Simulation Results

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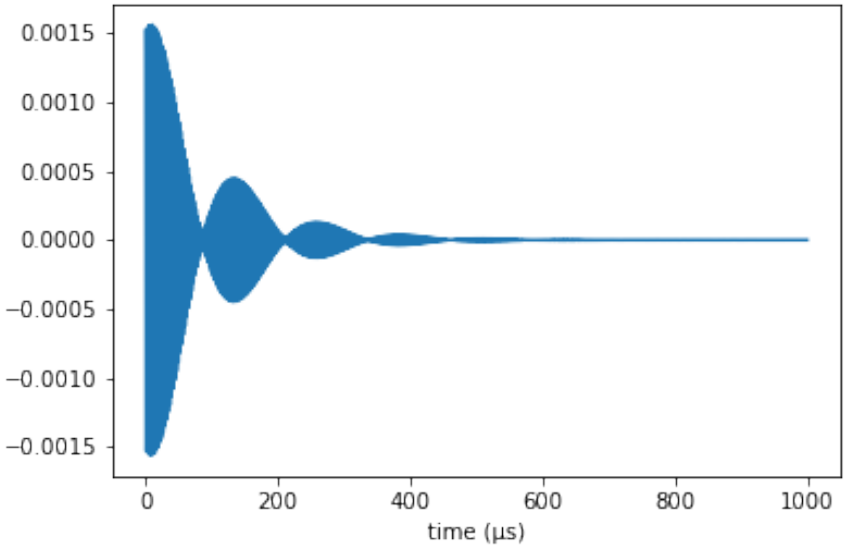
2021

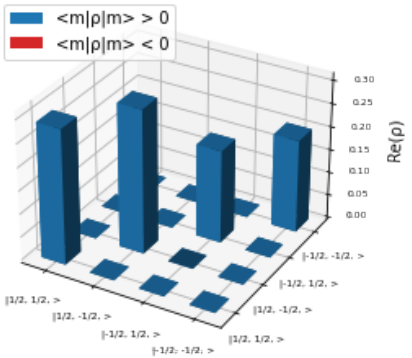
42correlated mixed dipD2

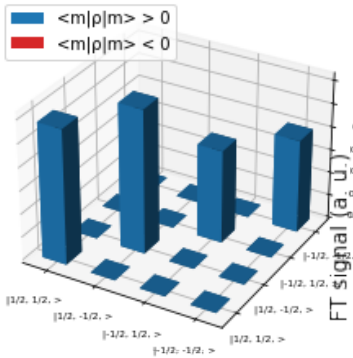
Spin: $0.5, B_0 = 10,$
$\gamma/2\pi = 4.0, \mathcal{H} = \mathsf{I}_z + b_D\left(3\cos^2\theta - 1\right) I_{1z} I_{2z}. b_D \approx 1.571 theta \approx 0.785$

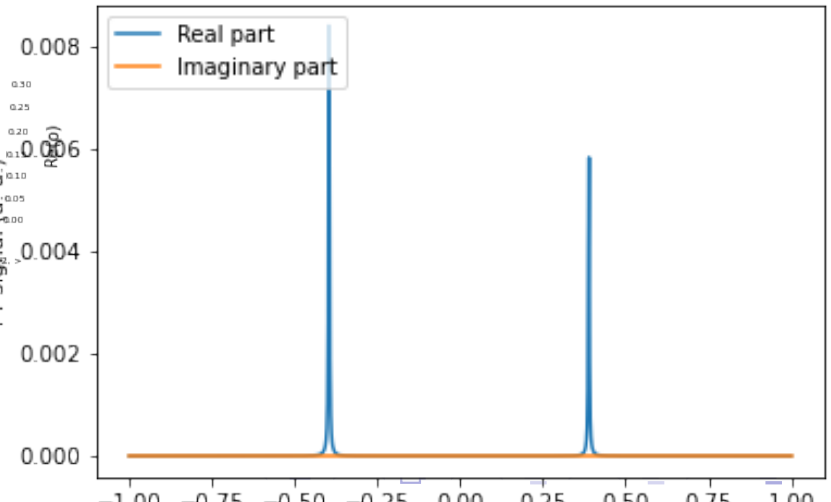
$$\rho_{\text{initial}} \doteq \begin{pmatrix} 0.291 & 0.0 & 0.0 & 0.0 \\ 0.0 & 0.309 & 0.0 & 0.0 \\ 0.0 & 0.0 & 0.2 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.2 \end{pmatrix}$$

$$\rho_{\text{final}} \doteq \begin{pmatrix} 0.291 & 0.0 & 0.001 & -0.0 \\ 0.0 & 0.309 & -0.0 & 0.001 \\ 0.001 & -0.0 & 0.2 & 0.0 \\ -0.0 & 0.001 & 0.0 & 0.2 \end{pmatrix}$$







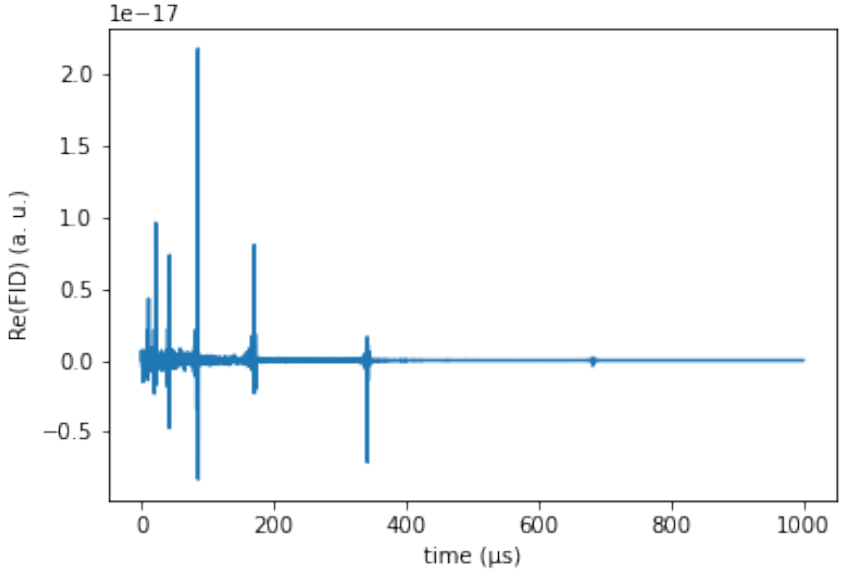


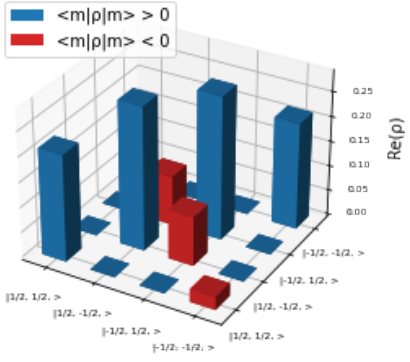
14uncorrelated mixed hyperfineAnisotrop

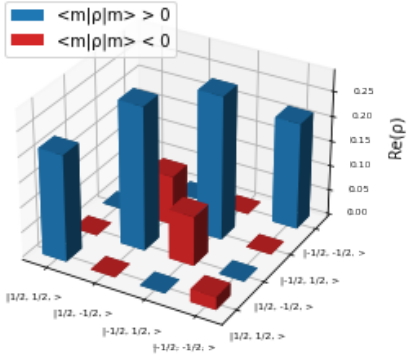
Spin: $0.5, B_0 = 10,\ \gamma/2\pi = 4.0, \mathcal{H} = \mathsf{I}_z + \hat{S}\tilde{A}\hat{I}A = [[2,0,0],[0,1,0],[0,0,1]],$

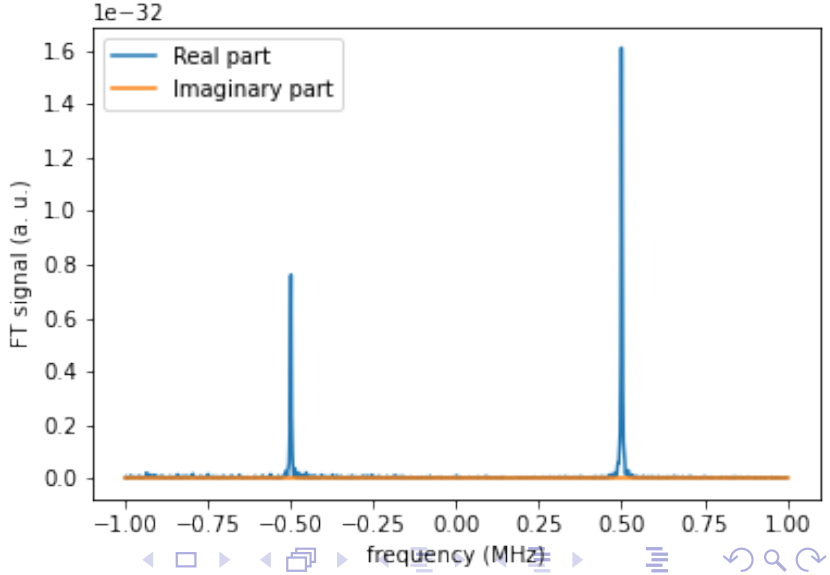
$$\rho_{\text{initial}} \doteq \begin{pmatrix} 0.213 & 0.0 & 0.0 & -0.025 \\ 0.0 & 0.287 & -0.099 & 0.0 \\ 0.0 & -0.099 & 0.287 & 0.0 \\ -0.025 & 0.0 & 0.0 & 0.213 \end{pmatrix}$$

$$\rho_{\text{final}} \doteq \begin{pmatrix} 0.213 & -0.0 & 0.0 & -0.025 \\ -0.0 & 0.287 & -0.099 & 0.0 \\ 0.0 & -0.099 & 0.287 & -0.0 \\ -0.025 & 0.0 & -0.0 & 0.213 \end{pmatrix}$$







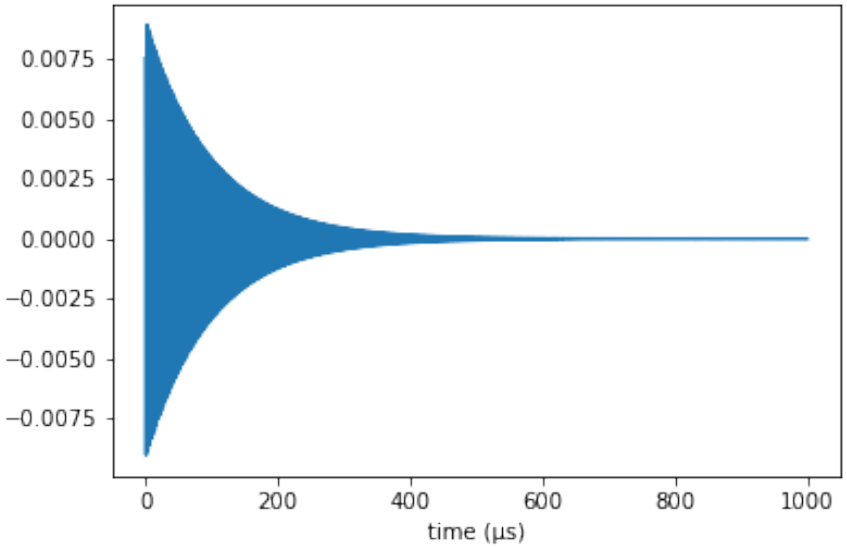


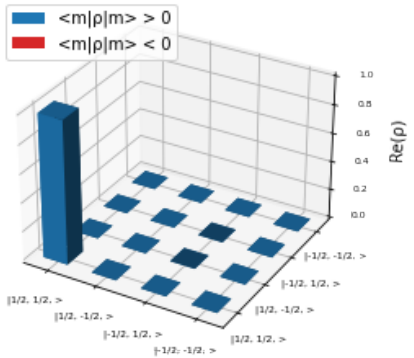
22uncorrelated pure dipD2

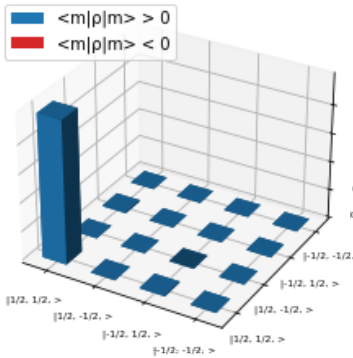
Spin: $0.5, B_0 = 10,$
$\gamma/2\pi = 4.0, \mathcal{H} = \mathsf{I}_z + b_D\left(3\cos^2\theta - 1\right) I_{1z} I_{2z}. b_D \approx 1.571 theta \approx 0.785$

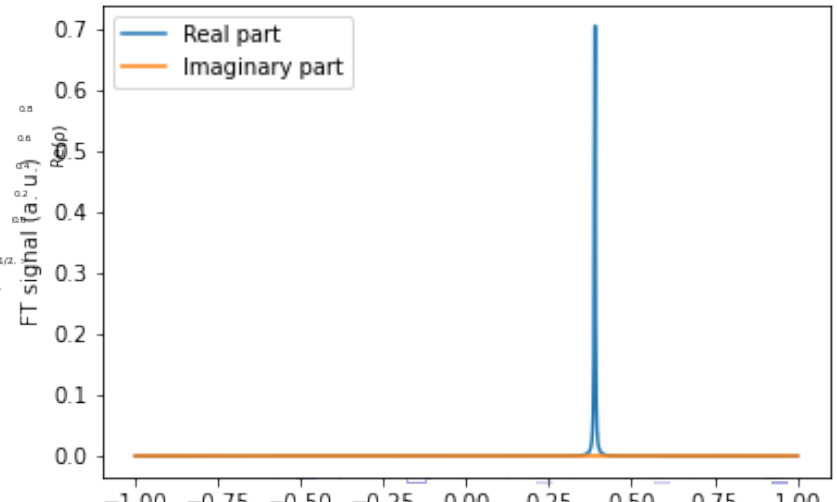
$$\rho_{\text{initial}} \doteq \begin{pmatrix} 1.0 & 0.0 & 0.0 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.0 \end{pmatrix}$$

$$\rho_{\text{final}} \doteq \begin{pmatrix} 1.0 & 0.0 & 0.008 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.0 \\ 0.008 & 0.0 & 0.0 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.0 \end{pmatrix}$$







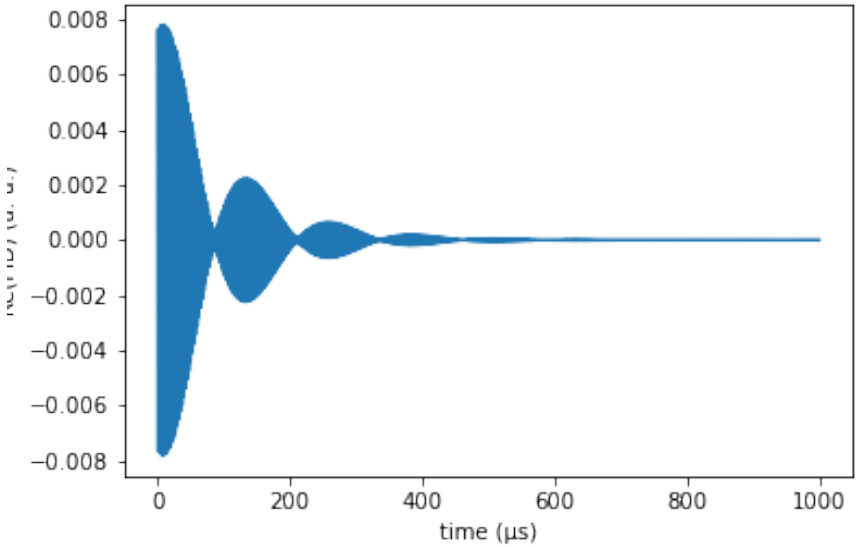


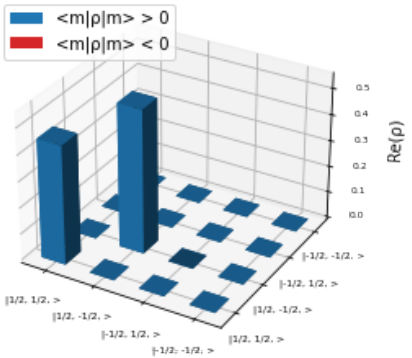
12uncorrelated mixed dipD2

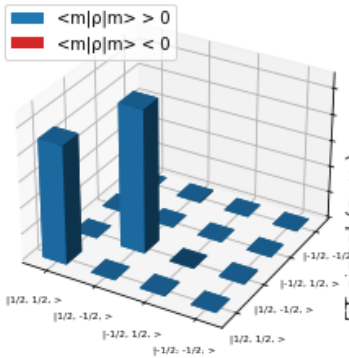
Spin: $0.5, B_0 = 10,$
$\gamma/2\pi = 4.0, \mathcal{H} = \mathsf{I}_z + b_D\left(3\cos^2\theta - 1\right) I_{1z} I_{2z}. b_D \approx 1.571 theta \approx 0.785$

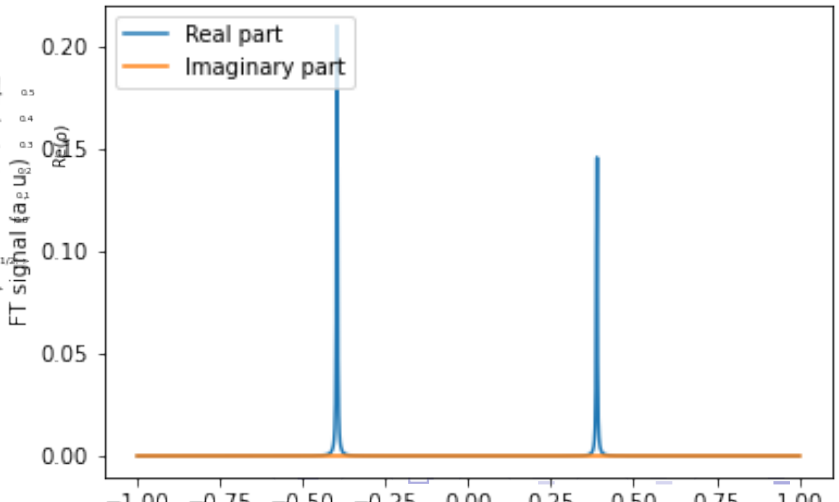
$$\rho_{\text{initial}} \doteq \begin{pmatrix} 0.453 & 0.0 & 0.0 & 0.0 \\ 0.0 & 0.547 & 0.0 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.0 \end{pmatrix}$$

$$\rho_{\text{final}} \doteq \begin{pmatrix} 0.453 & 0.0 & 0.003 & 0.0 \\ 0.0 & 0.547 & 0.0 & 0.004 \\ 0.003 & 0.0 & 0.0 & 0.0 \\ 0.0 & 0.004 & 0.0 & 0.0 \end{pmatrix}$$







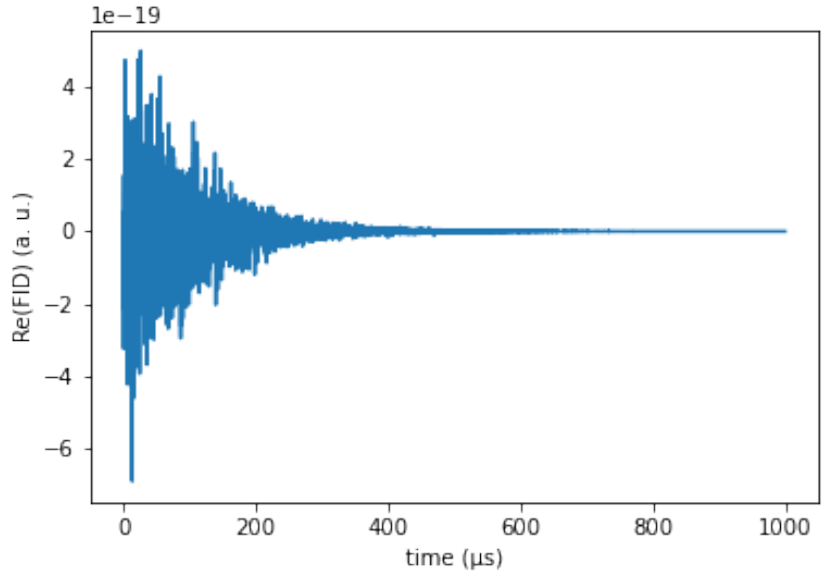


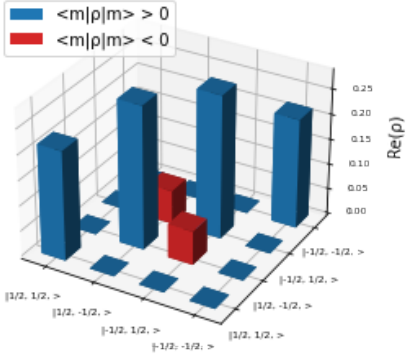
13uncorrelated mixed hyperfine

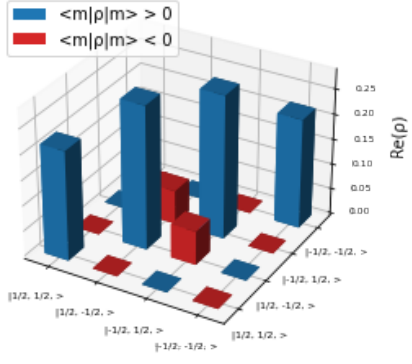
Spin: $0.5, B_0 = 10,\ \gamma/2\pi = 4.0, \mathcal{H} = \mathsf{I}_z + \hat{S}\tilde{A}\hat{I}A = [[1,0,0],[0,1,0],[0,0,1]],$

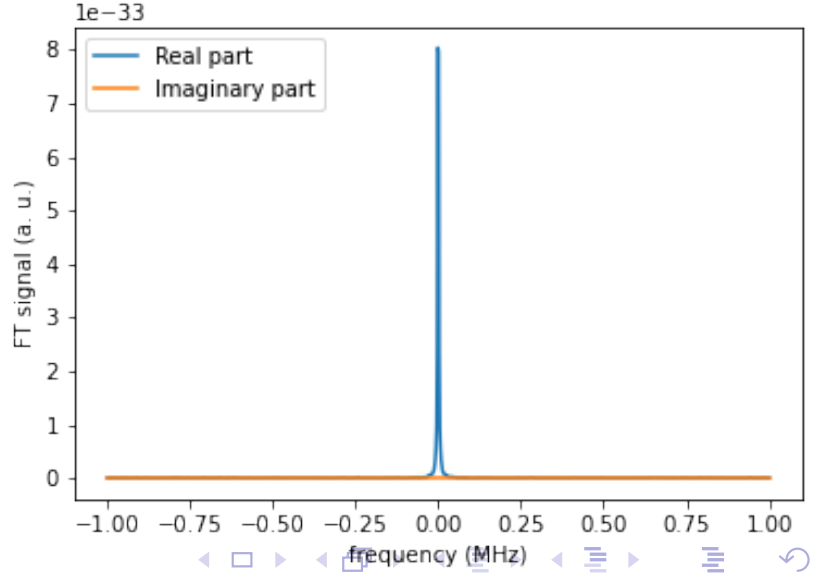
$$\rho_{\text{initial}} \doteq \begin{pmatrix} 0.217 & 0.0 & 0.0 & 0.0 \\ 0.0 & 0.283 & -0.067 & 0.0 \\ 0.0 & -0.067 & 0.283 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.217 \end{pmatrix}$$

$$\rho_{\text{final}} \doteq \begin{pmatrix} 0.217 & -0.0 & 0.0 & -0.0 \\ -0.0 & 0.283 & -0.067 & 0.0 \\ 0.0 & -0.067 & 0.283 & -0.0 \\ -0.0 & 0.0 & -0.0 & 0.217 \end{pmatrix}$$







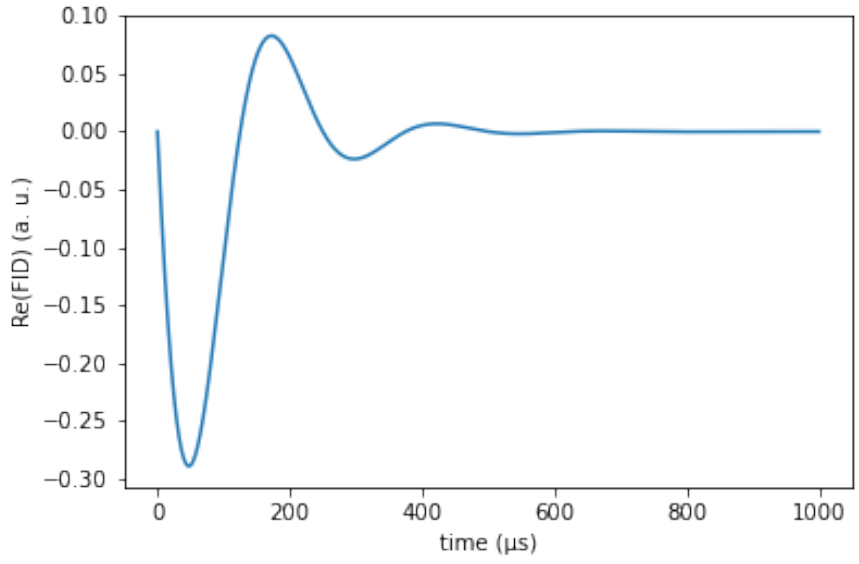


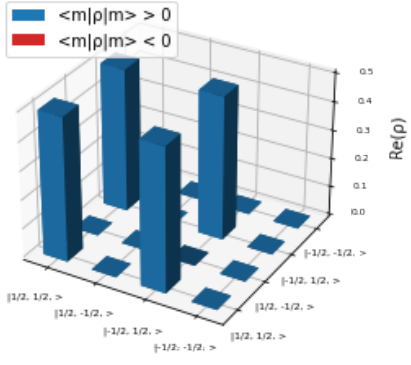
31correlated pure no interactions

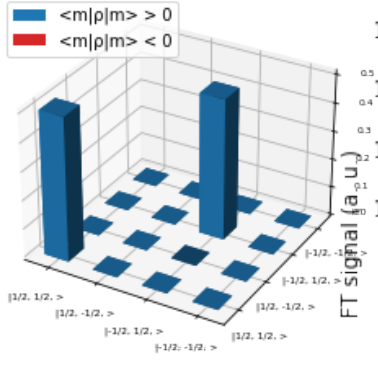
Spin: $0.5, B_0 = 10,\ \gamma/2\pi = 4.0, \mathcal{H} = \mathsf{I}_z$

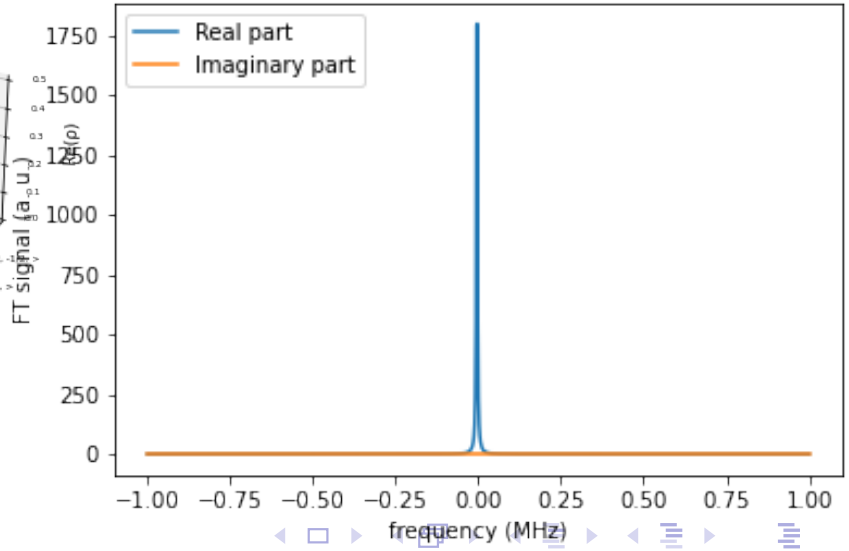
$$\rho_{\text{initial}} \doteq \begin{pmatrix} 0.5 & 0.0 & 0.5 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.0 \\ 0.5 & 0.0 & 0.5 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.0 \end{pmatrix}$$

$$\rho_{\text{final}} \doteq \begin{pmatrix} 0.505 & 0.0 & 0.0 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.0 \\ 0.0 & 0.0 & 0.495 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.0 \end{pmatrix}$$







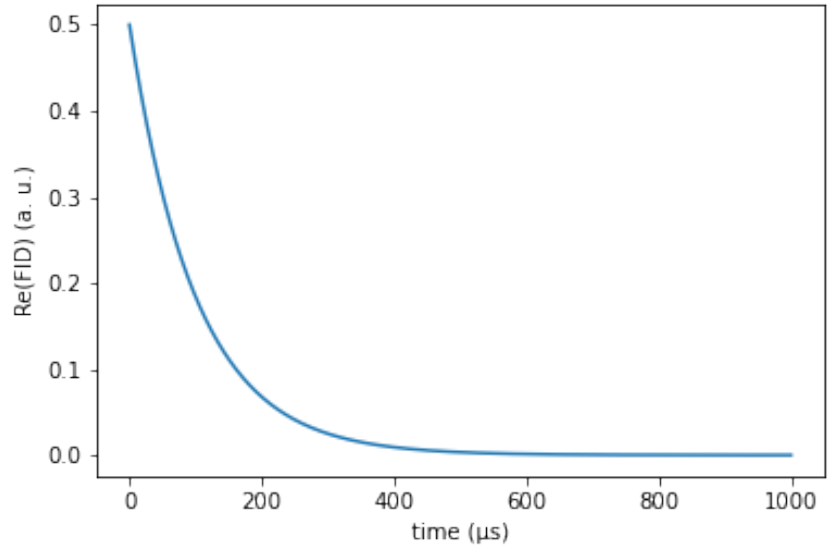


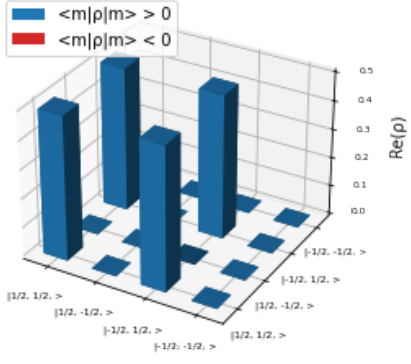
33correlated pure hyperfine

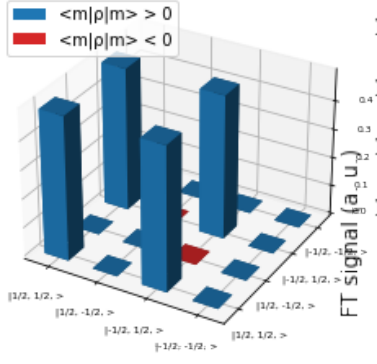
Spin: $0.5, B_0 = 10,\ \gamma/2\pi = 4.0, \mathcal{H} = \mathsf{I}_z + \hat{S}\tilde{A}\hat{I}A = [[1,0,0],[0,1,0],[0,0,1]],$

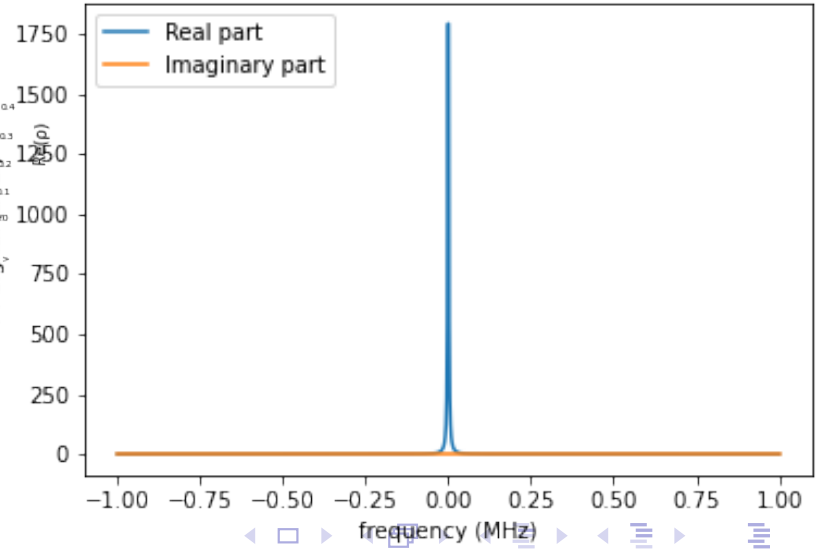
$$\rho_{\text{initial}} \doteq \begin{pmatrix} 0.5 & 0.0 & 0.5 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.0 \\ 0.5 & 0.0 & 0.5 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.0 \end{pmatrix}$$

$$\rho_{\text{final}} \doteq \begin{pmatrix} 0.5 & 0.0 & 0.5 & 0.0 \\ 0.0 & 0.0 & -0.0 & 0.0 \\ 0.5 & -0.0 & 0.5 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.0 \end{pmatrix}$$







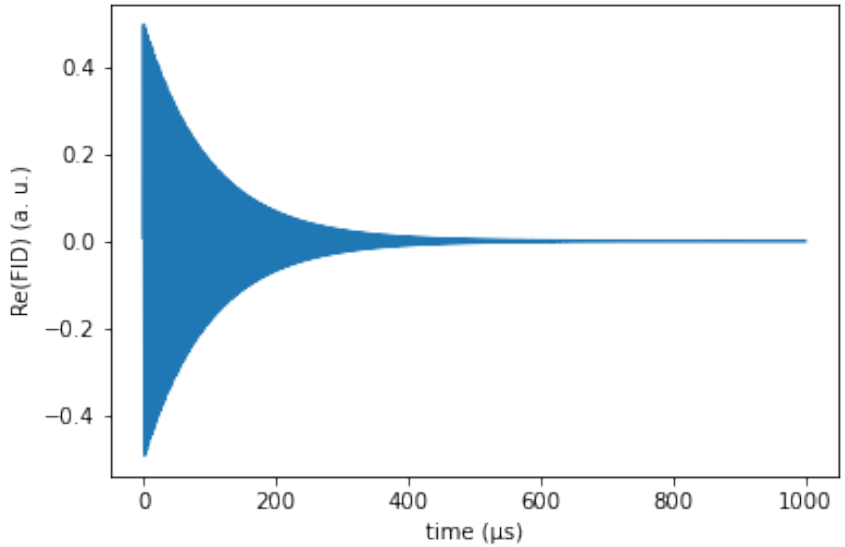


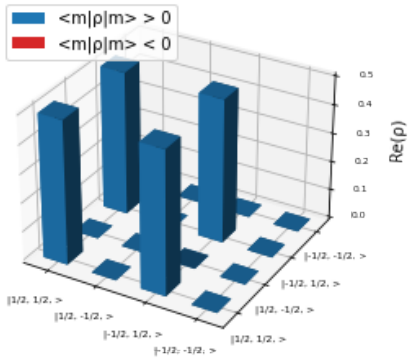
32correlated pure dipD2

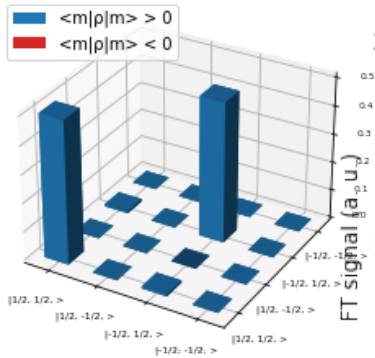
Spin: $0.5, B_0 = 10,$
$\gamma/2\pi = 4.0, \mathcal{H} = \mathsf{I}_z + b_D\left(3\cos^2\theta - 1\right) I_{1z} I_{2z}. b_D \approx 1.571 theta \approx 0.785$

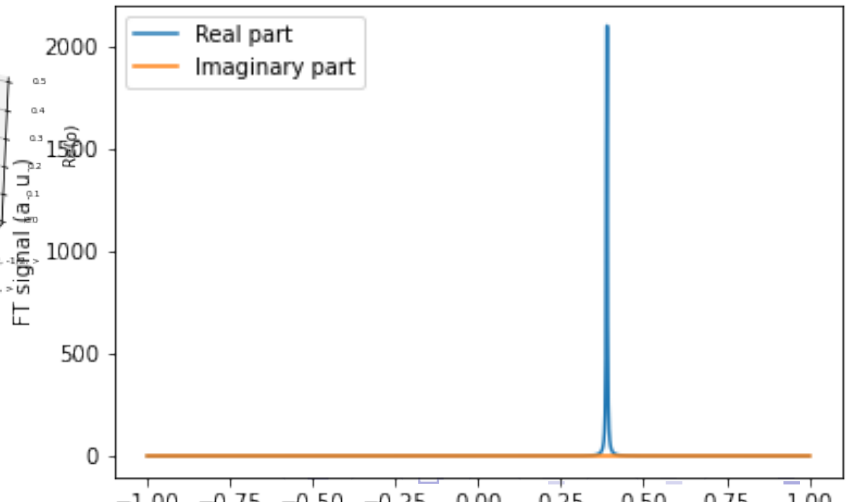
$$\rho_{\text{initial}} \doteq \begin{pmatrix} 0.5 & 0.0 & 0.5 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.0 \\ 0.5 & 0.0 & 0.5 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.0 \end{pmatrix}$$

$$\rho_{\text{final}} \doteq \begin{pmatrix} 0.505 & 0.0 & 0.008 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.0 \\ 0.008 & 0.0 & 0.495 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.0 \end{pmatrix}$$







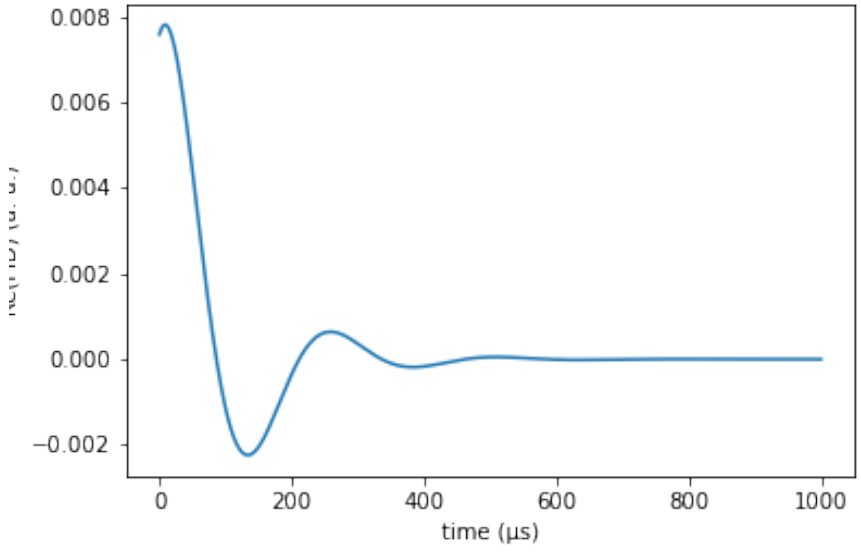


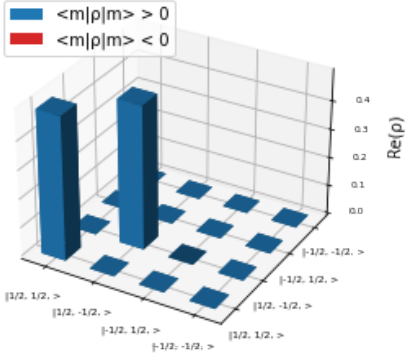
11uncorrelated mixed no interactions

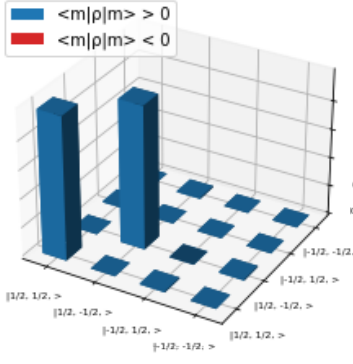
Spin: $0.5, B_0 = 10,\ \gamma/2\pi = 4.0, \mathcal{H} = \mathsf{I}_z$

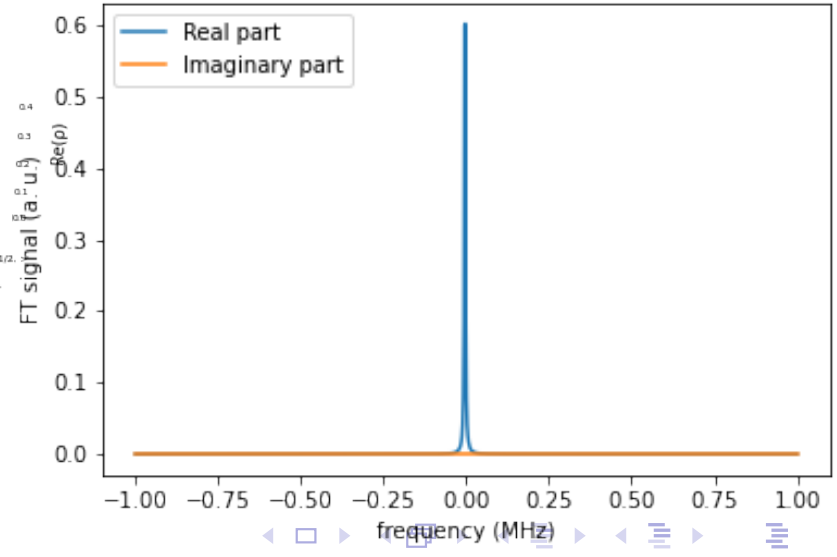
$$\rho_{\text{initial}} \doteq \begin{pmatrix} 0.5 & 0.0 & 0.0 & 0.0 \\ 0.0 & 0.5 & 0.0 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.0 \end{pmatrix}$$

$$\rho_{\text{final}} \doteq \begin{pmatrix} 0.5 & 0.0 & 0.004 & 0.0 \\ 0.0 & 0.5 & 0.0 & 0.004 \\ 0.004 & 0.0 & 0.0 & 0.0 \\ 0.0 & 0.004 & 0.0 & 0.0 \end{pmatrix}$$







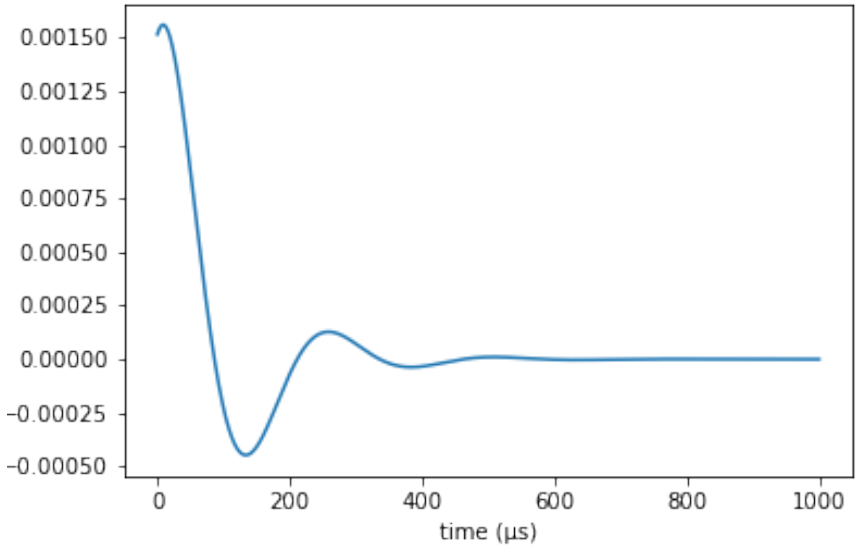


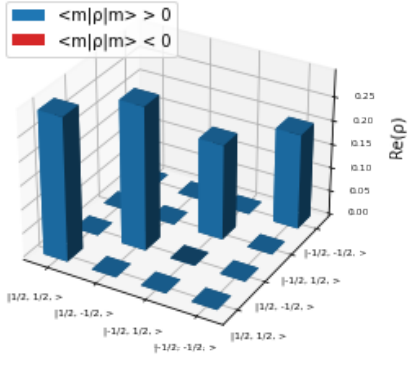
41correlated mixed no interaction

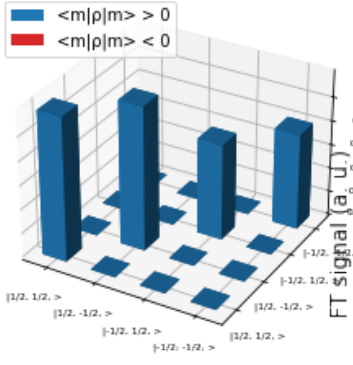
Spin: $0.5, B_0 = 10,\ \gamma/2\pi = 4.0, \mathcal{H} = \mathsf{I}_z$

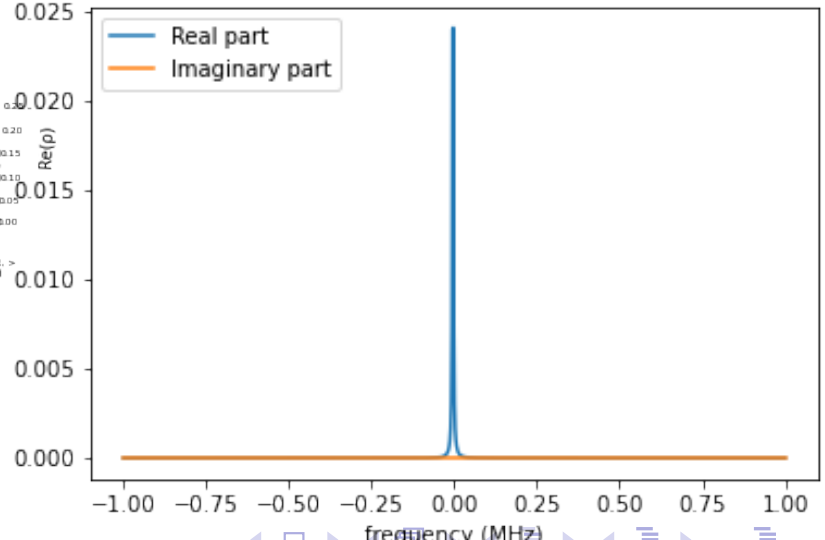
$$\rho_{\text{initial}} \doteq \begin{pmatrix} 0.3 & 0.0 & 0.0 & 0.0 \\ 0.0 & 0.3 & 0.0 & 0.0 \\ 0.0 & 0.0 & 0.2 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.2 \end{pmatrix}$$

$$\rho_{\text{final}} \doteq \begin{pmatrix} 0.3 & 0.0 & 0.001 & -0.0 \\ 0.0 & 0.3 & -0.0 & 0.001 \\ 0.001 & -0.0 & 0.2 & 0.0 \\ -0.0 & 0.001 & 0.0 & 0.2 \end{pmatrix}$$







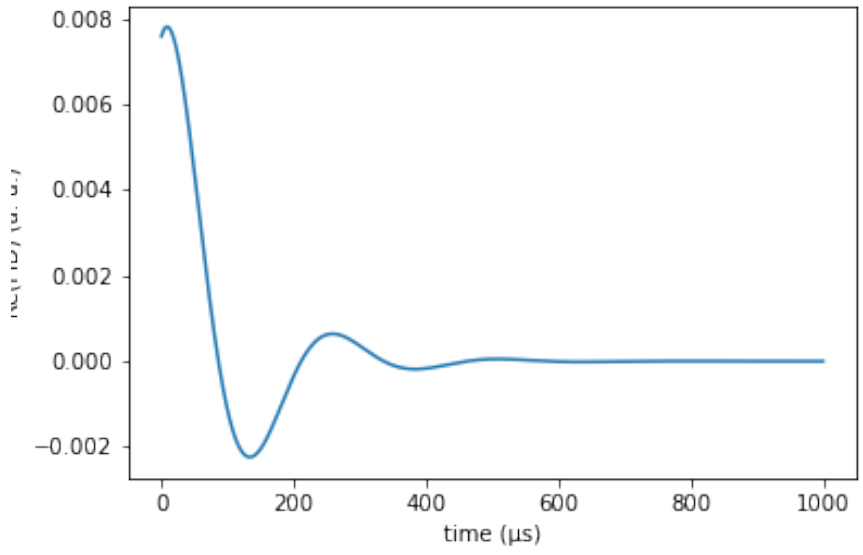


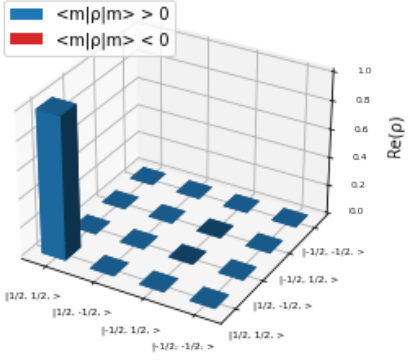
21uncorrelated pure no interactions

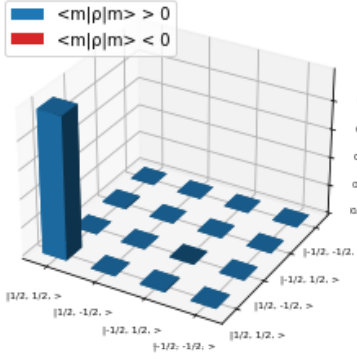
Spin: $0.5, B_0 = 10,\ \gamma/2\pi = 4.0, \mathcal{H} = \mathsf{I}_z$

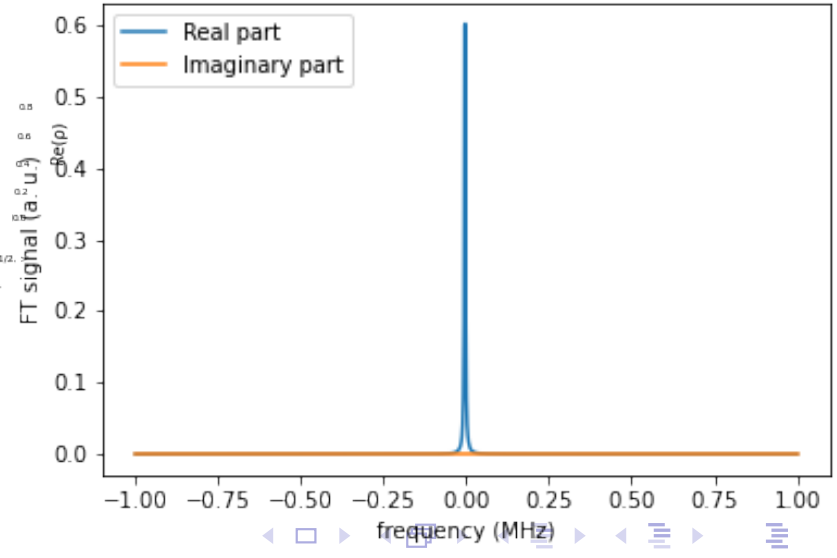
$$\rho_{\text{initial}} \doteq \begin{pmatrix} 1.0 & 0.0 & 0.0 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.0 \end{pmatrix}$$

$$\rho_{\text{final}} \doteq \begin{pmatrix} 1.0 & 0.0 & 0.008 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.0 \\ 0.008 & 0.0 & 0.0 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.0 \end{pmatrix}$$







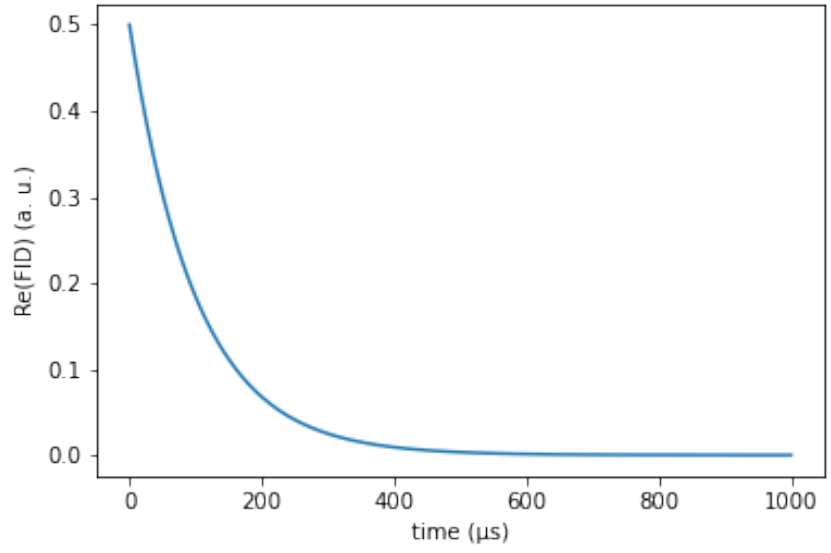


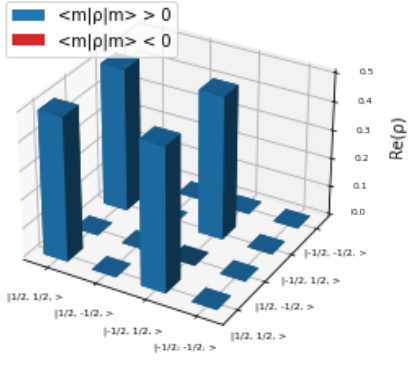
34correlated pure hyperfineAnisotrop

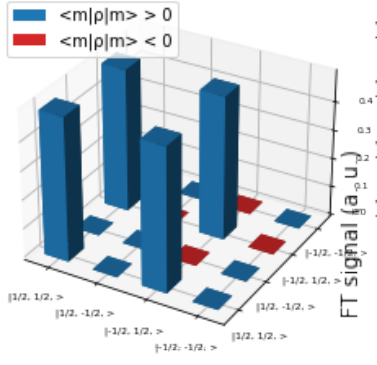
Spin: $0.5, B_0 = 10,\ \gamma/2\pi = 4.0, \mathcal{H} = \mathsf{I}_z + \hat{S}\tilde{A}\hat{I}A = [[2,0,0],[0,1,0],[0,0,1]],$

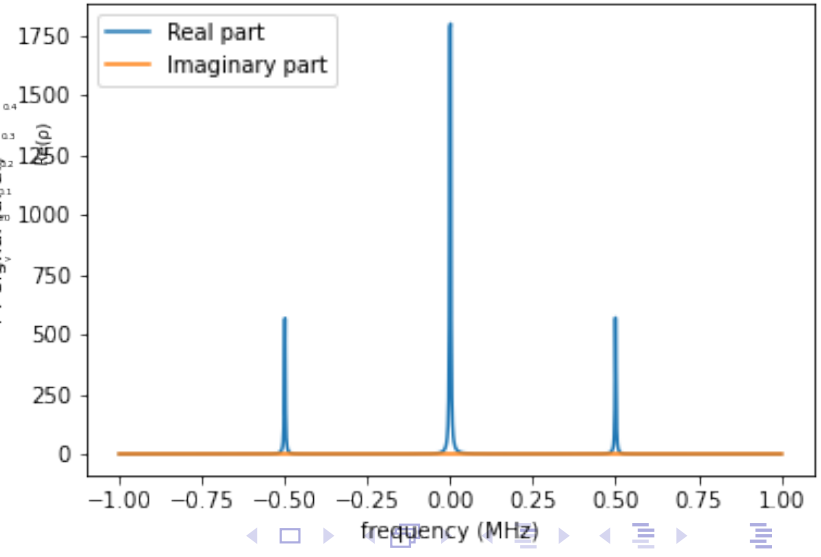
$$\rho_{\text{initial}} \doteq \begin{pmatrix} 0.5 & 0.0 & 0.5 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.0 \\ 0.5 & 0.0 & 0.5 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.0 \end{pmatrix}$$

$$\rho_{\text{final}} \doteq \begin{pmatrix} 0.5 & 0.0 & 0.5 & 0.0 \\ 0.0 & 0.0 & -0.0 & 0.0 \\ 0.5 & -0.0 & 0.5 & -0.0 \\ 0.0 & 0.0 & -0.0 & 0.0 \end{pmatrix}$$







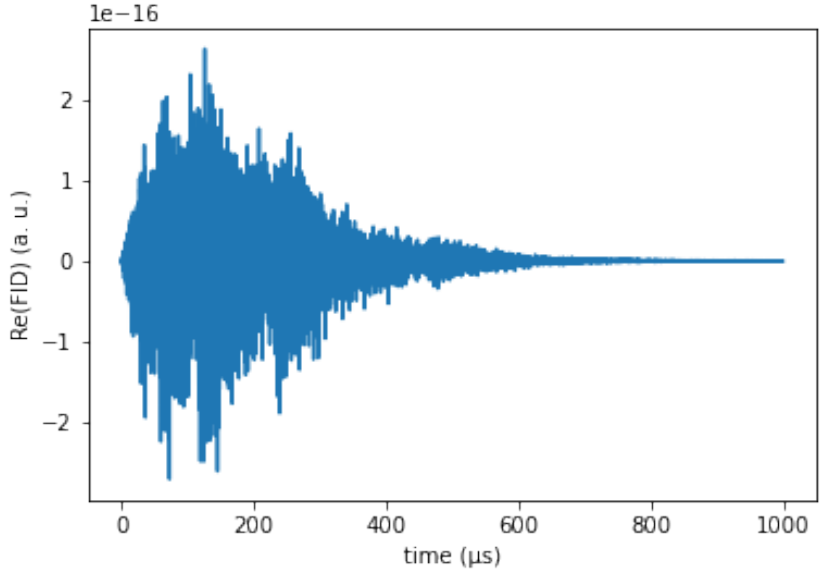


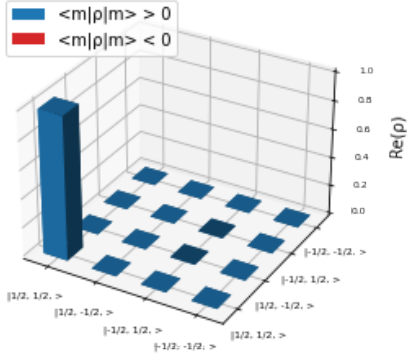
23uncorrelated pure hyperfine

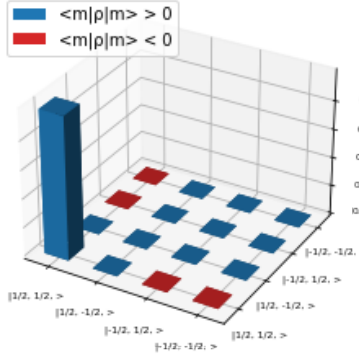
Spin: $0.5, B_0 = 10,\ \gamma/2\pi = 4.0, \mathcal{H} = \mathrm{I}_z + \hat{S}\tilde{A}\hat{I}A = [[1,0,0],[0,1,0],[0,0,1]],$

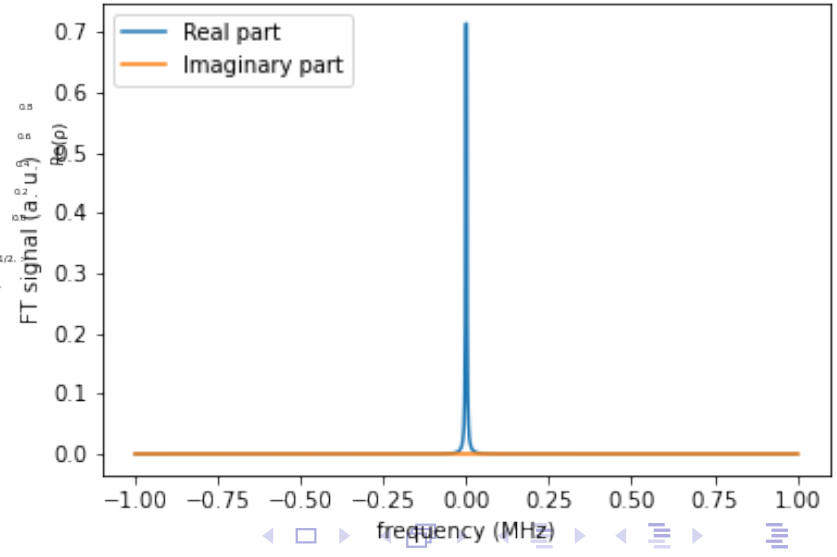
$$\rho_{\text{initial}} \doteq \begin{pmatrix} 1.0 & 0.0 & 0.0 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.0 \end{pmatrix}$$

$$\rho_{\text{final}} \doteq \begin{pmatrix} 1.0 & 0.0 & -0.0 & -0.0 \\ 0.0 & 0.0 & 0.0 & 0.0 \\ -0.0 & 0.0 & 0.0 & 0.0 \\ -0.0 & 0.0 & 0.0 & 0.0 \end{pmatrix}$$









24uncorrelated pure hyperfineAnisotrop

Spin: $0.5, B_0 = 10,\ \gamma/2\pi = 4.0, \mathcal{H} = \mathsf{I}_z + \hat{S}\tilde{A}\hat{I}A = [[2,0,0],[0,1,0],[0,0,1]],$

$$\rho_{\text{initial}} \doteq \begin{pmatrix} 1.0 & 0.0 & 0.0 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.0 \\ 0.0 & 0.0 & 0.0 & 0.0 \end{pmatrix}$$

$$\rho_{\text{final}} \doteq \begin{pmatrix} 1.0 & 0.0 & -0.0 & -0.0 \\ 0.0 & 0.0 & 0.0 & -0.0 \\ -0.0 & 0.0 & 0.0 & -0.0 \\ -0.0 & -0.0 & -0.0 & 0.0 \end{pmatrix}$$