

Phase control in the vibrational qubit

Meiyu Zhao and Dmitri Babikov^{a)}

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$$\Delta\varphi \neq 0$$

$$|\langle \psi(\alpha, \theta) | \phi \rangle| = \frac{1}{\sqrt{2}} \sqrt{1 - \cos(\alpha - \theta)} \quad (1)$$

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$$\begin{aligned} \alpha = 0, \theta = 0 & \quad 1 \\ \alpha = \frac{\pi}{2}, \theta = 0 & \quad 1 \end{aligned}$$

$$\frac{1}{2} \left| \sum_1 \langle \phi_i | \psi(\cdot) \rangle \right| \quad (1)$$

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$$\begin{aligned}
 & \frac{1}{\sqrt{2}} \left(|0\rangle + e^{i\Delta\varphi} |1\rangle \right) \\
 & \text{where } \Delta\varphi = \alpha + \theta
 \end{aligned}$$

C. Hadamard transform

$$|0\rangle \rightarrow$$

III. CONCLUSIONS

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ACKNOWLEDGMENTS

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