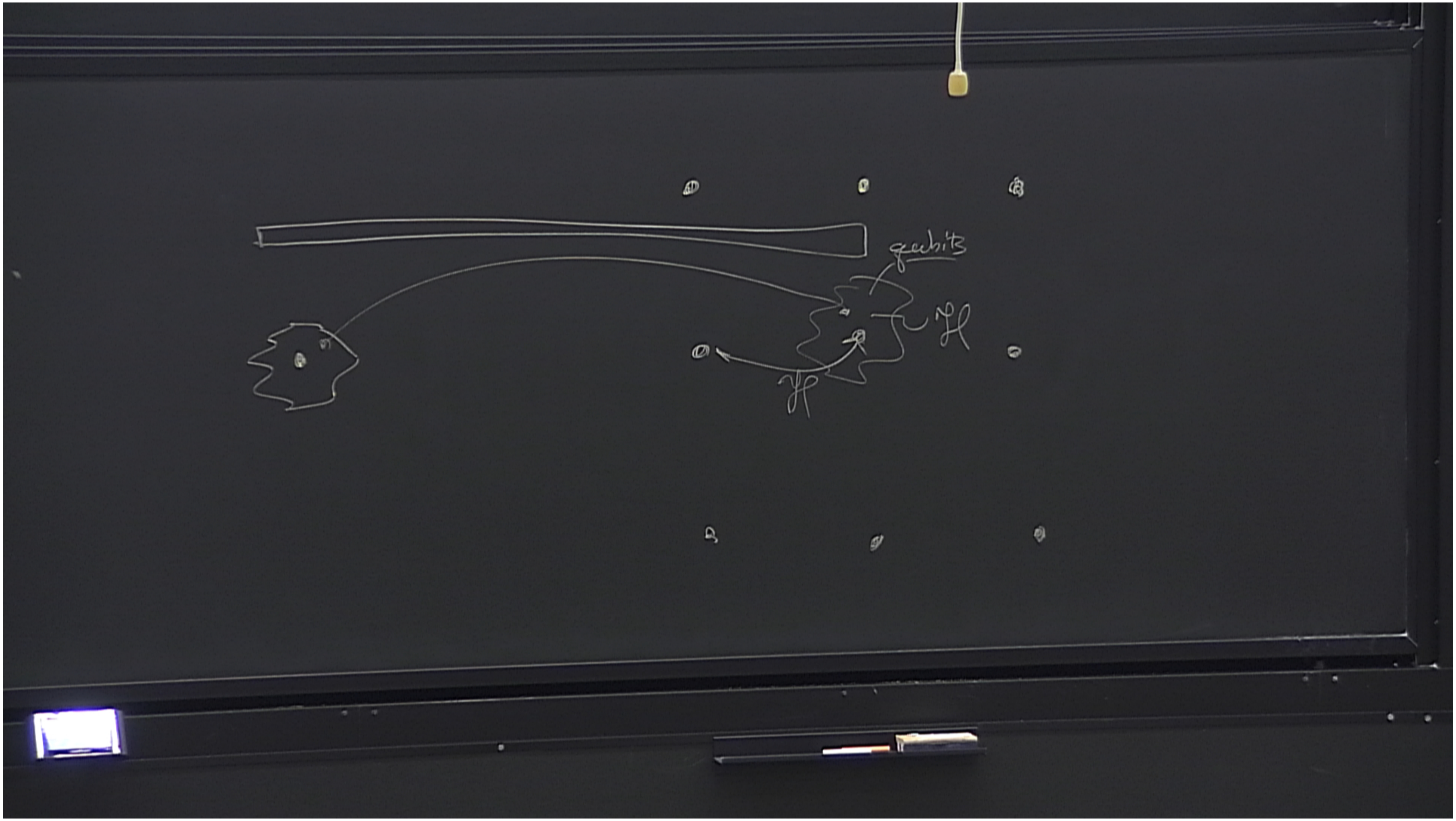
Title: Explorations in Quantum Information-10

Date: Mar 27, 2015 09:00 AM

URL: http://pirsa.org/15030029

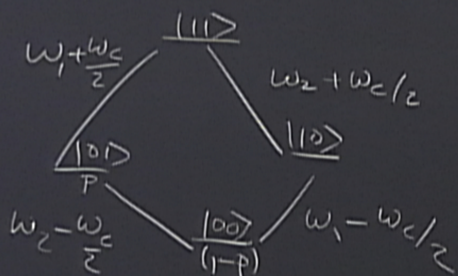
Abstract:



qubits

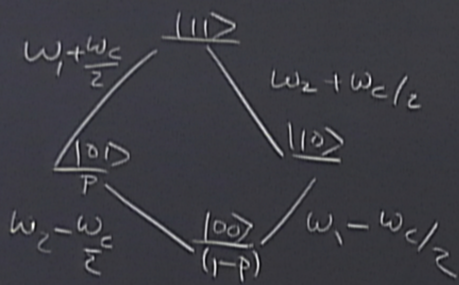
- low errors when there is noise.
- a complete set of high fidelity gates.
- parallel QEC
- distant gates

2 qubits ; $\mathcal{H} = \omega_1 \sigma_z^1 + \omega_2 \sigma_z^2 + \omega_c \sigma_z^1 \sigma_z^2 \begin{cases} \sigma_z \sigma_z \\ \sigma_x \sigma_x + \sigma_y \sigma_y = \sigma_+ \sigma_- - \sigma_- \sigma_+ \\ \sigma \cdot \sigma \end{cases}$



$$\rho_{eq} = (1-p) \underbrace{E_+ E_+}_{\frac{(\mathbb{1}+\sigma_z)(1+\sigma_z)}{4}} + p \underbrace{E_+ E_-}_{\frac{(\mathbb{1}+\sigma_z)(1-\sigma_z)}{4}} = \frac{\mathbb{1}}{4} \left[\frac{\sigma_z^1 + (1-2p)\sigma_z^2 + (1-2p)\sigma_z \sigma_z}{4} \right]$$

2 qubits ; $\mathcal{H} = \omega_1\sigma_z^1 + \omega_2\sigma_z^2 + \omega_c\sigma_z^1\sigma_z^2 \begin{cases} \sigma_z\sigma_z \\ \sigma_x\sigma_x + \sigma_y\sigma_y = \sigma_+\sigma_- + \sigma_-\sigma_+ \\ \sigma\cdot\sigma \end{cases}$

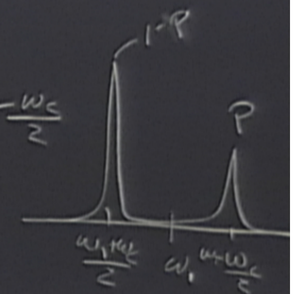


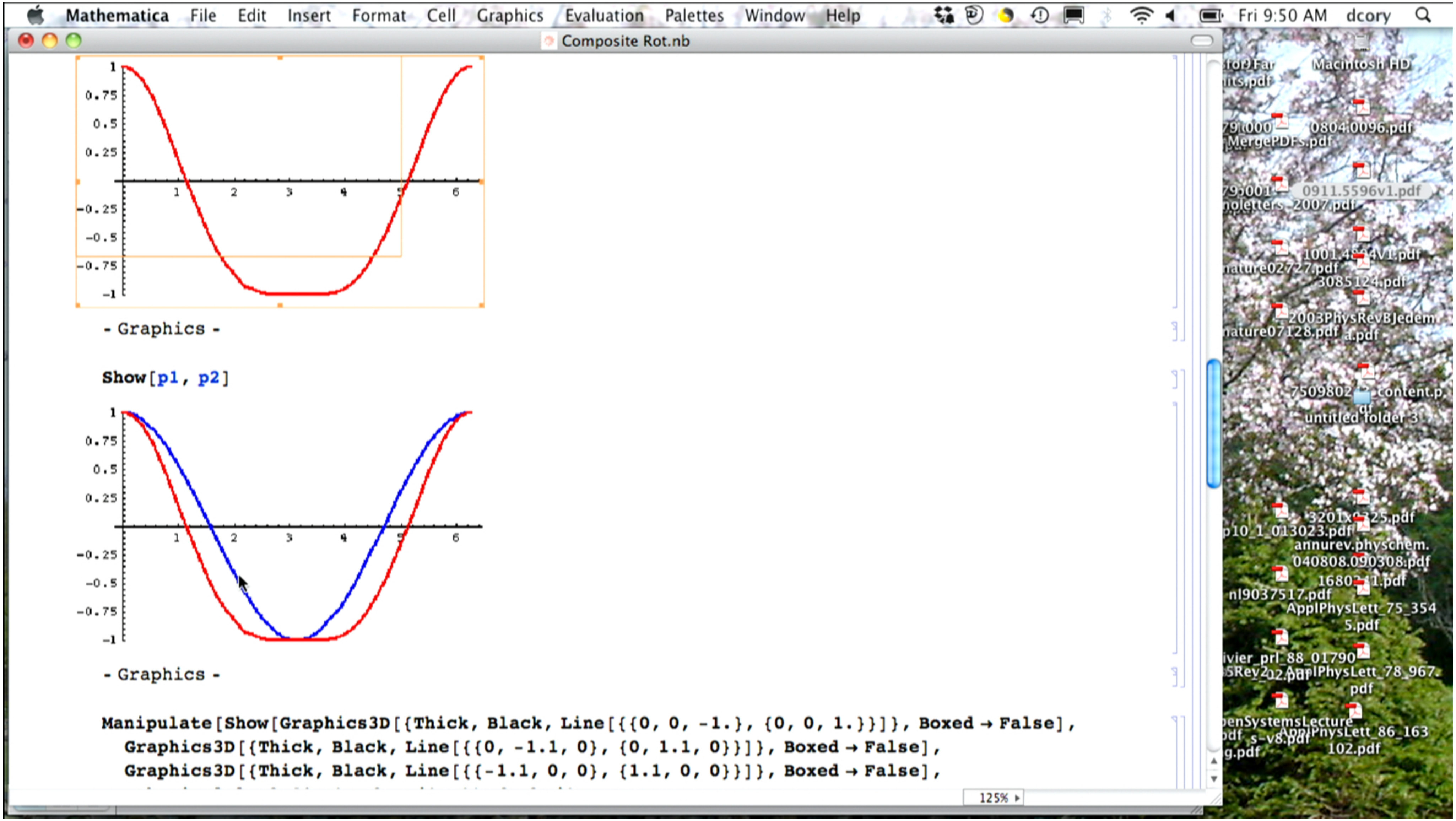
$$\rho_{eq} = (1-p)\underbrace{E_+E_+}_{\frac{(1+\sigma_z)(1+\sigma_z)}{4}} + p\,\underbrace{E_+E_-}_{\frac{(1+\sigma_z)(1-\sigma_z)}{4}} = \frac{1}{4}\left[\sigma_z^1 + (1-2p)\sigma_z^2 + (1-2p)\sigma_z\sigma_z\right]$$

Ramsey on qubit 1

$$\underbrace{\sigma_x^1}_{\to\sigma_y} + (1-2p)\underbrace{\sigma_x^1\sigma_z^2}_{\sigma_y\sigma_z}$$

$$(1-p)\,\underbrace{\sigma_x^1 E_+}_{\omega_1+\frac{\omega_c}{2}} + p\,\underbrace{\sigma_x^1 E_-}_{\omega_1-\frac{\omega_c}{2}}$$





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- Graphics -
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- Graphics -
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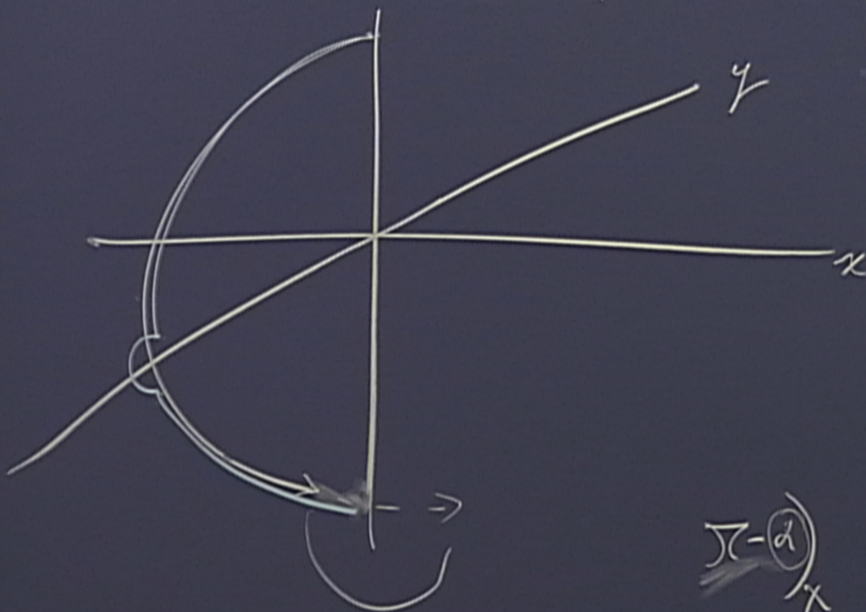
π_x



$$\left.\tfrac{\pi}{2}\right)_x \left.\pi\right)_y \left.\tfrac{\pi}{2}\right)_x$$

$$\left.\pi-\alpha\right)_x = \left.\tfrac{\pi}{2}-\varepsilon\right)_x \left.\pi-2\varepsilon\right)_y \left.\tfrac{\pi}{2}-\varepsilon\right)_x$$