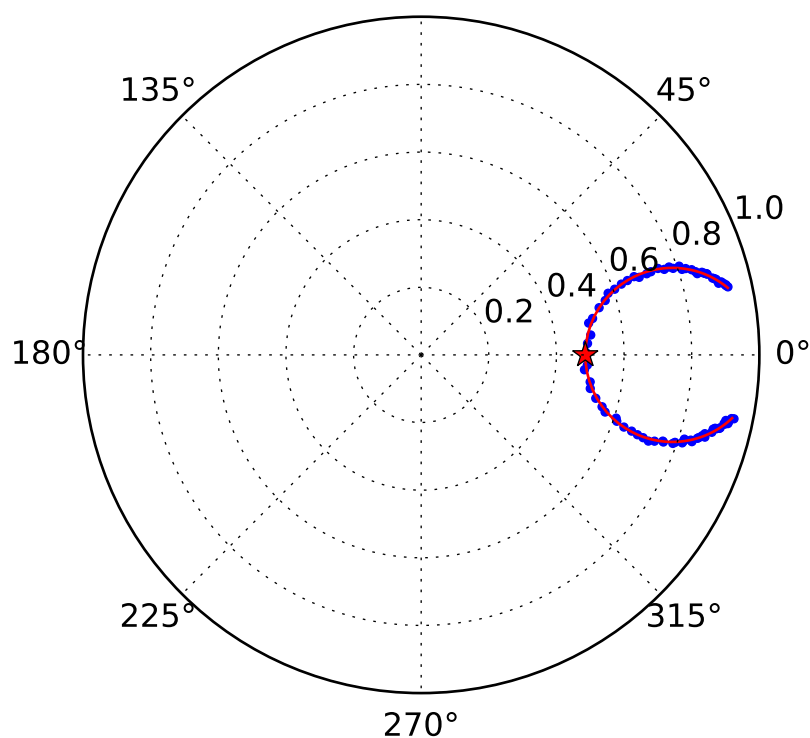
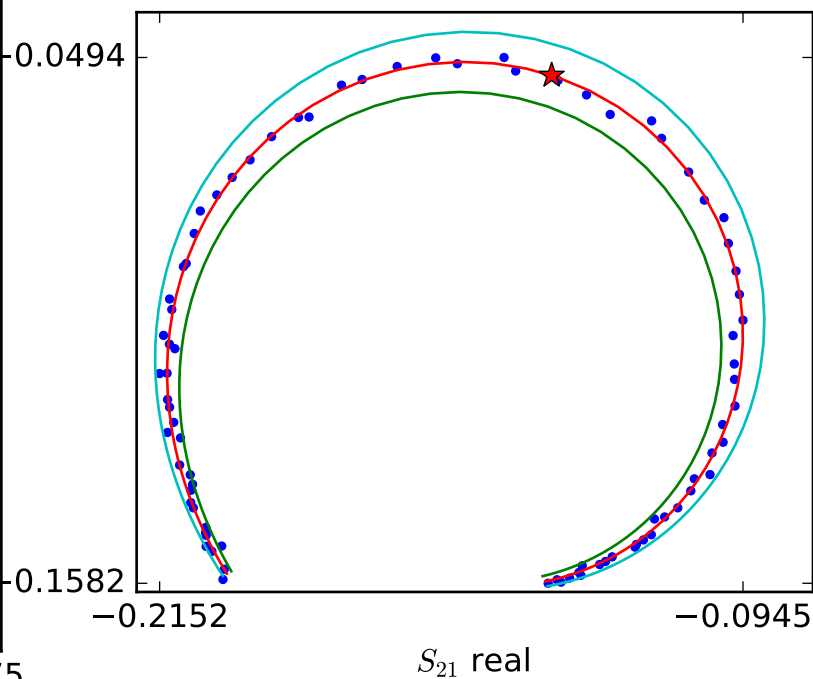
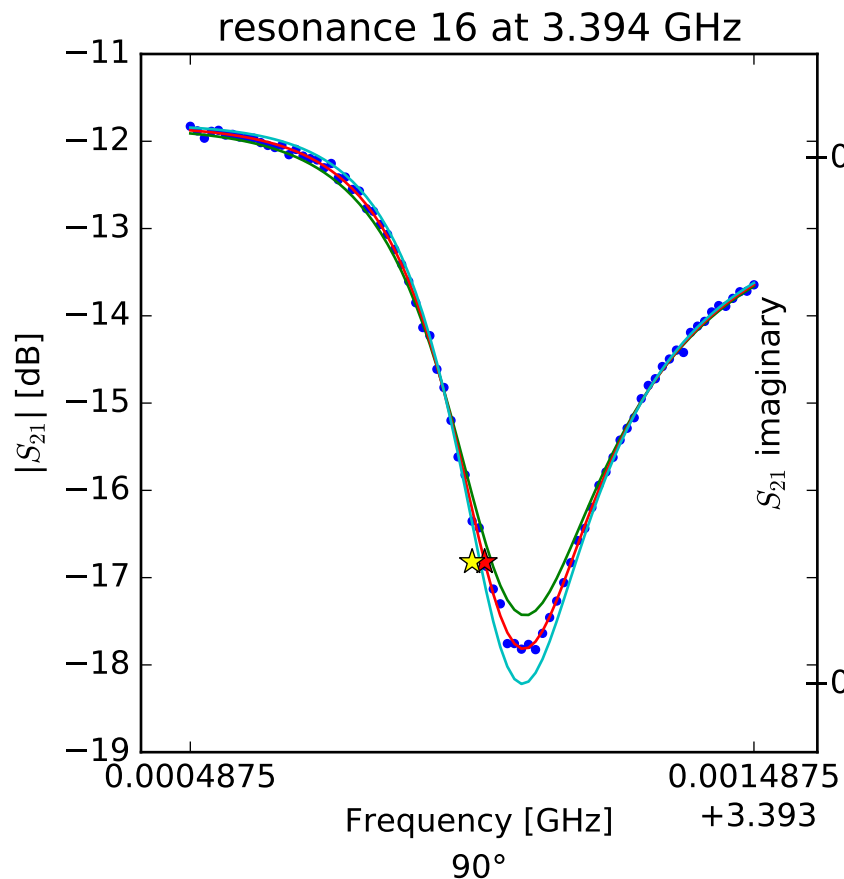
$$S_{21}(f) = ae^{-2\pi jf\tau} \left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r \left(\frac{f-f_r}{f_r} \right)} \right]$$

$$\begin{aligned} f_r &= 3.36814945398 \\ Q_r &= 21672.1690799 \\ Q_c &= 159331.461907 \\ a &= (0.217724214291 - 0.0900243695821j) \\ \phi_0 &= 0.612717778163 \\ \tau &= 28.0888691009 \end{aligned}$$



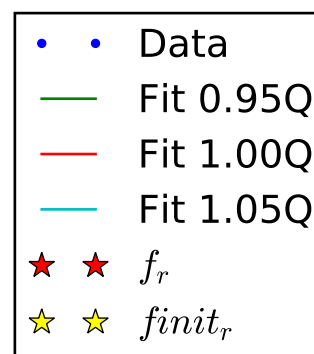
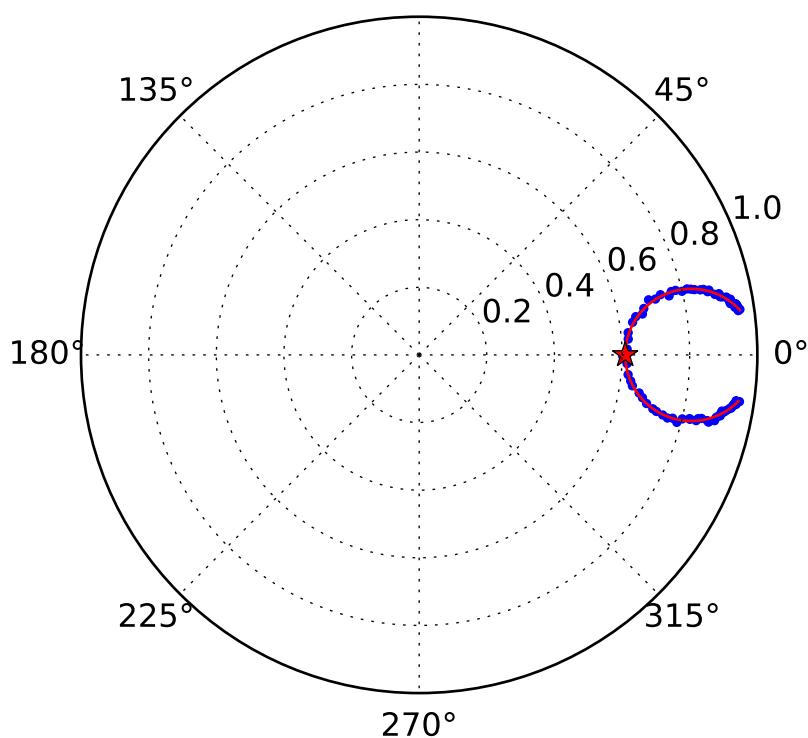
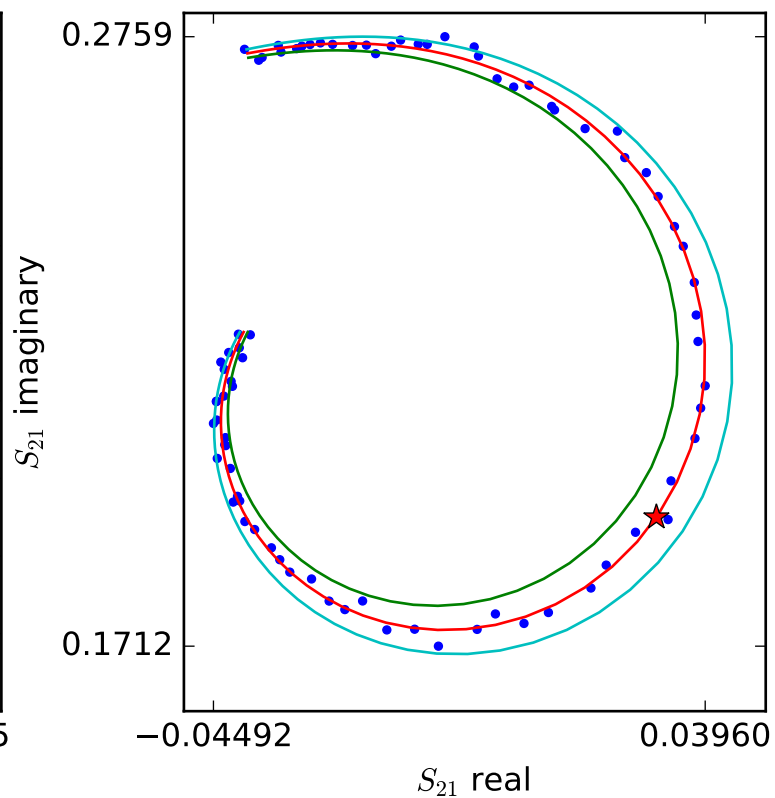
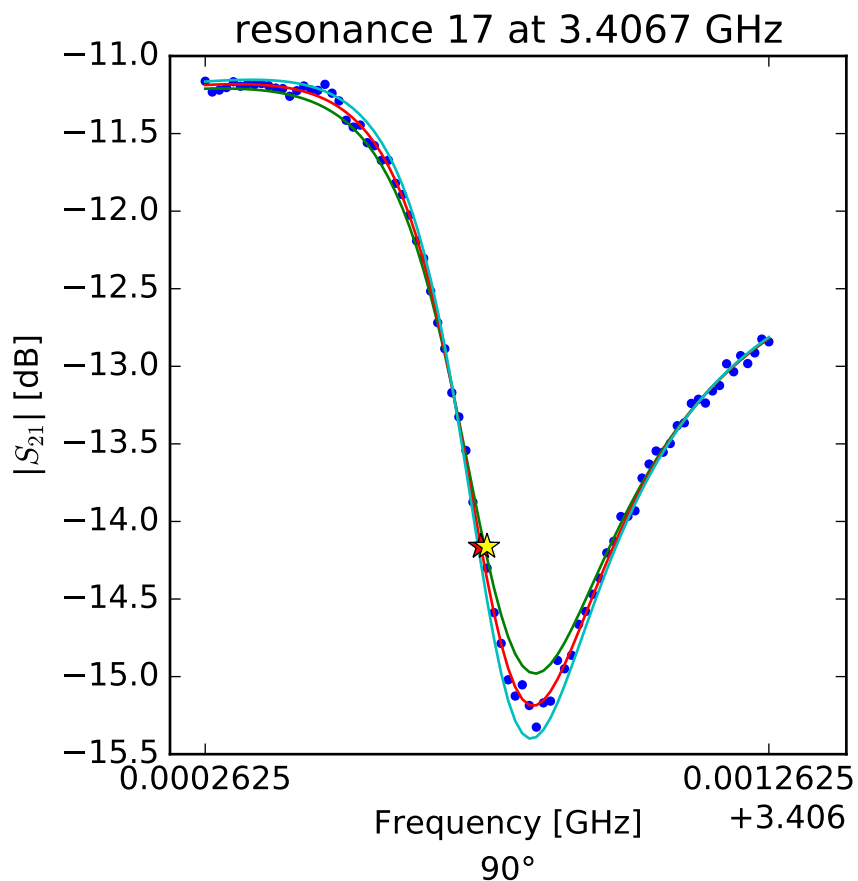
$$S_{21}(f) = ae^{-2\pi jf\tau} \left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r \left(\frac{f-f_r}{f_r} \right)} \right]$$

$$\begin{aligned} f_r &= 3.38014751834 \\ Q_r &= 14019.4161546 \\ Q_c &= 48177.6222837 \\ a &= (0.237644221294 + 0.0959884238408j) \\ \phi_0 &= 0.505096959461 \\ \tau &= 28.4215249418 \end{aligned}$$



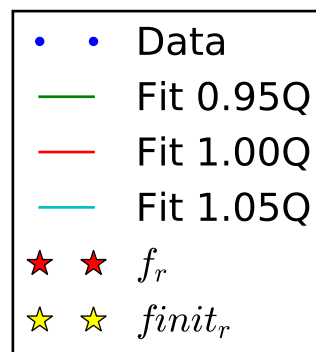
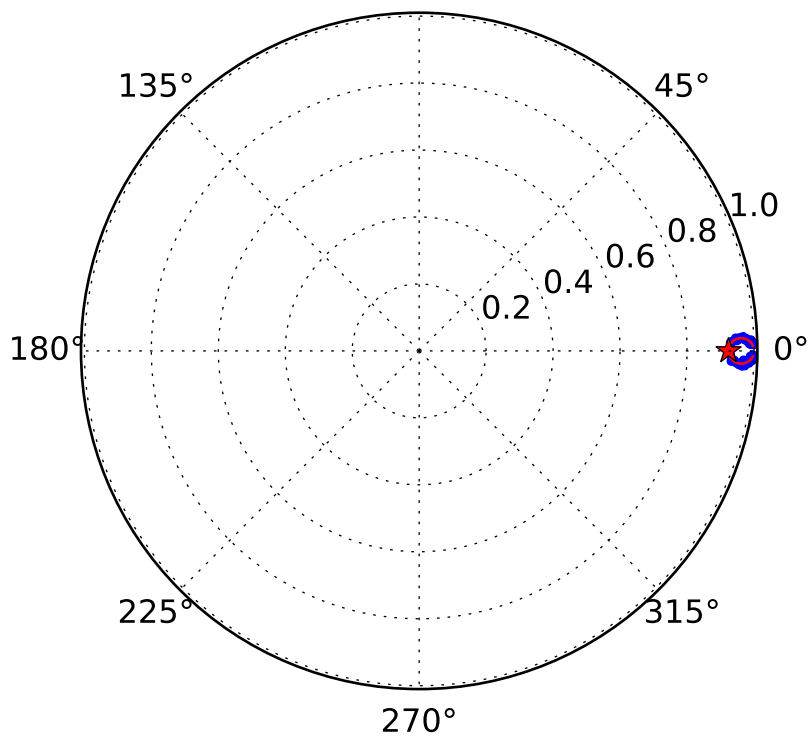
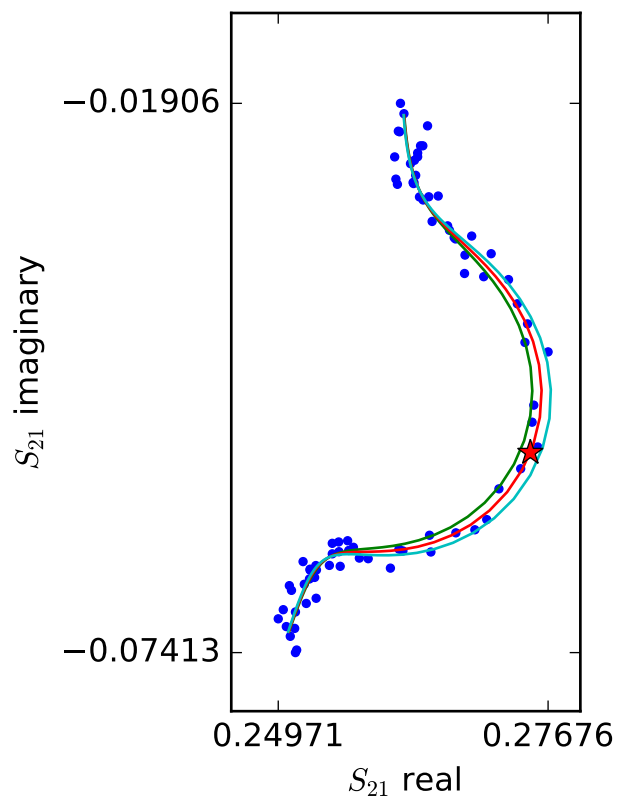
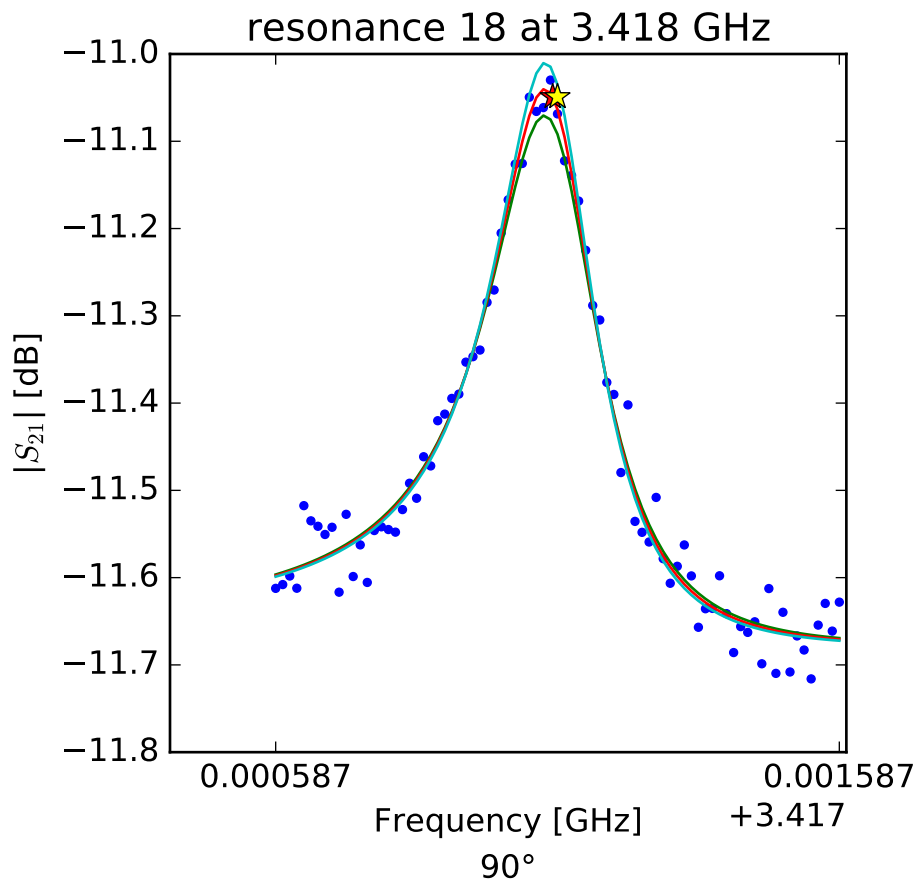
$$S_{21}(f) = ae^{-2\pi jf\tau} \left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r \left(\frac{f-f_r}{f_r} \right)} \right]$$

$$\begin{aligned} f_r &= 3.39400968526 \\ Q_r &= 7543.59680388 \\ Q_c &= 14656.278906 \\ a &= (-0.115803326731 - 0.218652274096j) \\ \phi_0 &= 0.45390981687 \\ \tau &= 25.6478990614 \end{aligned}$$



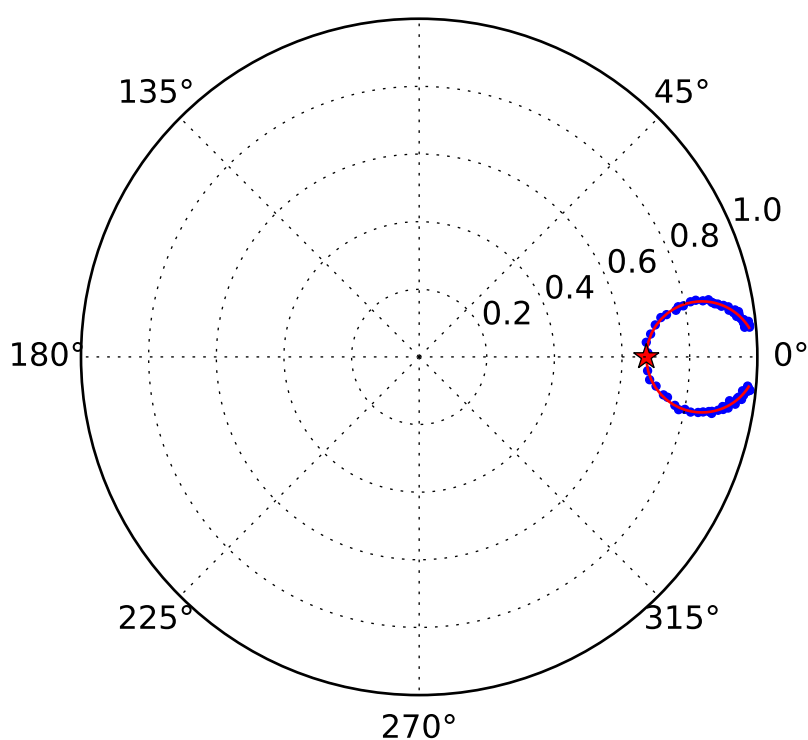
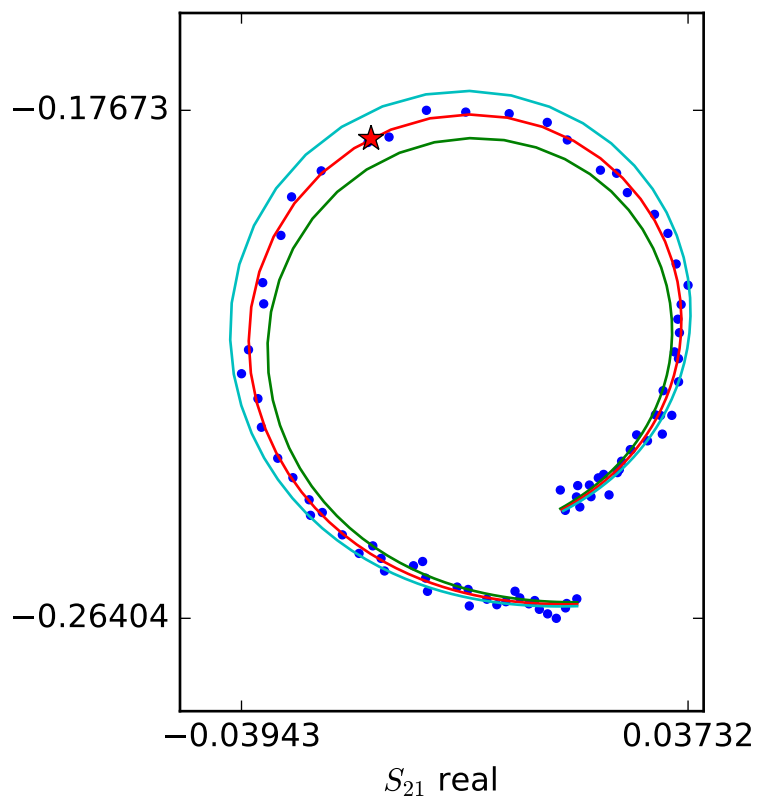
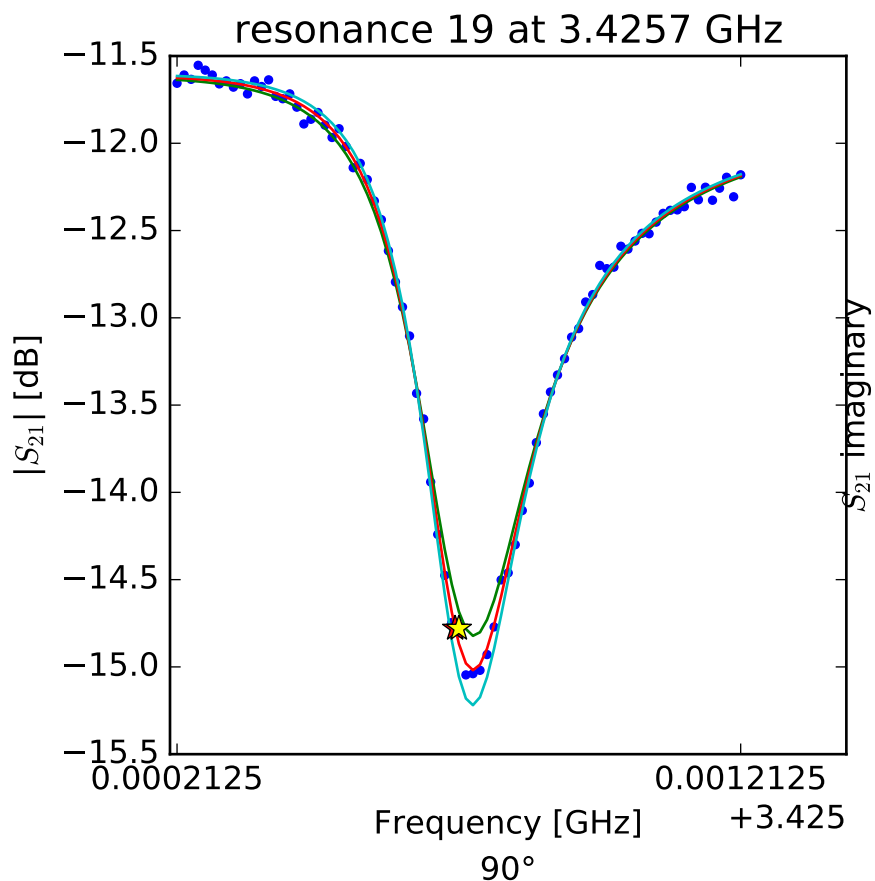
$$S_{21}(f) = ae^{-2\pi jf\tau} \left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r \left(\frac{f-f_r}{f_r} \right)} \right]$$

$$\begin{aligned} f_r &= 3.40675157823 \\ Q_r &= 8517.01297243 \\ Q_c &= 21788.8731771 \\ a &= (-0.258663243982 - 0.034514656597j) \\ \phi_0 &= 0.716578493913 \\ \tau &= 27.9565485607 \end{aligned}$$



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

$$\begin{aligned} f_r &= 3.41807894816 \\ Q_r &= 15207.3520431 \\ Q_c &= 200175.007609 \\ a &= (0.138851726477 + 0.221025937612j) \\ \phi_0 &= 2.88534258668 \\ \tau &= 27.2634934216 \end{aligned}$$

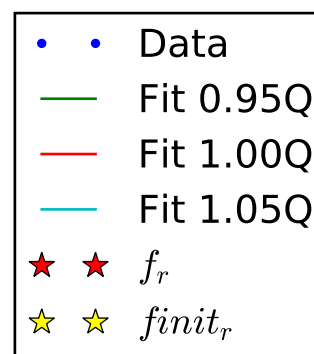
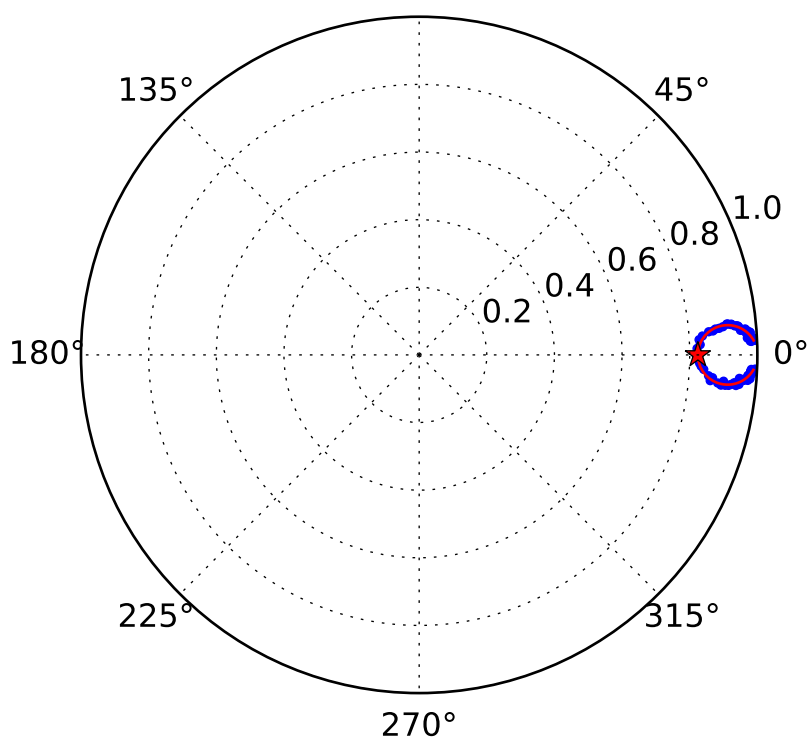
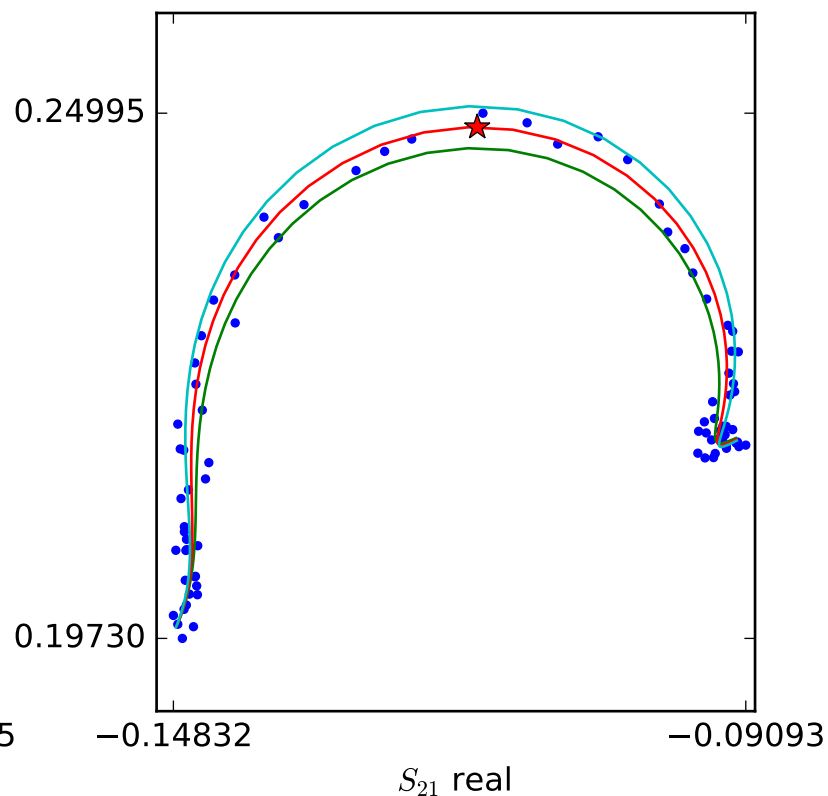
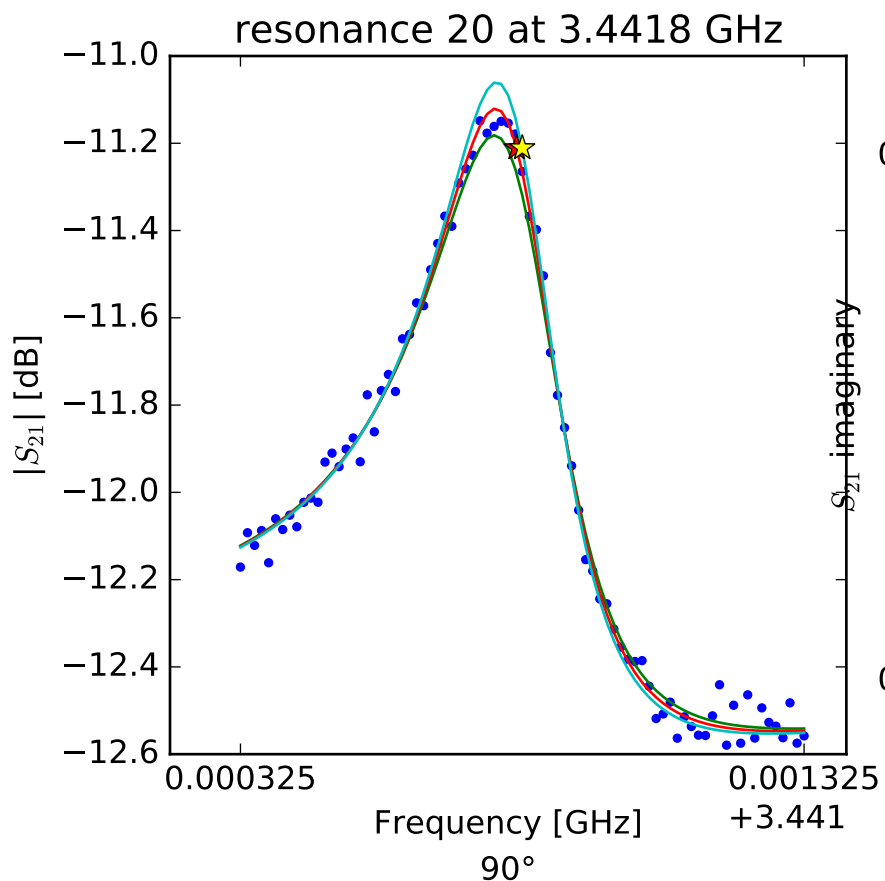


Legend:

- Data
- Fit 0.95Q
- Fit 1.00Q
- Fit 1.05Q
- ★ f_r
- ★ f_{init_r}

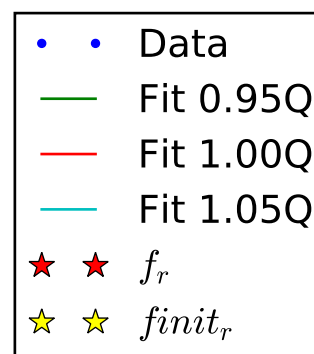
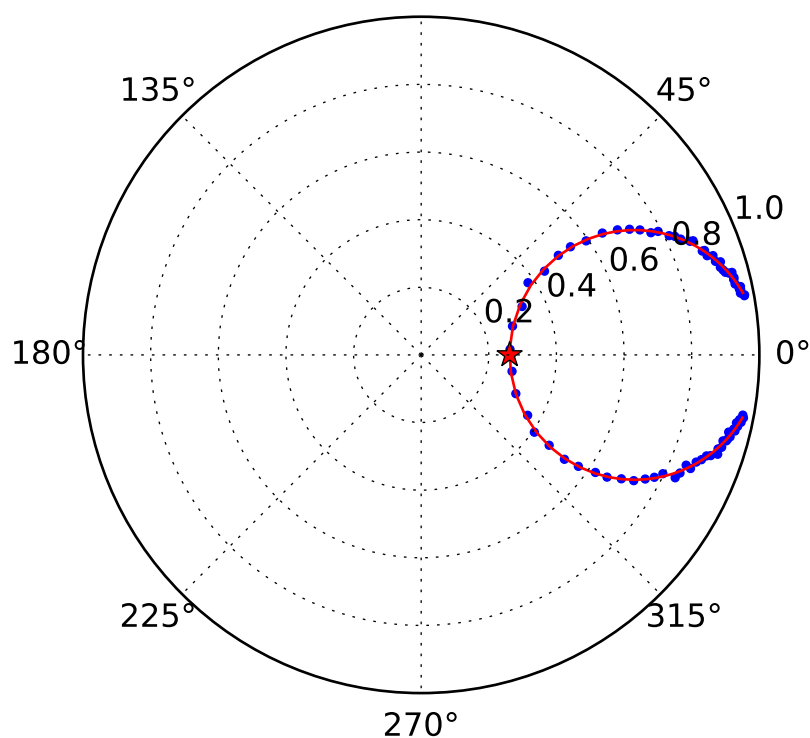
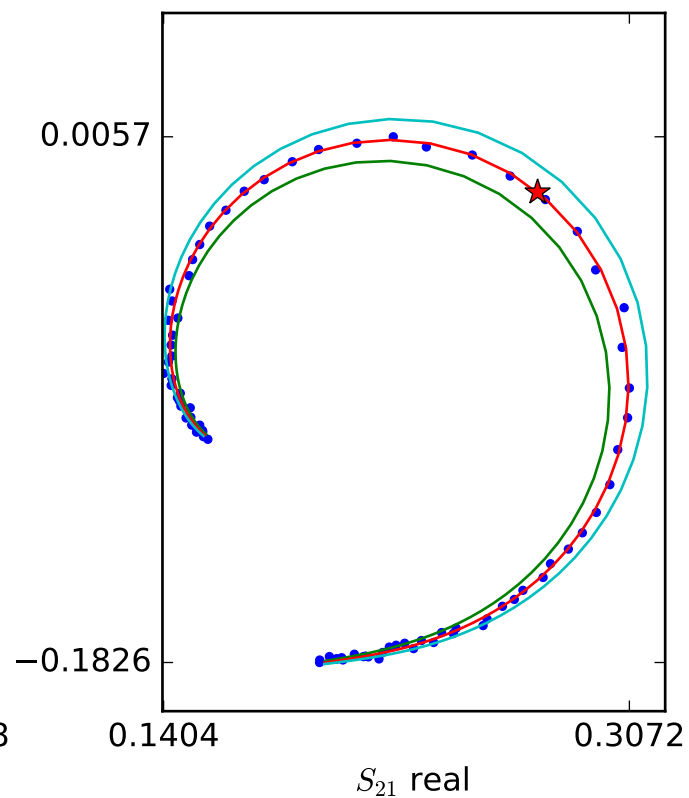
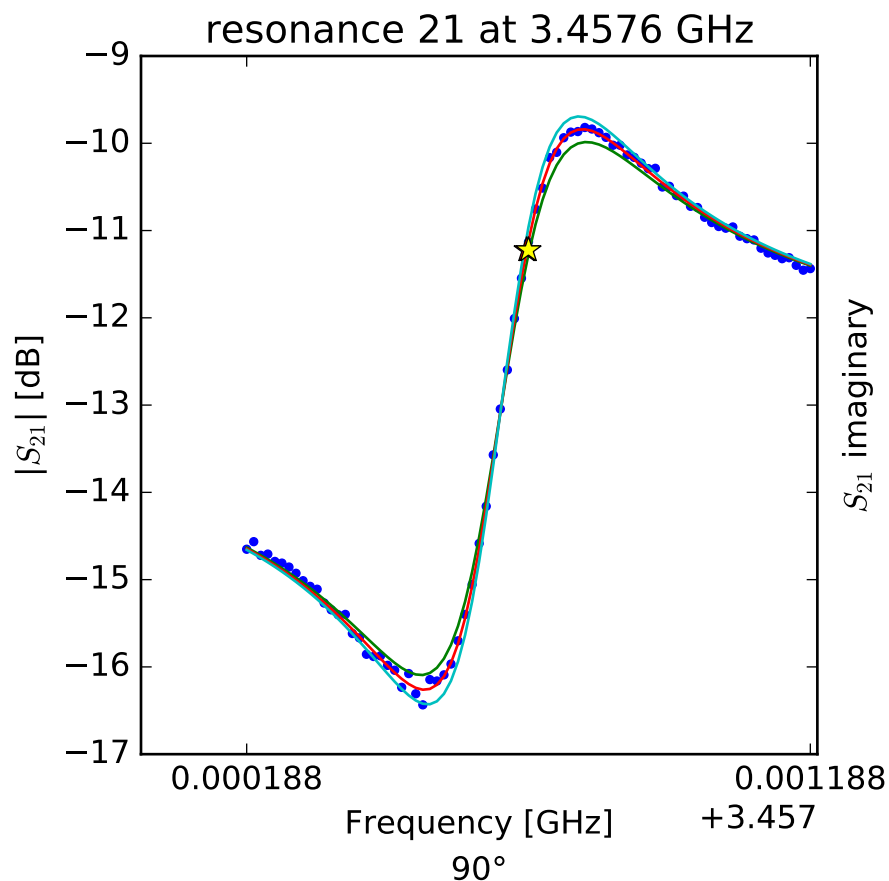
$$S_{21}(f) = ae^{-2\pi jf\tau} \left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r \left(\frac{f-f_r}{f_r} \right)} \right]$$

$f_r = 3.42570587613$
 $Q_r = 11953.1729493$
 $Q_c = 36395.9211342$
 $a = (-0.14236425423 + 0.216519579506j)$
 $\phi_0 = 0.369971838801$
 $\tau = 27.3171699002$



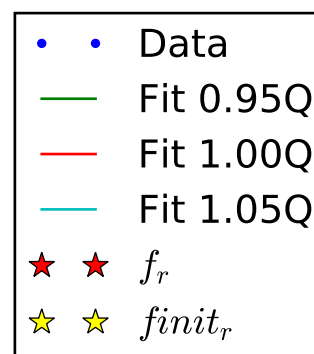
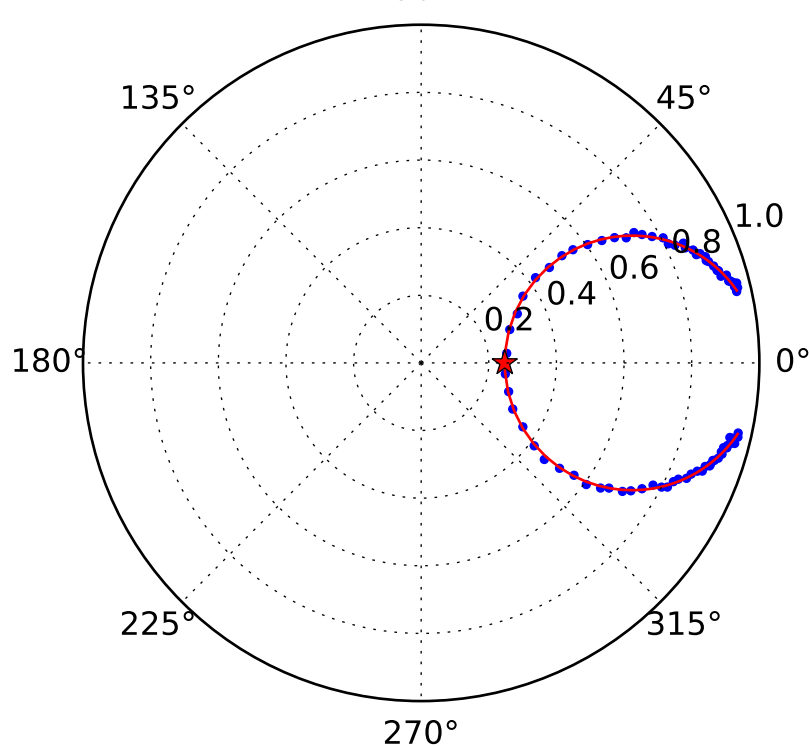
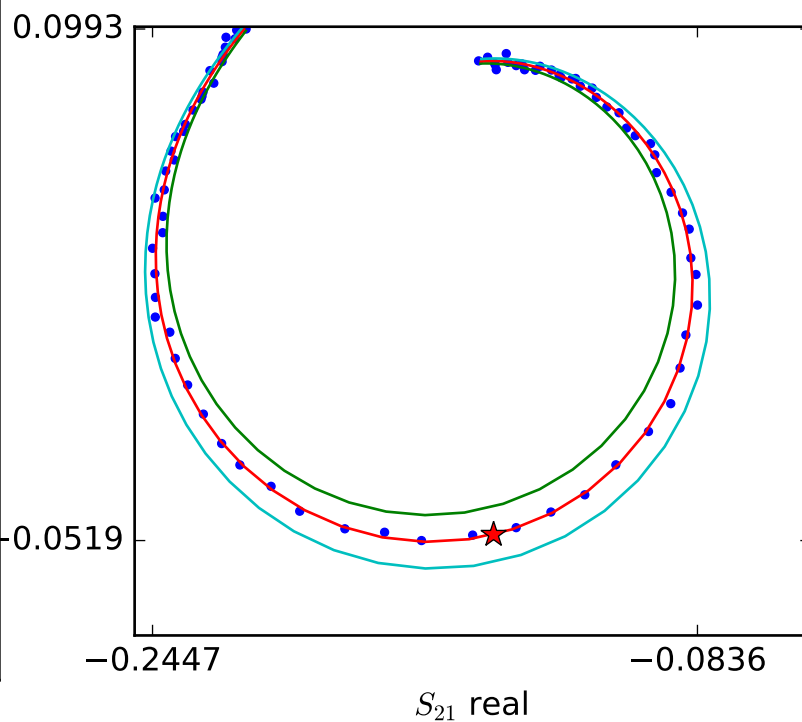
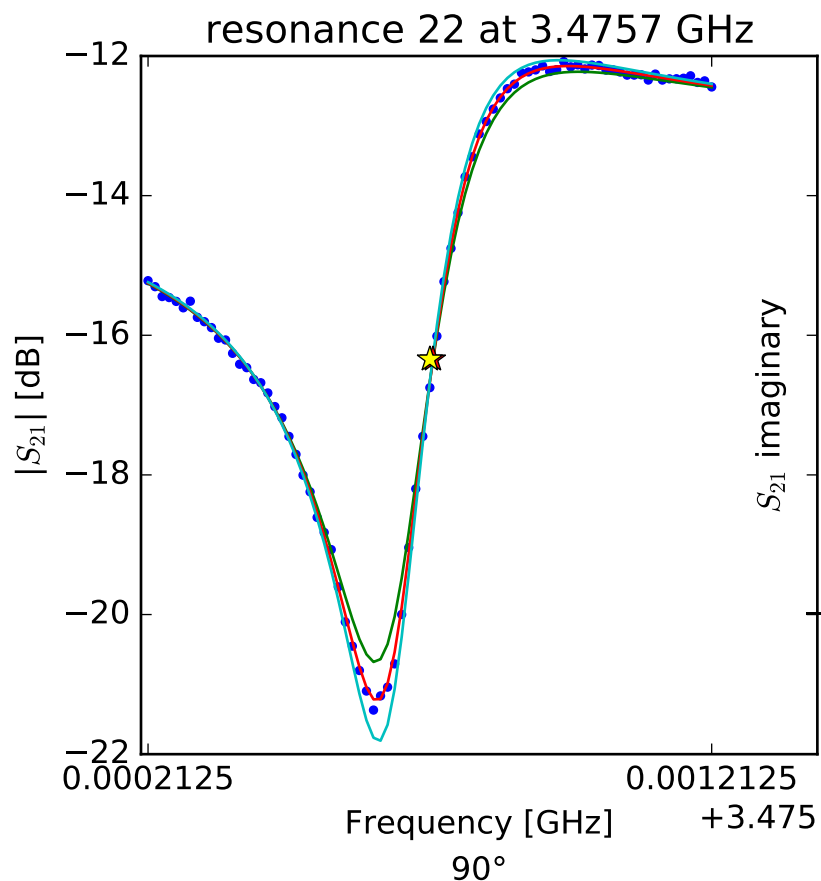
$$S_{21}(f) = ae^{-2\pi jf\tau} \left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r(\frac{f-f_r}{f_r})} \right]$$

$$\begin{aligned} f_r &= 3.4418149565 \\ Q_r &= 12998.5648091 \\ Q_c &= 73852.8539885 \\ a &= (0.227451425248 + 0.074058728133j) \\ \phi_0 &= 2.54637364145 \\ \tau &= 26.938100898 \end{aligned}$$



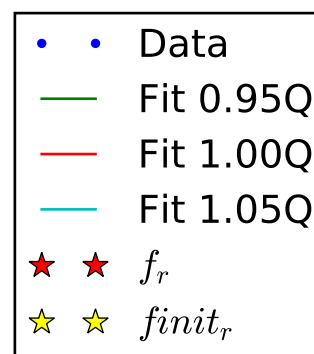
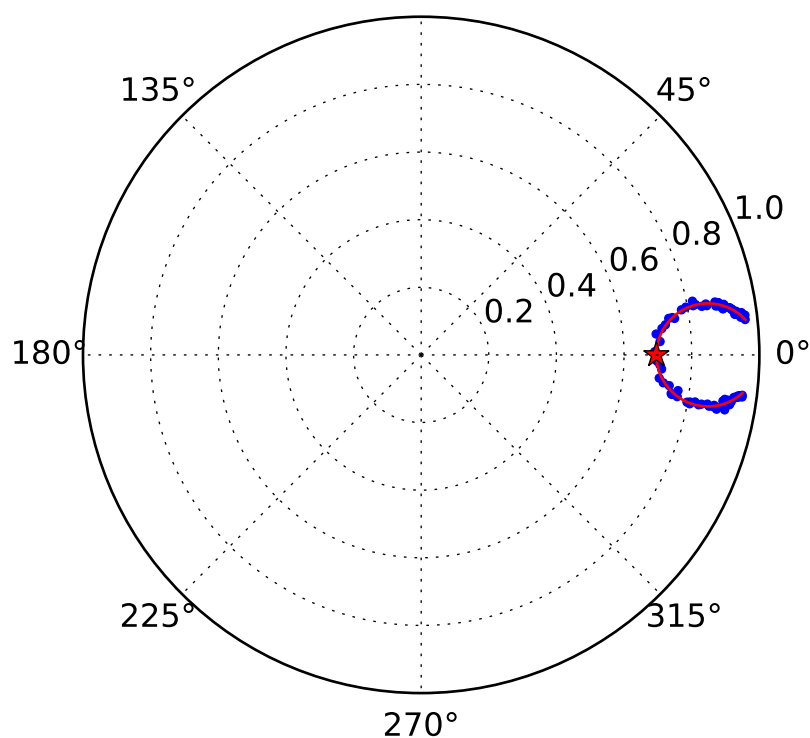
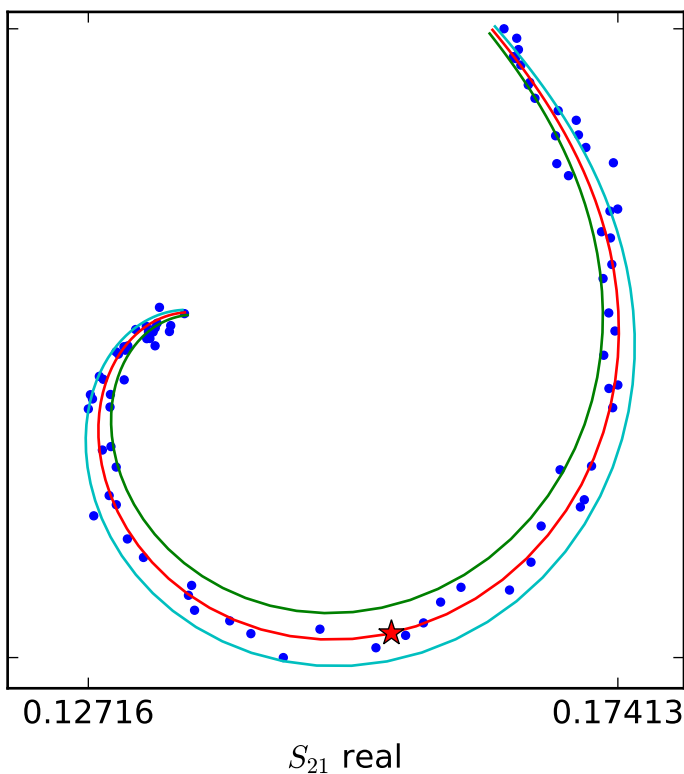
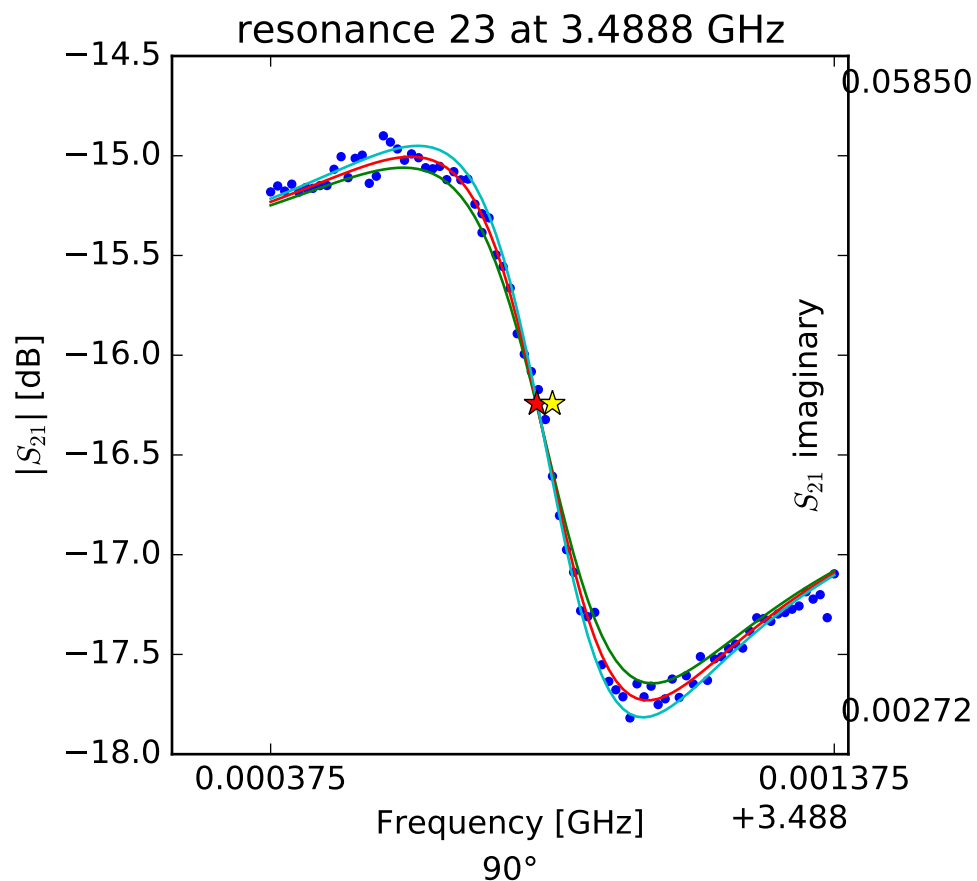
$$S_{21}(f) = ae^{-2\pi jf\tau} \left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r \left(\frac{f-f_r}{f_r} \right)} \right]$$

$f_r = 3.45768418071$
 $Q_r = 12907.418637$
 $Q_c = 17476.5781297$
 $a = (0.186810823156 + 0.130687751794j)$
 $\phi_0 = -1.50724921666$
 $\tau = 27.246598369$



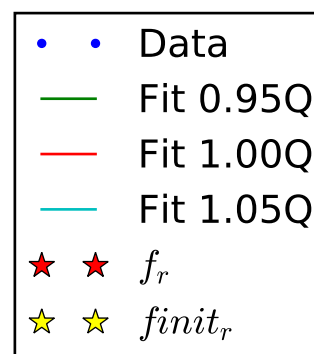
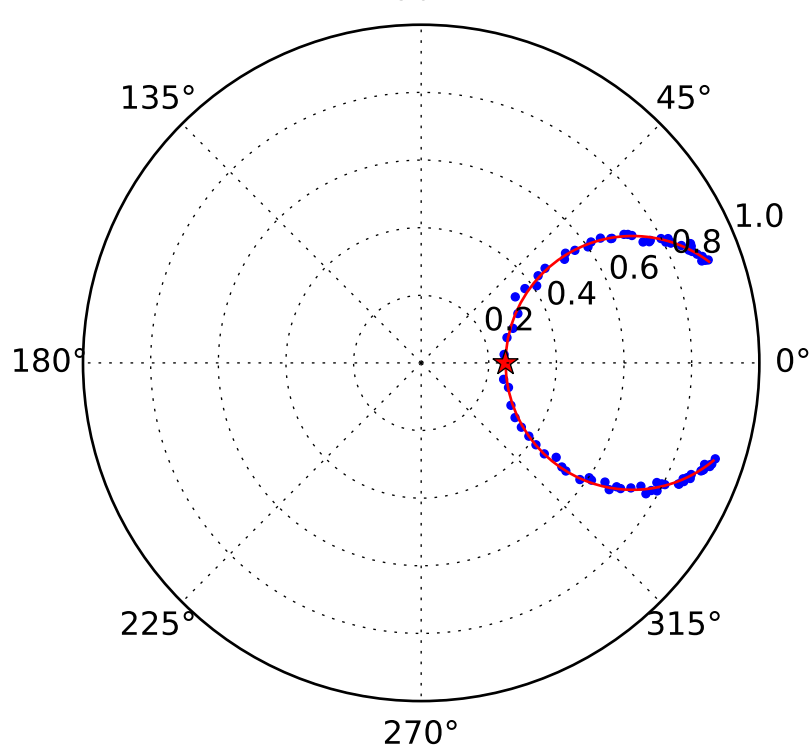
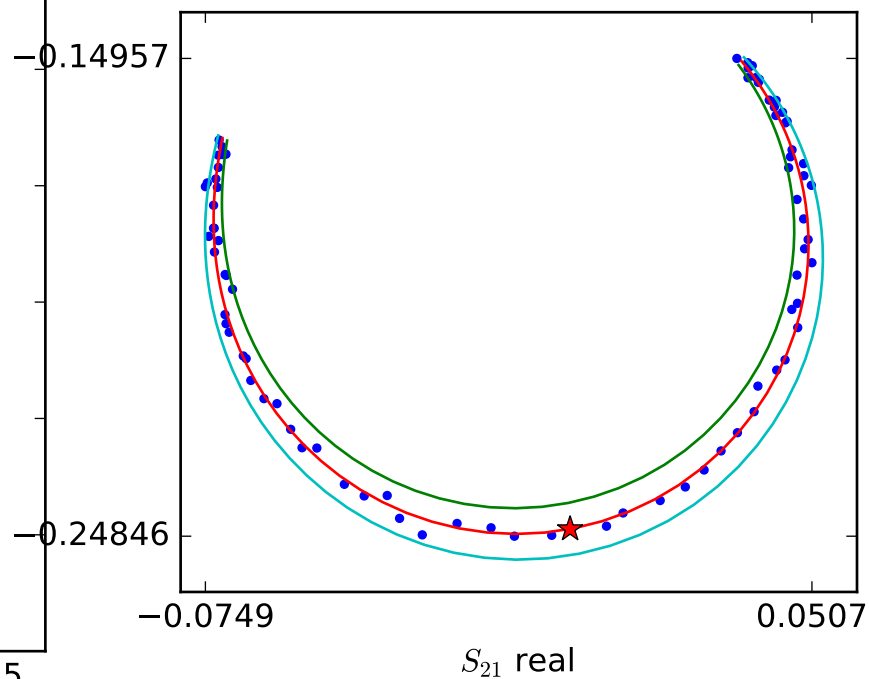
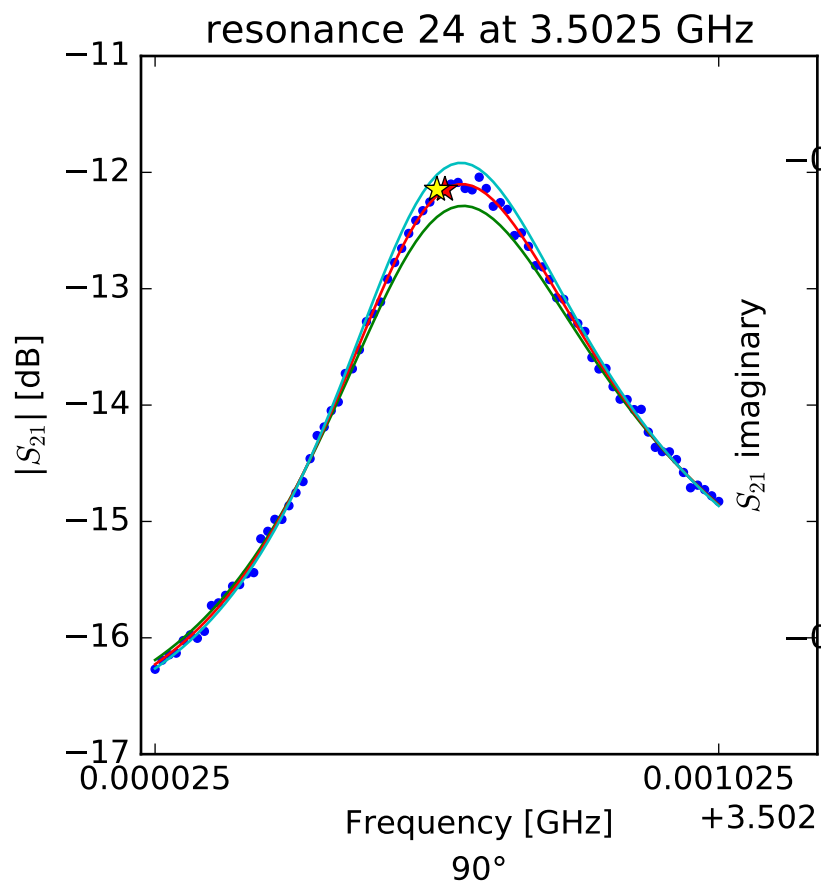
$$S_{21}(f) = ae^{-2\pi jf\tau} \left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r \left(\frac{f-f_r}{f_r} \right)} \right]$$

$$\begin{aligned} f_r &= 3.47571793477 \\ Q_r &= 11264.4806017 \\ Q_c &= 14960.1502391 \\ a &= (0.212851759282 - 0.00640429978297j) \\ \phi_0 &= -0.794521500179 \\ \tau &= 29.2247574608 \end{aligned}$$



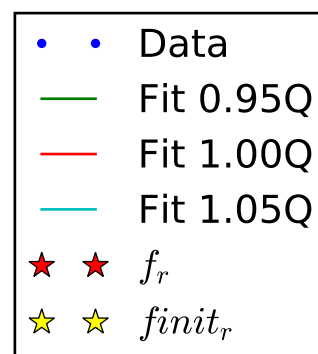
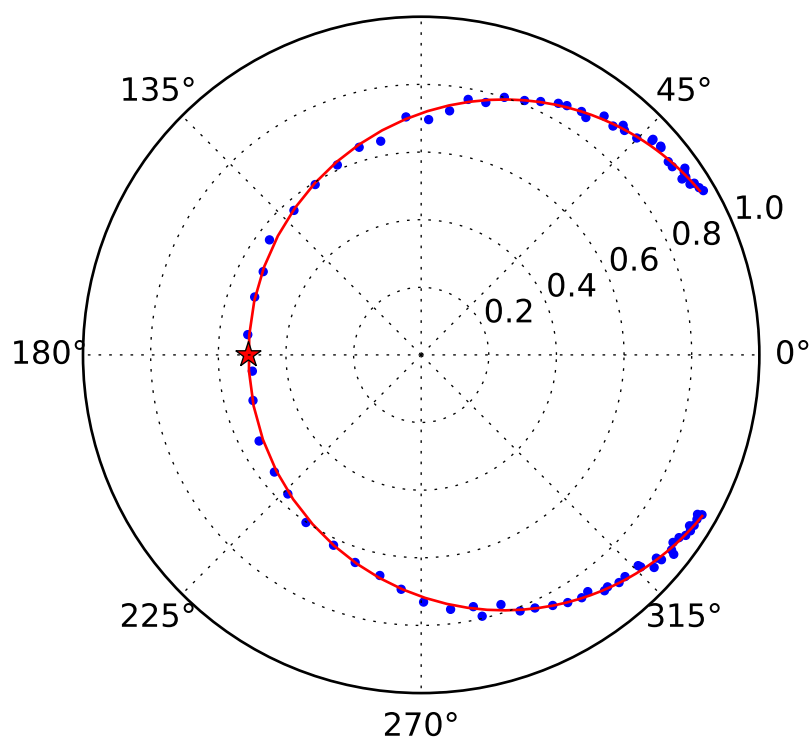
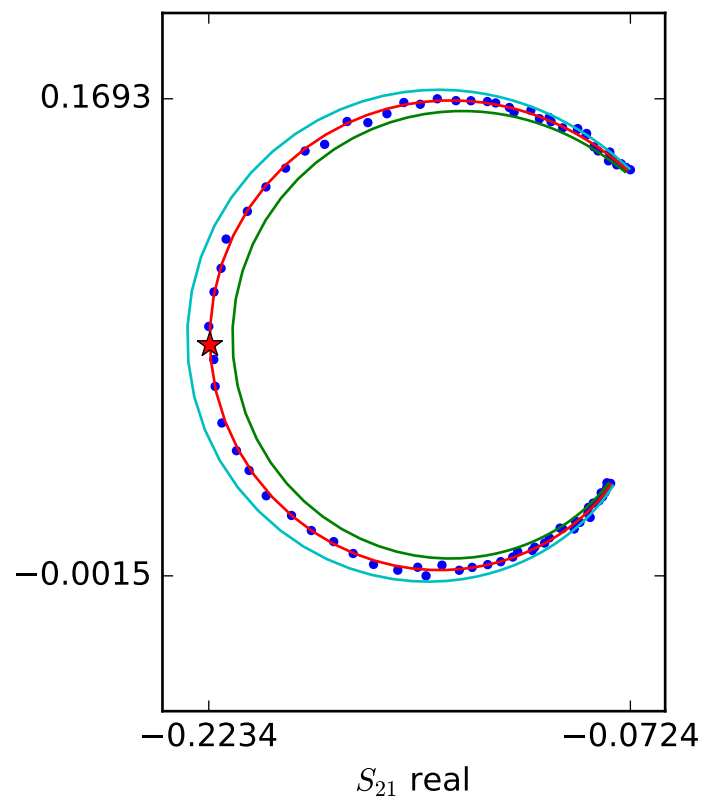
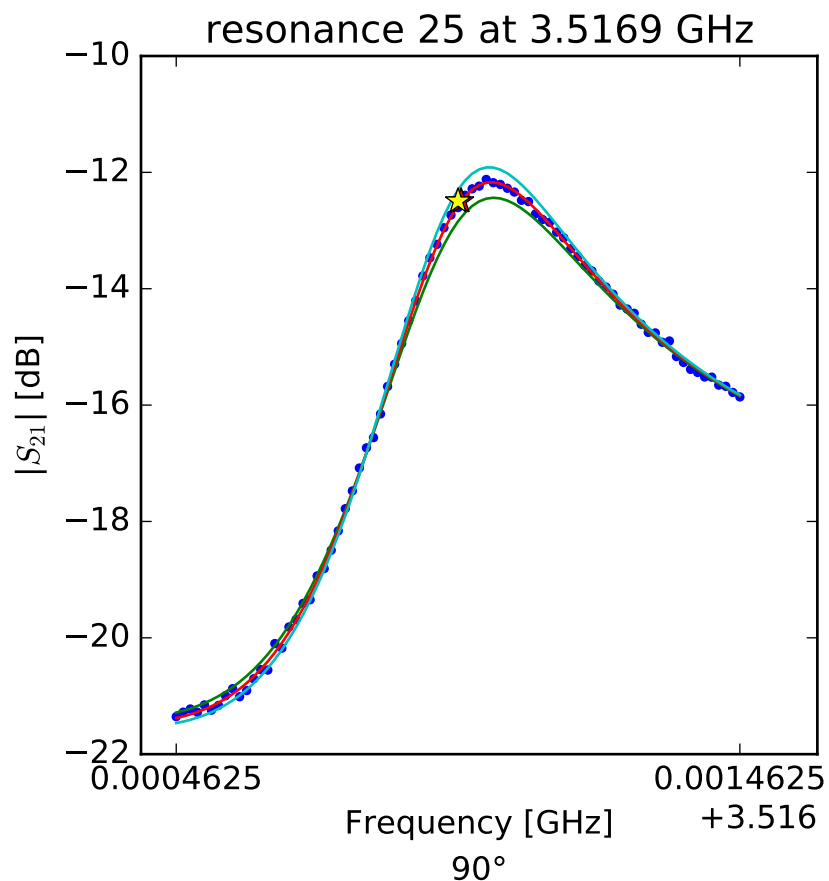
$$S_{21}(f) = ae^{-2\pi jf\tau} \left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r \left(\frac{f-f_r}{f_r} \right)} \right]$$

$$\begin{aligned} f_r &= 3.488847227 \\ Q_r &= 8332.95015167 \\ Q_c &= 27359.3540544 \\ a &= (0.148624244952 - 0.0510493229174j) \\ \phi_0 &= 1.35428031597 \\ \tau &= 23.7594930707 \end{aligned}$$



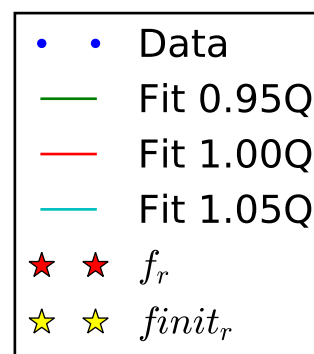
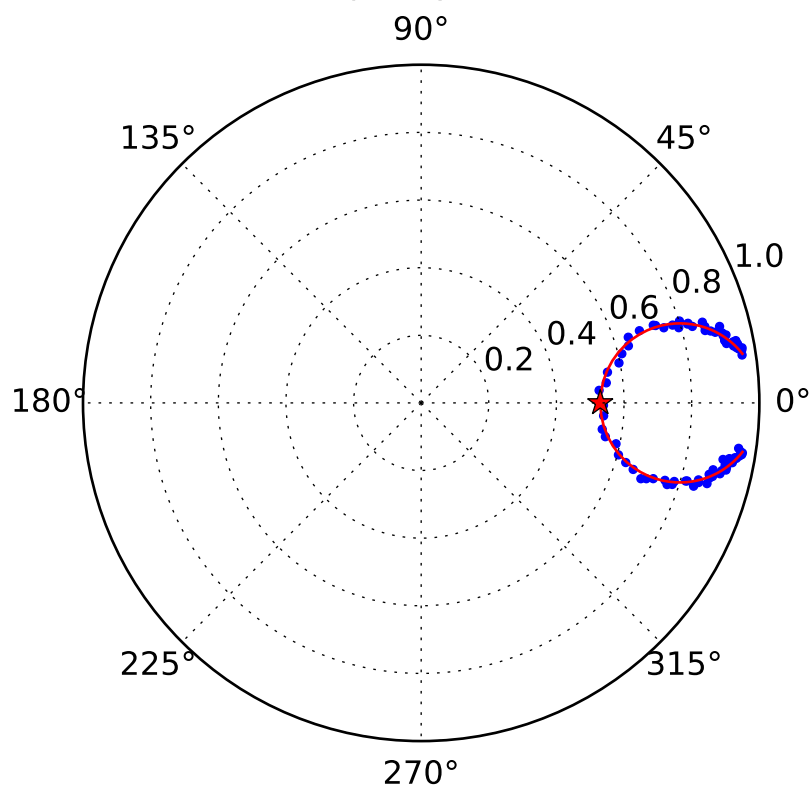
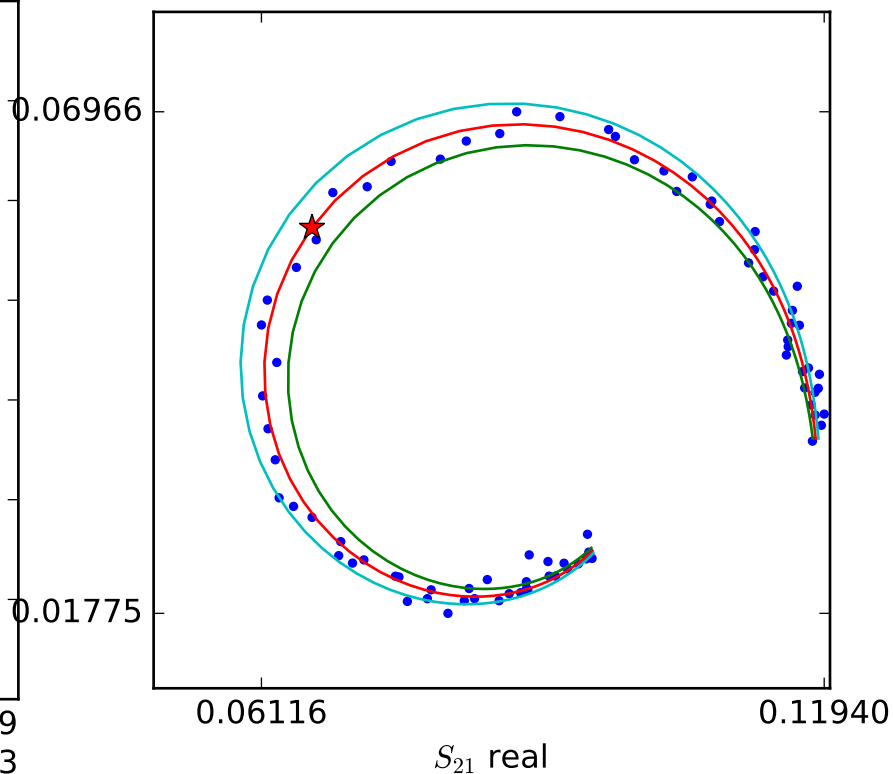
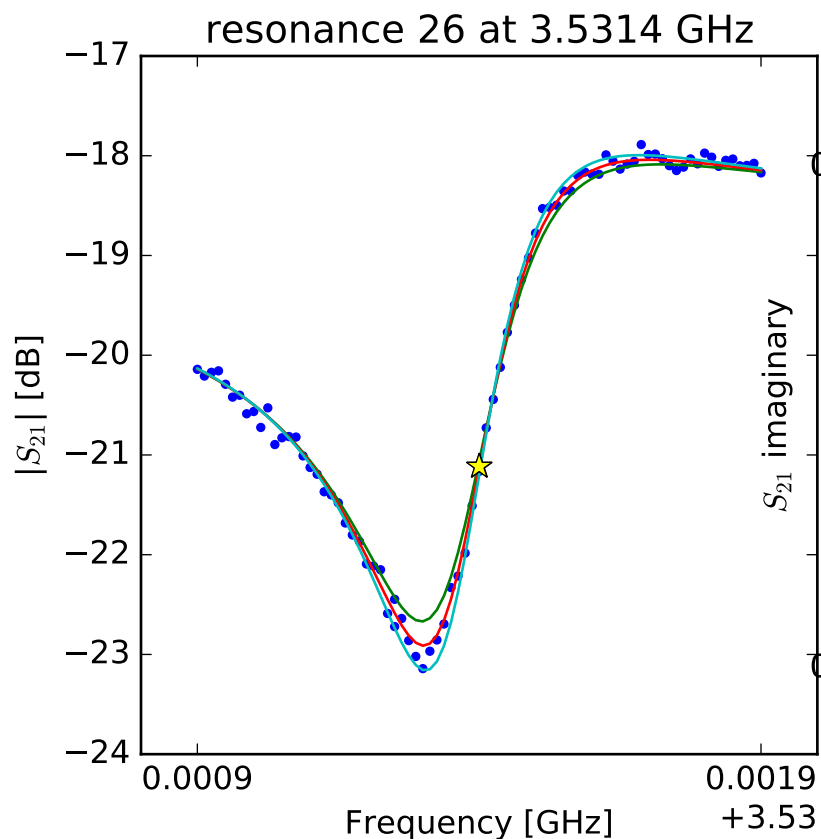
$$S_{21}(f) = ae^{-2\pi jf\tau} \left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r \left(\frac{f-f_r}{f_r} \right)} \right]$$

$$\begin{aligned} f_r &= 3.50253917475 \\ Q_r &= 7245.27519361 \\ Q_c &= 9653.56038455 \\ a &= (0.0685863257658 - 0.125647481325j) \\ \phi_0 &= -2.79815202468 \\ \tau &= 25.1539013482 \end{aligned}$$



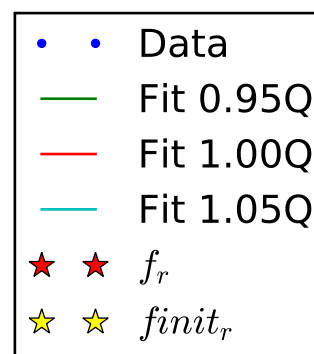
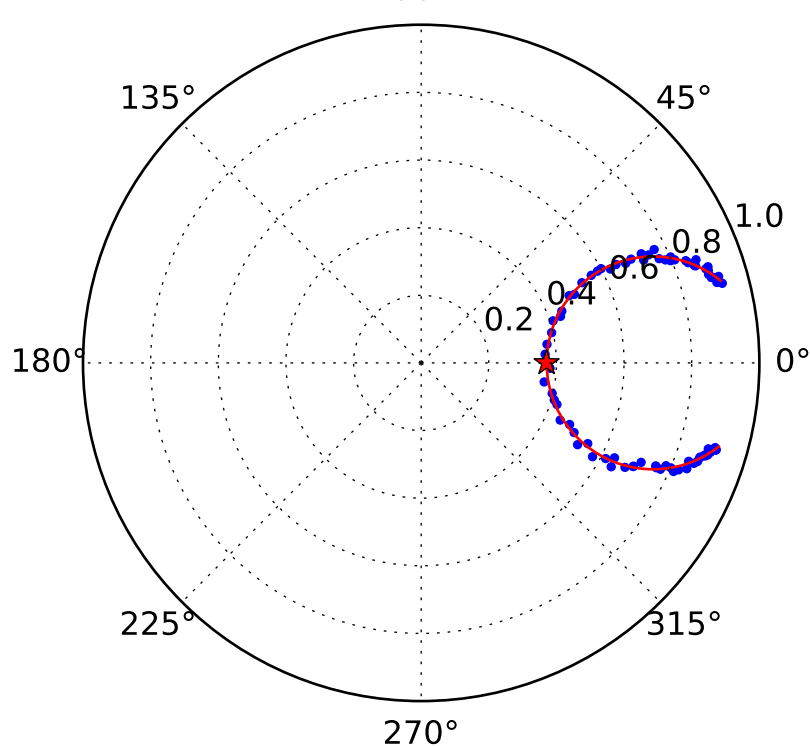
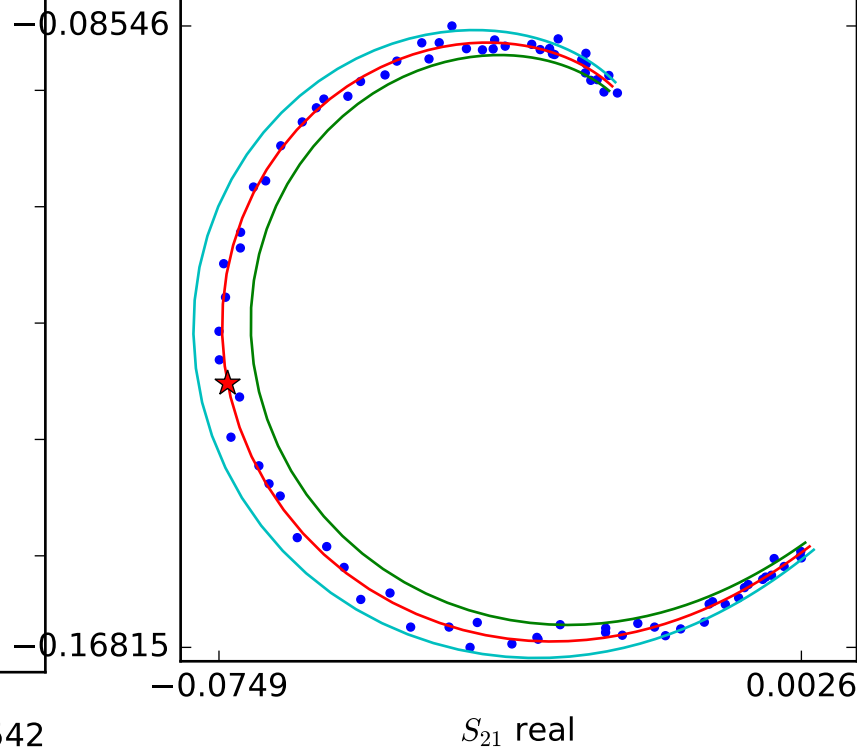
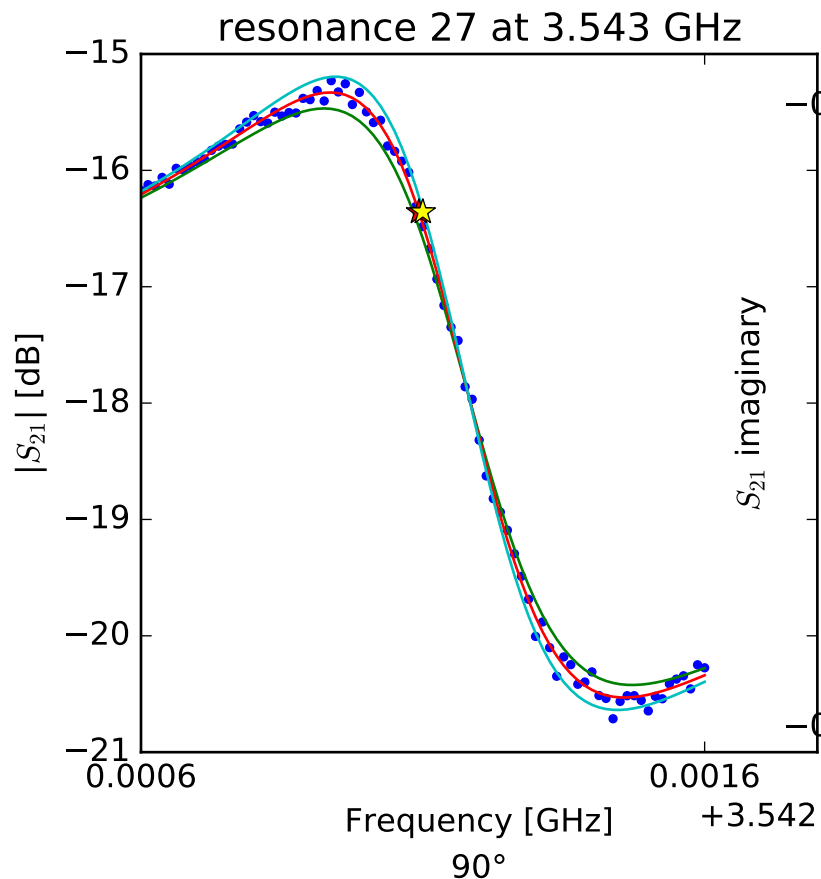
$$S_{21}(f) = ae^{-2\pi jf\tau} \left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r \left(\frac{f-f_r}{f_r} \right)} \right]$$

$$\begin{aligned} f_r &= 3.51696810441 \\ Q_r &= 9791.56601007 \\ Q_c &= 6481.3585701 \\ a &= (0.0483337265002 + 0.0956035694693j) \\ \phi_0 &= -2.1387835464 \\ \tau &= 19.8547502745 \end{aligned}$$



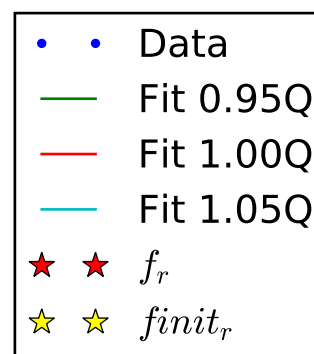
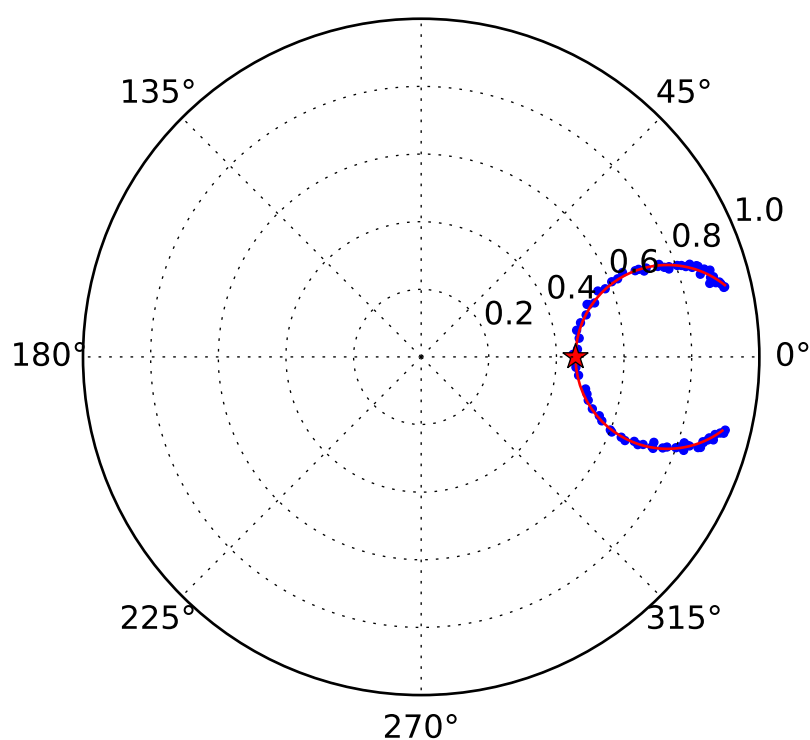
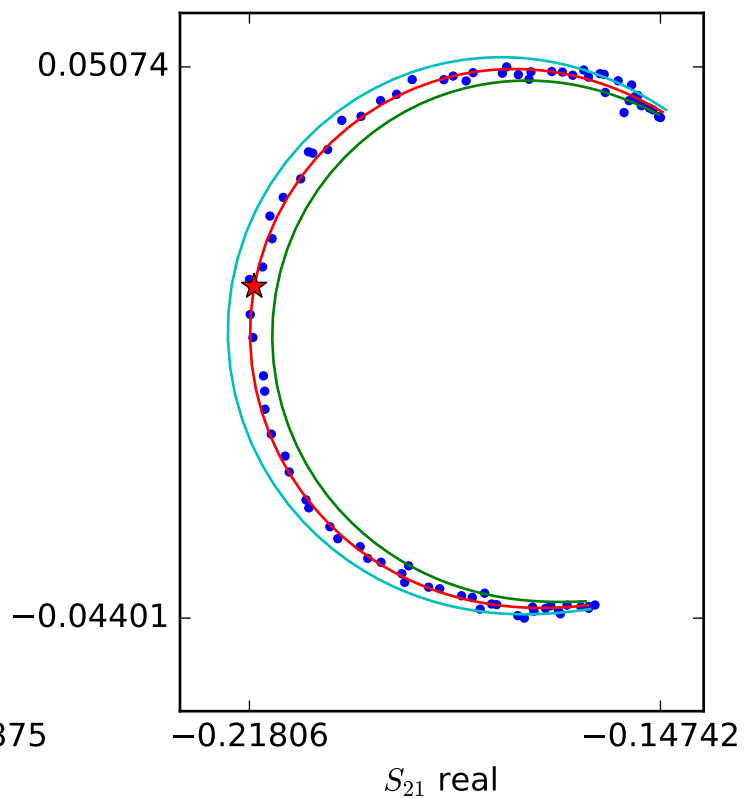
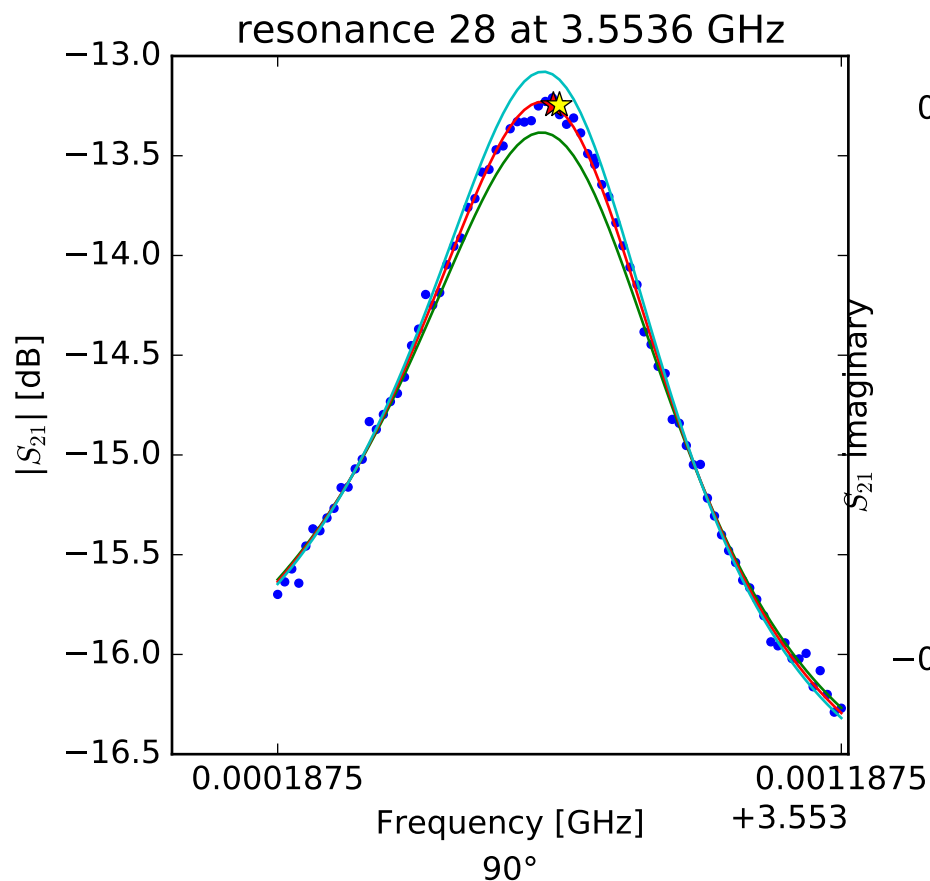
$$S_{21}(f) = ae^{-2\pi jf\tau} \left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r \left(\frac{f-f_r}{f_r} \right)} \right]$$

$$\begin{aligned} f_r &= 3.53140059256 \\ Q_r &= 10217.8993621 \\ Q_c &= 21721.2702897 \\ a &= (0.111794150437 + 0.0240917211805j) \\ \phi_0 &= -0.837364022623 \\ \tau &= 23.7851804951 \end{aligned}$$



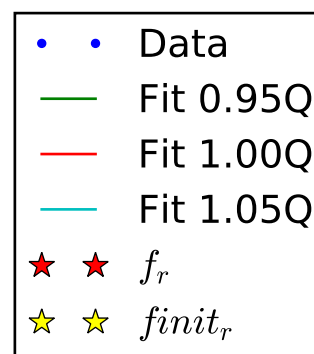
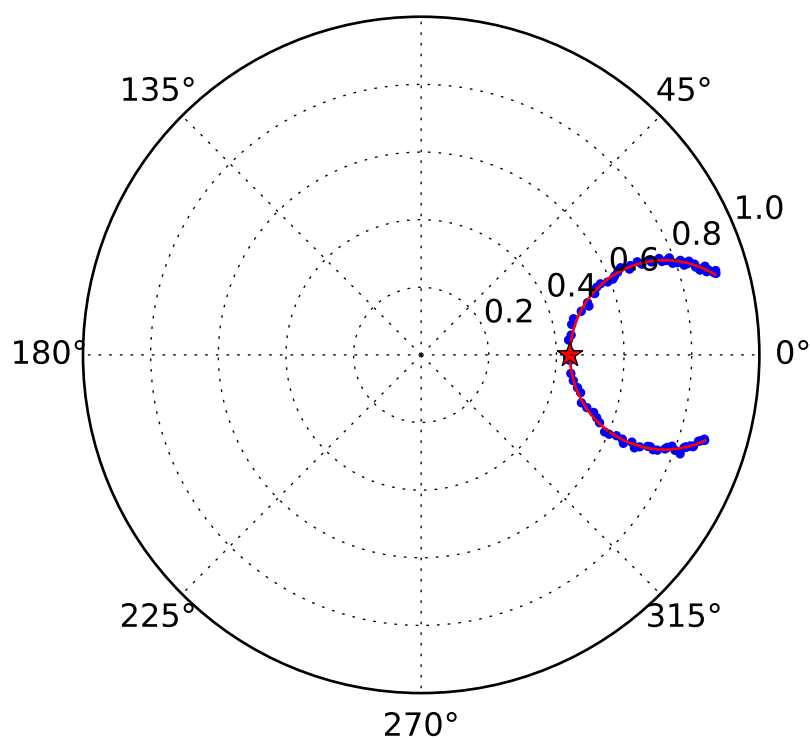
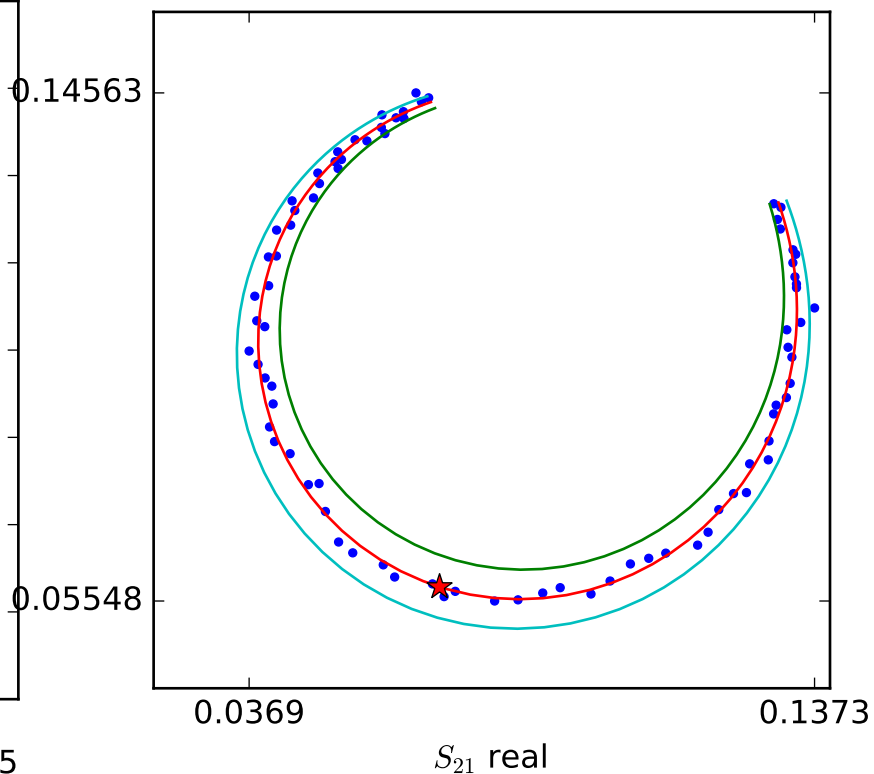
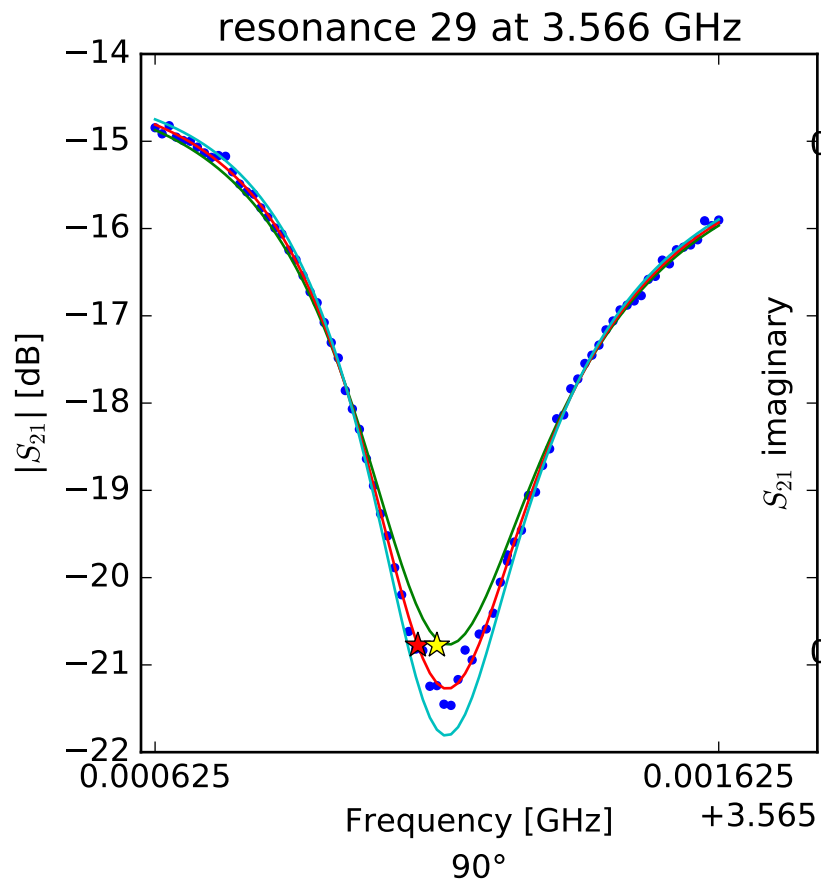
$$S_{21}(f) = ae^{-2\pi jf\tau} \left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r \left(\frac{f-f_r}{f_r} \right)} \right]$$

$$\begin{aligned} f_r &= 3.5430930629 \\ Q_r &= 7393.97205907 \\ Q_c &= 11752.6141646 \\ a &= (0.0956528627757 - 0.0766312659222j) \\ \phi_0 &= 1.68559104996 \\ \tau &= 24.0295892944 \end{aligned}$$



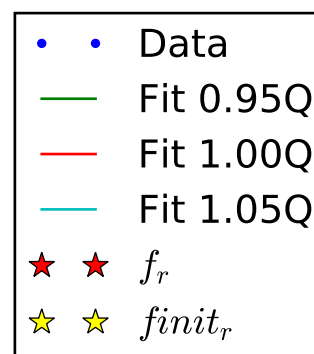
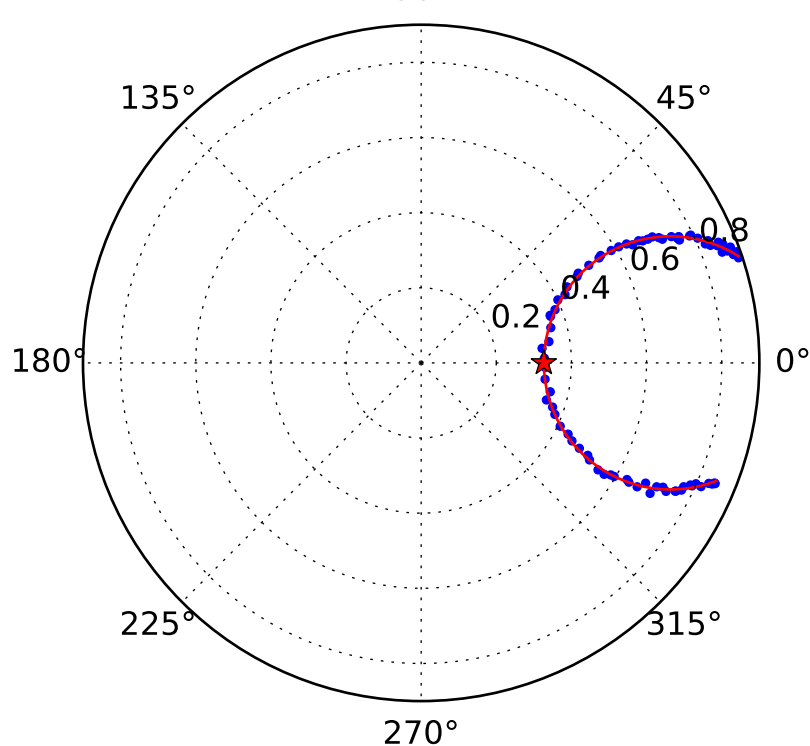
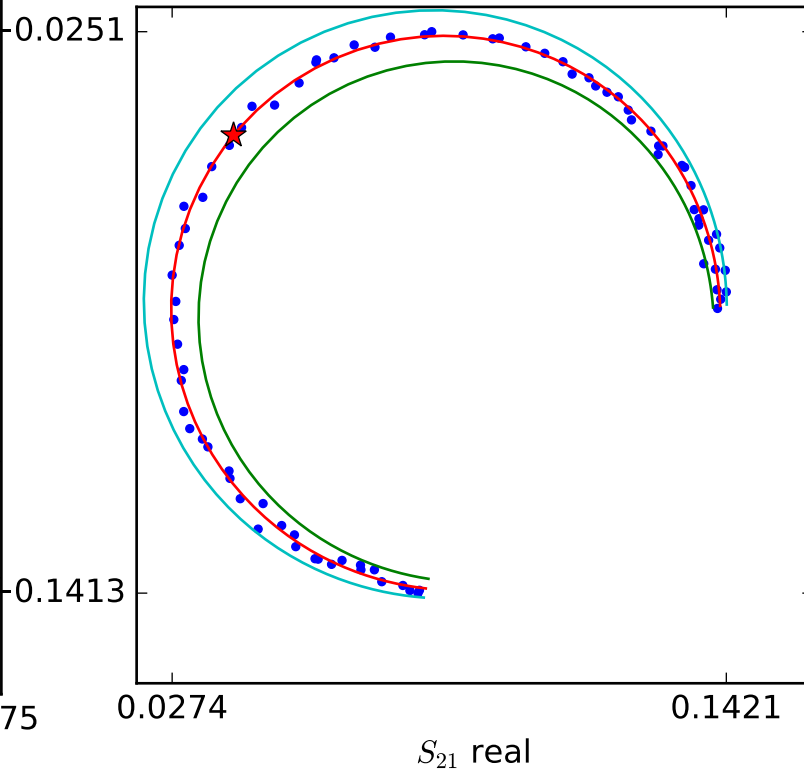
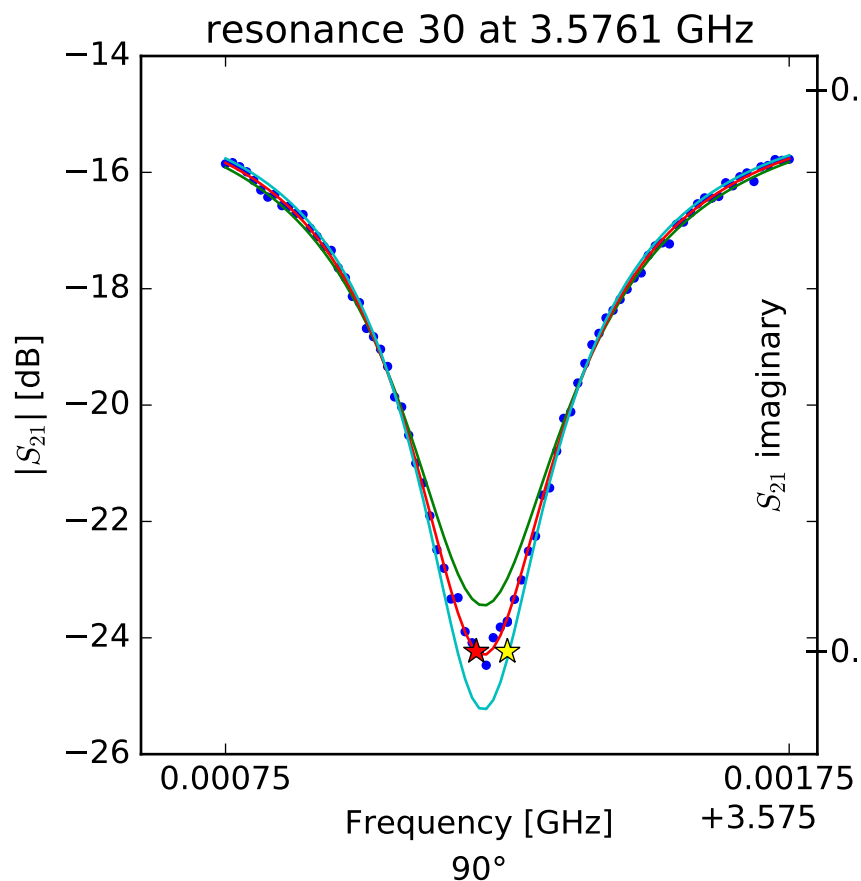
$$S_{21}(f) = ae^{-2\pi jf\tau} \left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r \left(\frac{f-f_r}{f_r} \right)} \right]$$

$$\begin{aligned} f_r &= 3.55367662995 \\ Q_r &= 7236.44993787 \\ Q_c &= 13311.1801108 \\ a &= (-0.0943059553325 + 0.105694071569j) \\ \phi_0 &= 2.93919714044 \\ \tau &= 25.8504456357 \end{aligned}$$



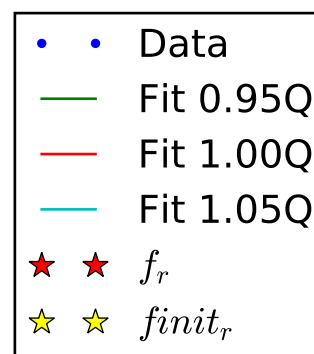
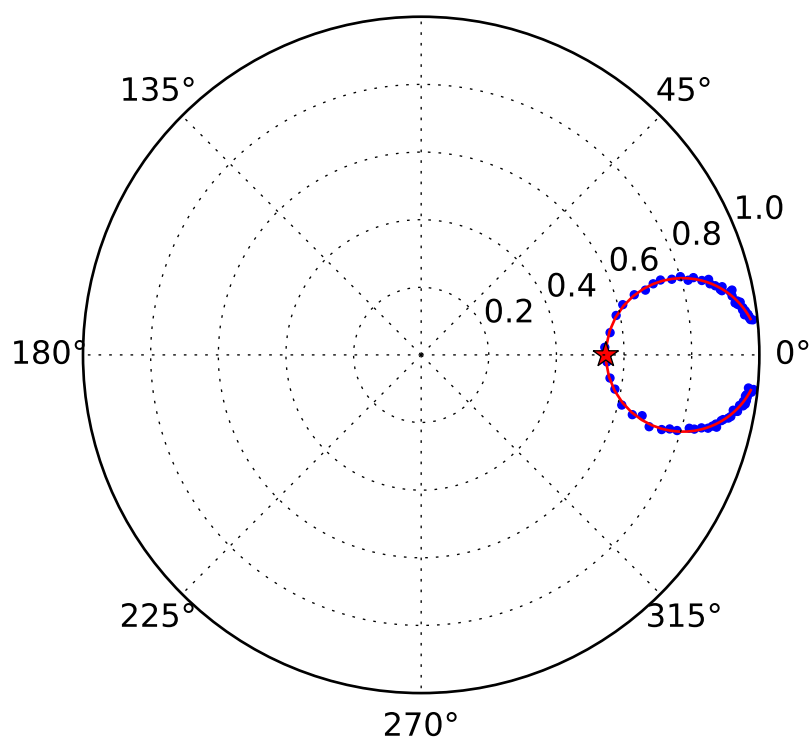
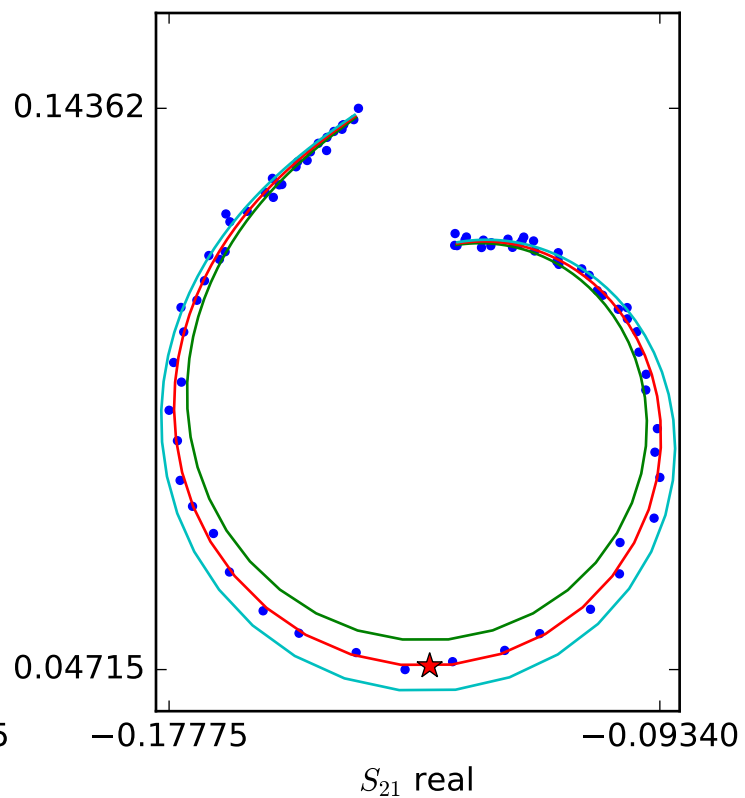
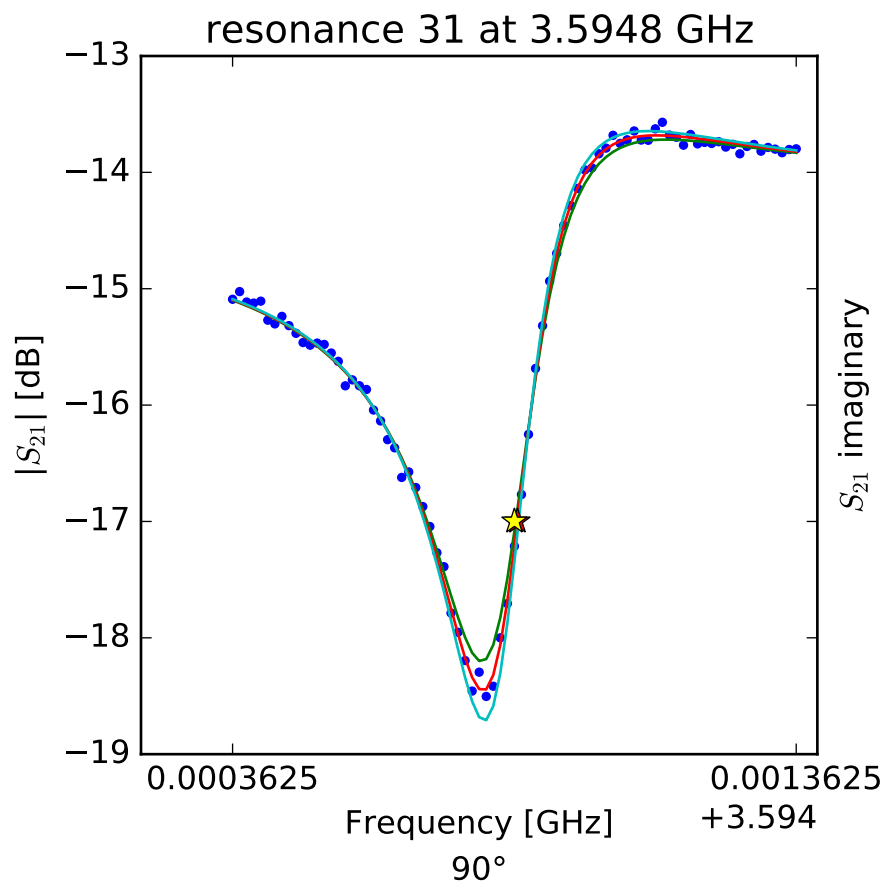
$$S_{21}(f) = ae^{-2\pi jf\tau} \left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r \left(\frac{f-f_r}{f_r} \right)} \right]$$

$$\begin{aligned} f_r &= 3.56609113478 \\ Q_r &= 6039.54038689 \\ Q_c &= 10784.0262985 \\ a &= (-0.163992646617 - 0.0977322404567j) \\ \phi_0 &= 0.254074352333 \\ \tau &= 29.5642415152 \end{aligned}$$



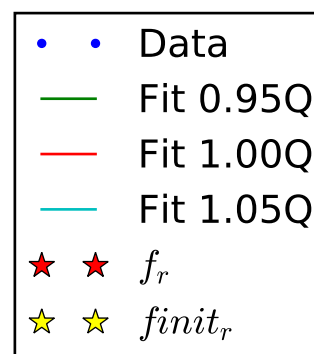
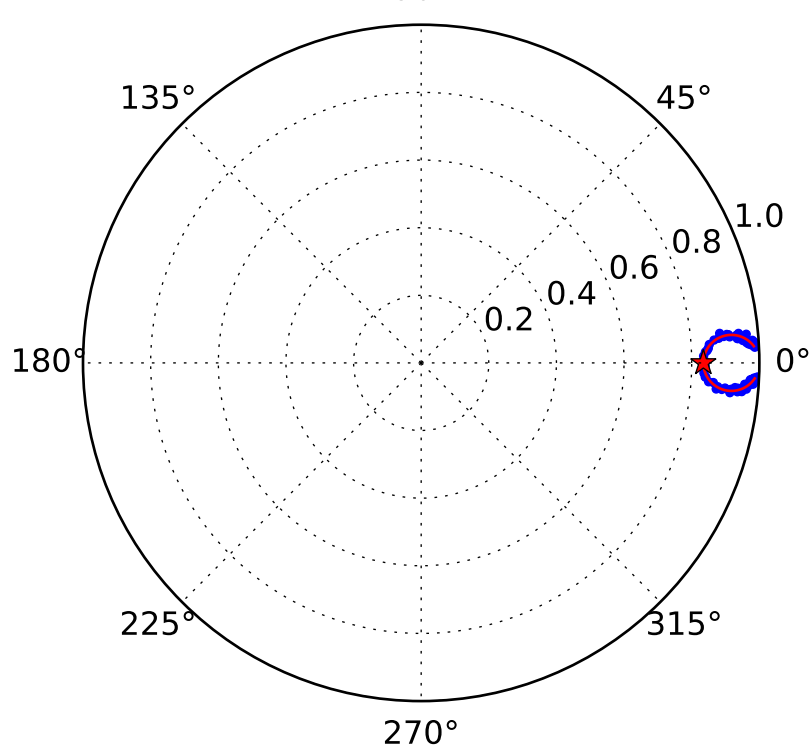
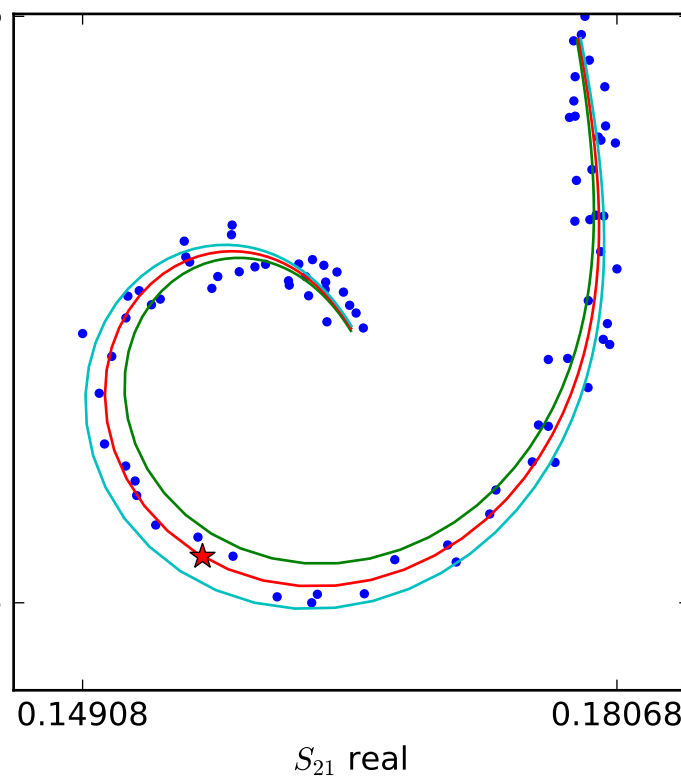
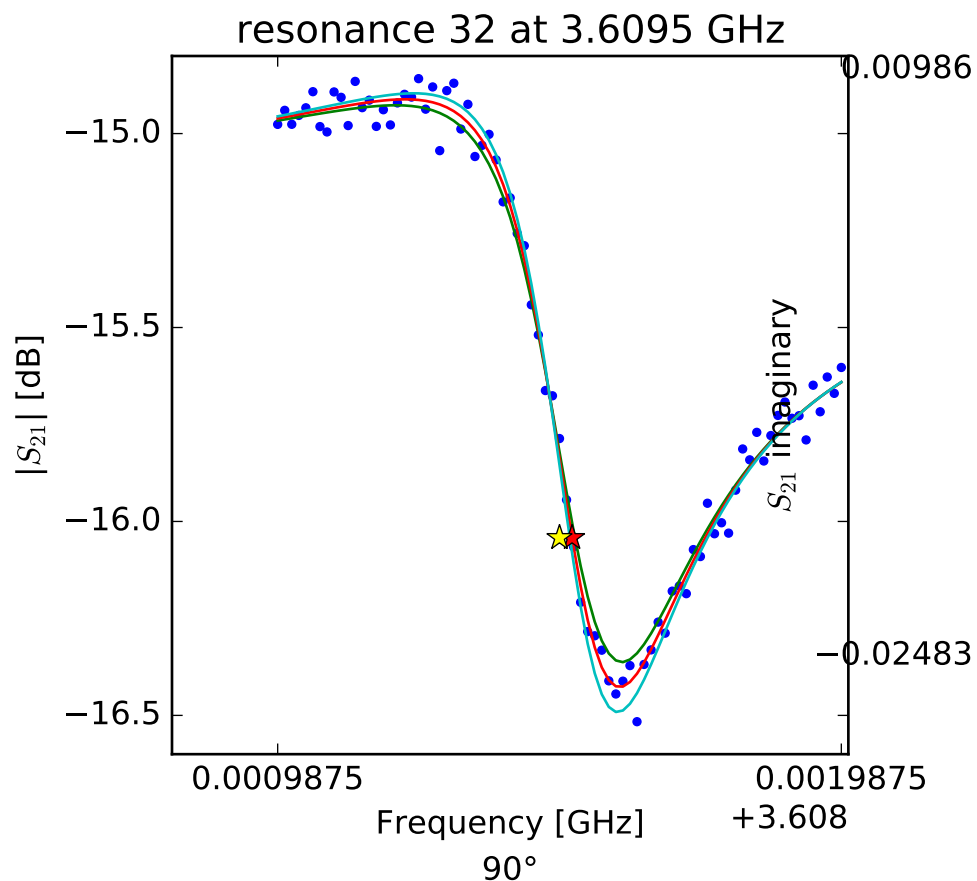
$$S_{21}(f) = ae^{-2\pi jf\tau} \left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r \left(\frac{f-f_r}{f_r} \right)} \right]$$

$$\begin{aligned} f_r &= 3.57619489169 \\ Q_r &= 5880.03047937 \\ Q_c &= 8728.73346183 \\ a &= (0.0869589411625 + 0.164893565686j) \\ \phi_0 &= 0.0547466094249 \\ \tau &= 28.3239103386 \end{aligned}$$



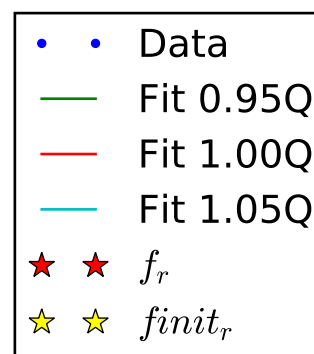
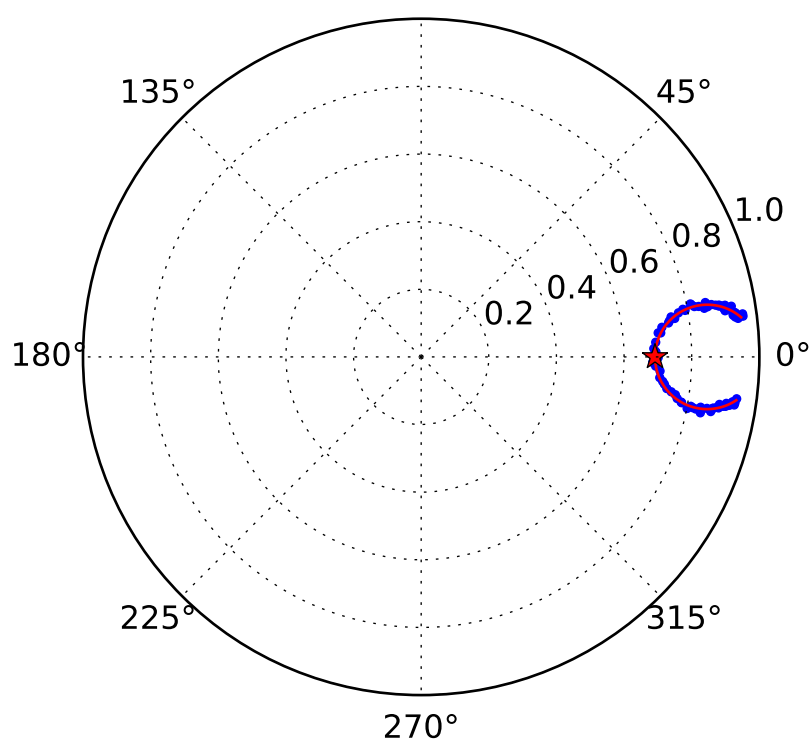
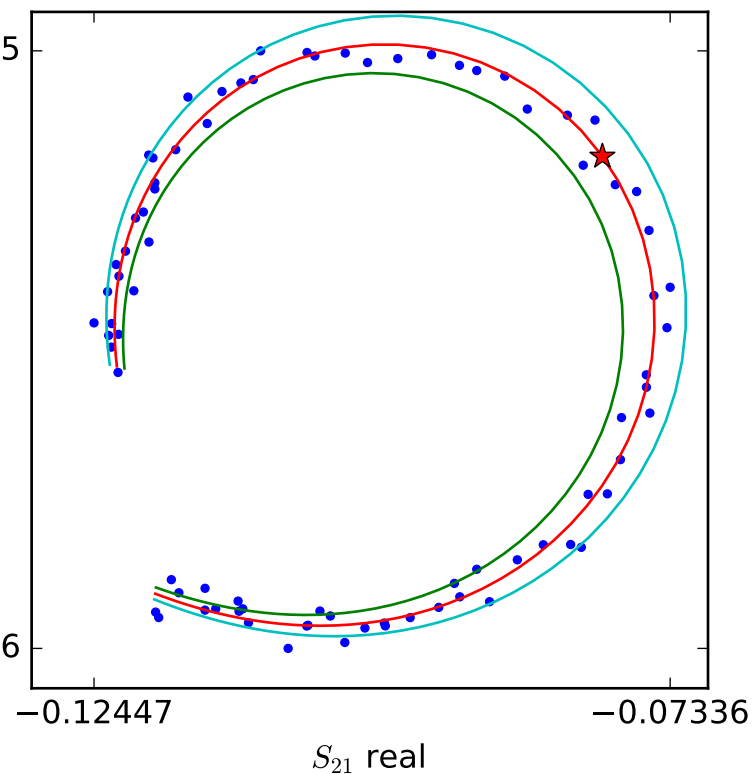
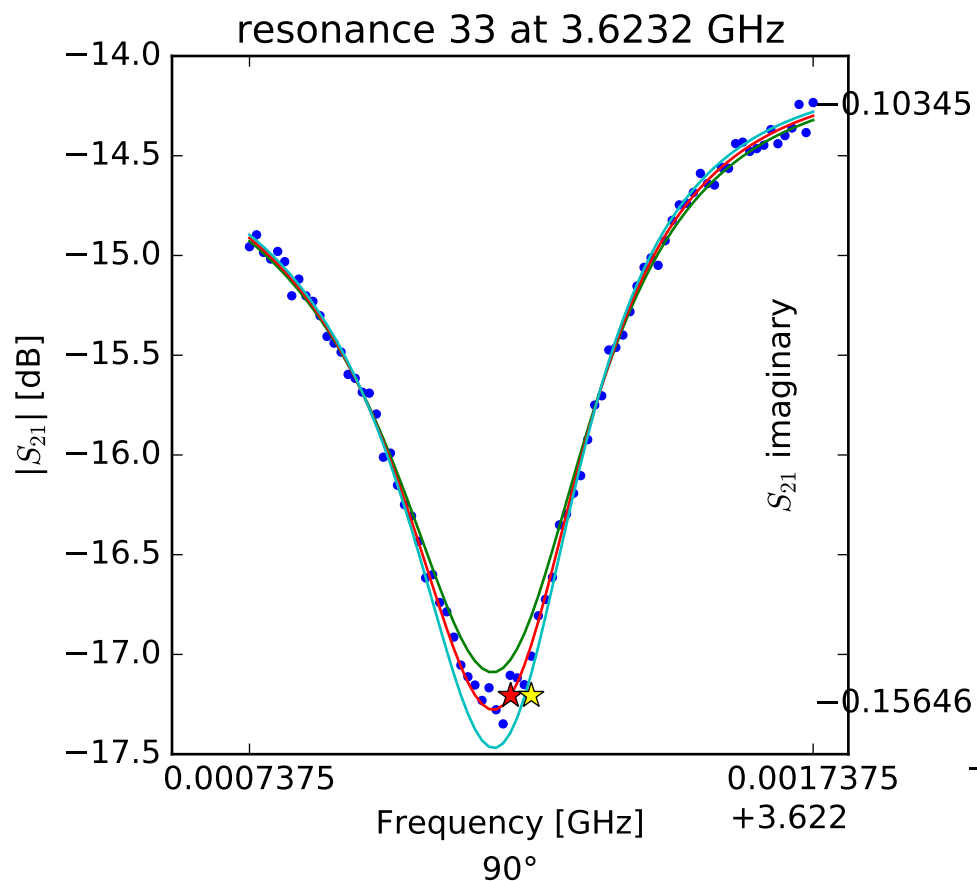
$$S_{21}(f) = ae^{-2\pi jf\tau} \left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r \left(\frac{f-f_r}{f_r} \right)} \right]$$

$$\begin{aligned} f_r &= 3.59486796235 \\ Q_r &= 14622.4484587 \\ Q_c &= 32201.4742053 \\ a &= (0.112302223547 + 0.156620182608j) \\ \phi_0 &= -0.74306331441 \\ \tau &= 28.0329372754 \end{aligned}$$



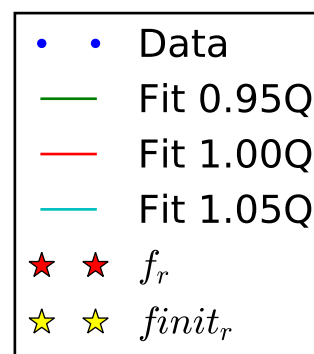
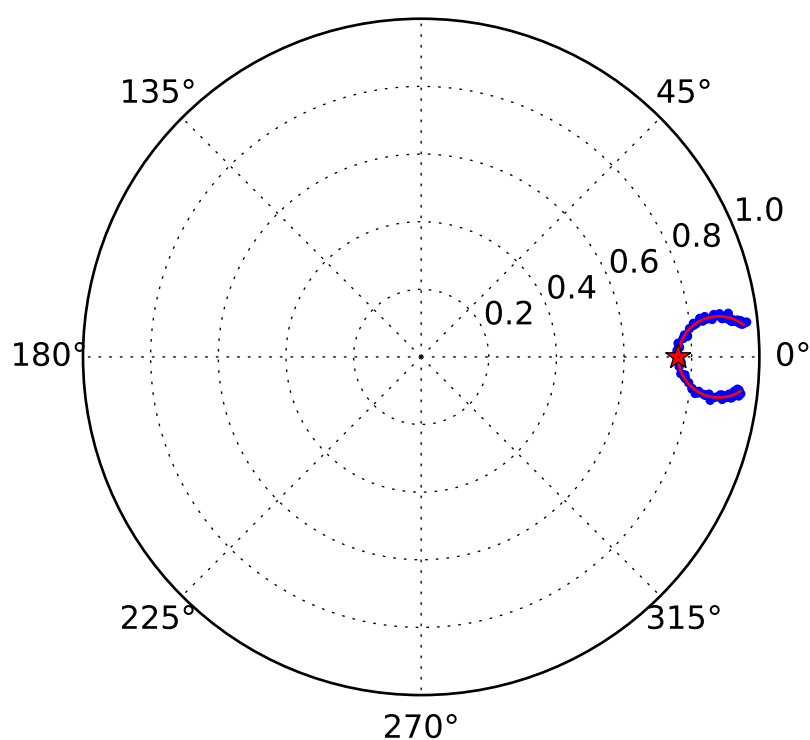
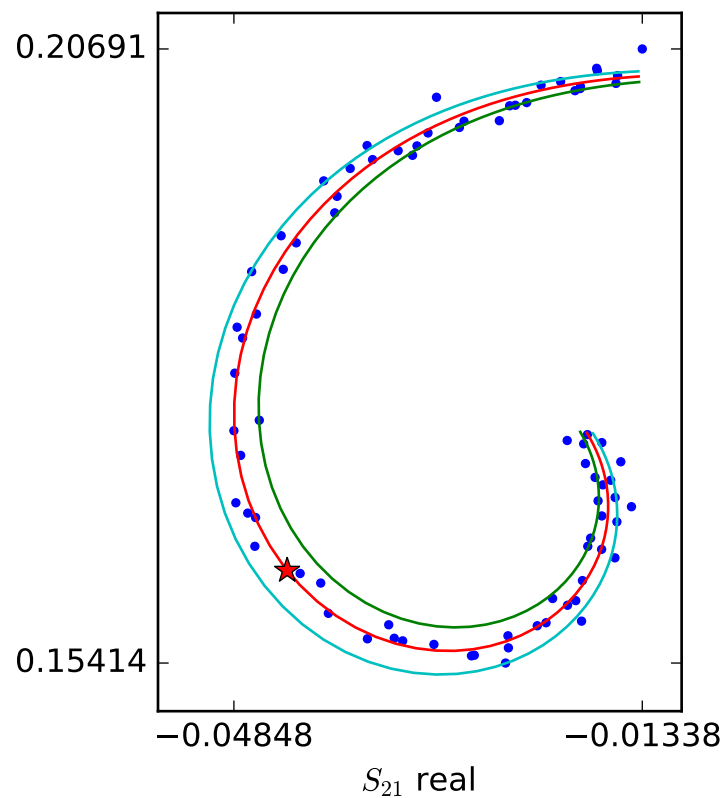
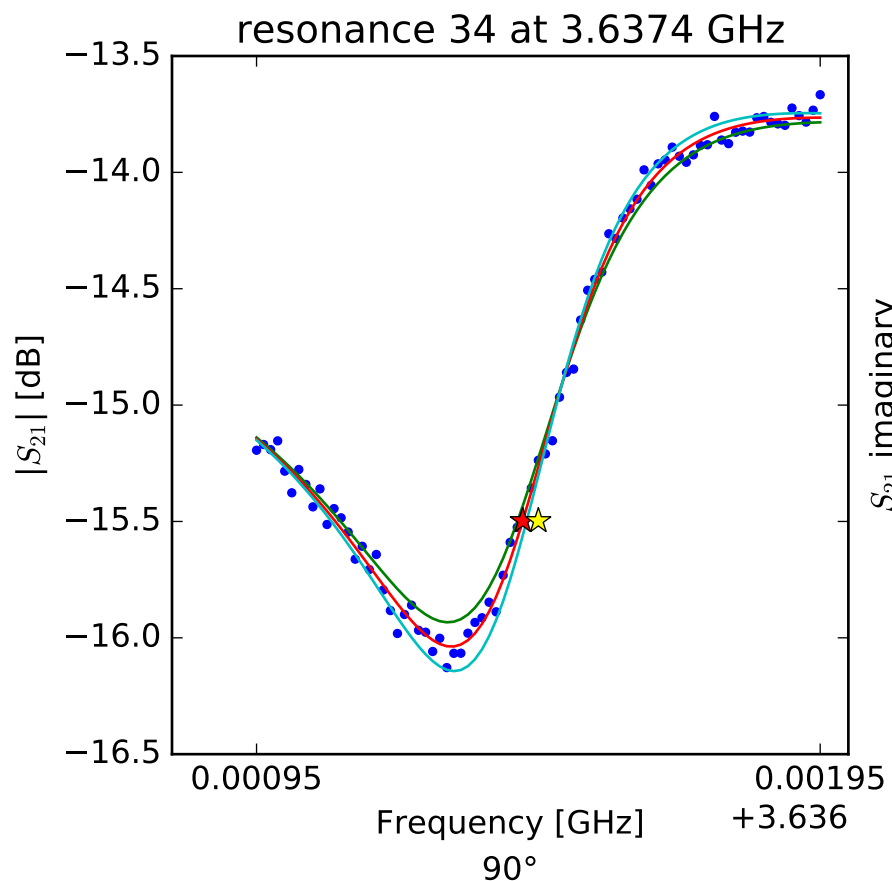
$$S_{21}(f) = ae^{-2\pi jf\tau} \left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r \left(\frac{f-f_r}{f_r} \right)} \right]$$

$$\begin{aligned} f_r &= 3.60950979349 \\ Q_r &= 11416.8448304 \\ Q_c &= 68937.4397662 \\ a &= (-0.165650621697 - 0.0521710982077j) \\ \phi_0 &= 0.912429167808 \\ \tau &= 24.8088767314 \end{aligned}$$



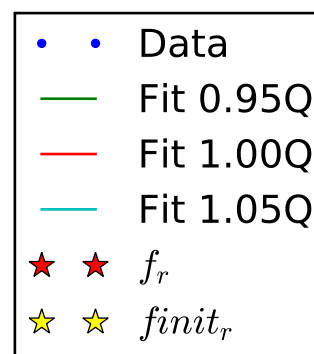
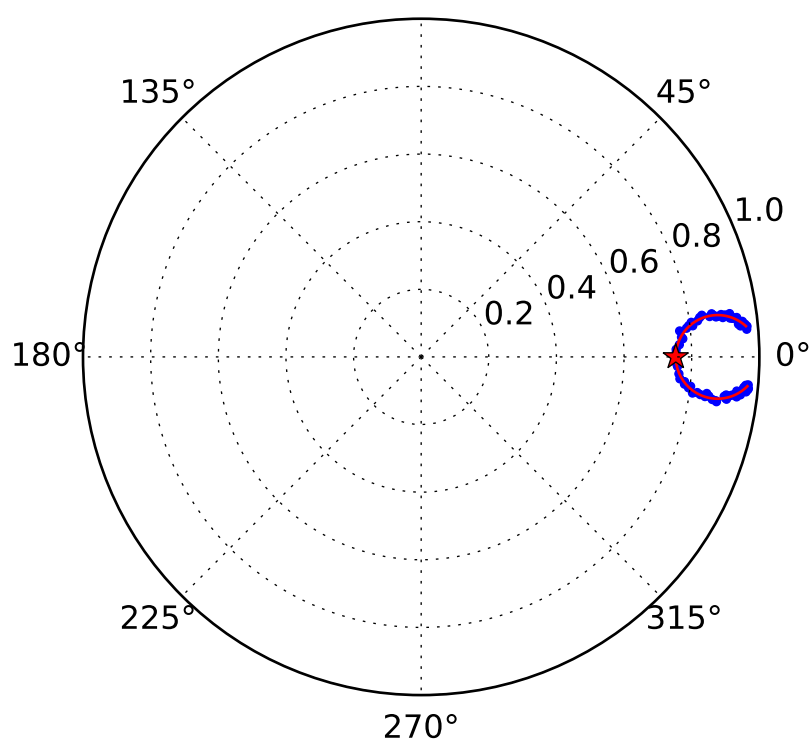
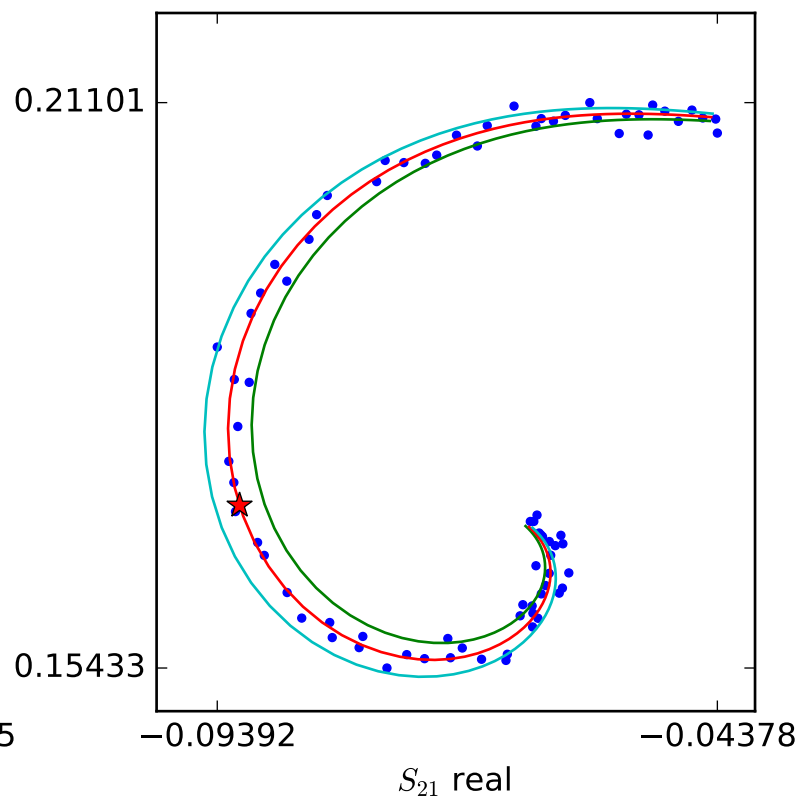
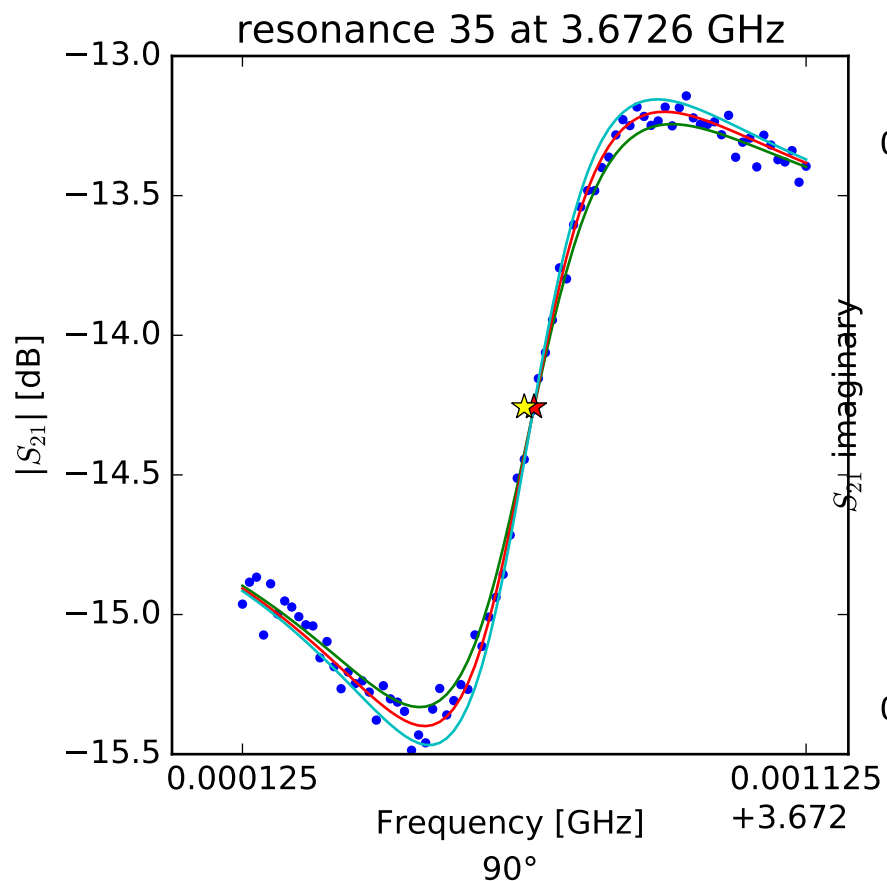
$$S_{21}(f) = ae^{-2\pi jf\tau} \left[1 - \frac{Q_r/Q_c e^{j\phi_0}}{1 + 2jQ_r \left(\frac{f-f_r}{f_r} \right)} \right]$$

$$\begin{aligned} f_r &= 3.62320084388 \\ Q_r &= 7327.43013689 \\ Q_c &= 23741.9636325 \\ a &= (-0.0913772434591 - 0.174220760103j) \\ \phi_0 &= -0.210557340525 \\ \tau &= 26.5056671971 \end{aligned}$$



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

$$\begin{aligned} f_r &= 3.63742229935 \\ Q_r &= 7003.7187087 \\ Q_c &= 29198.5003471 \\ a &= (0.147021000924 - 0.130807793346j) \\ \phi_0 &= -0.814185299532 \\ \tau &= 26.2892062976 \end{aligned}$$



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

$$\begin{aligned} f_r &= 3.67264224116 \\ Q_r &= 8677.73997848 \\ Q_c &= 35093.1149456 \\ a &= (0.170488225426 + 0.100602300637j) \\ \phi_0 &= -1.3597076428 \\ \tau &= 29.0788228689 \end{aligned}$$