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Errata: A Quantum Computation Workbook

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Contents

Chapter 1

Postulates of Quantum Mechanics

Problem 1.10 (a), p. 30 The words "first" and "second" in the statements must be exchanged (p_2 should also be replaced with p_1 to be consistent with the rest subquestions). The correct statement should read as

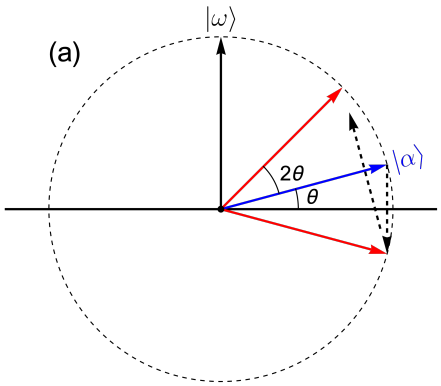
> What is the probability p_0 to find the *second* qubit in $|0\rangle$ (regardless of the *first* qubit)? Similarly, what is the probability p_1 to find the *second* qubit in the state $|1\rangle$?

Chapter 4

Quantum Algorithms

Fig. 4.4b "... with respect to ω ..." $\rightarrow$ "... with respect to $|v\rangle$ ..."

Fig. 4.5a $\theta, \theta/2 \rightarrow 2\theta, \theta$, respectively. Here is the correct figure for Fig. 4.5**a**:



Below Eq. (4.64) on page 161 "... performing the transformation $\hat{U}$ repeatedly depending on the value y on the native register." $\rightarrow$ "... performing the transformation $\hat{U}$ repeatedly depending on value x on the native register."

Problem 4.1 (a) "Classically (...), ..." –> "Show that classically (...), ...".

Chapter 5

Quantum Decoherence

Section 5.1 In several places, "Zender" must be corrected to "Zehnder".

Section 5.1, p.191, the last line "In the blue arm, photon passes through ..." → "In the red arm, photon passes through ...".

Section 5.1, p.194, below Eq. (5.6) "Whence the photon detection probabilities ..." → "Hence the photon detection probabilities...".

Section 5.3, p.216, line 8 "...probabilities $\mathscr{F}_m(\hat{\rho})$" must reads as "...probabilities $\mathrm{Tr}\,\mathscr{F}_m(\hat{\rho})$".

Section 5.4, Eq. (5.99) It should read as

$$\hat{G} = \frac{1}{2}\sum_{\mu>0} \hat{L}_\mu^\dagger \hat{L}_\mu \,.$$

Section 5.4, Eq. (5.147) It should read as

$$\frac{d\hat{\rho}}{dt} = \cdots \,.$$

Section 5.5, the first sentence, p. 234 "..., who close (or different) ..." → "..., how close (or different) ...".

Section 5.5.2, p. 236, just below Eq. (5.164) "... the canonical norm associate with ..." → "... the canonical norm associated with ...".

Section 5.5.2, p. 237, just below Eq. (5.177) "... traceless Hermitian operators (a_0) ..." → "... traceless Hermitian operators ($a_0 = 0$) ...".

Section 5.5.3, p. 244, the first line "associate with a POVM ..." → "associated with a POVM ...".

Section 5.5.4, p. 247, below Eq. (5.209) "... of two vectors normalized vectors ..." → "... of two normalized vectors ...".

Section 5.5.4, p. 248, below Eq. (5.215) "... to note that $\hat{\rho}$ as two eigenvalues ..." $\rightarrow$ "... to note that $\hat{\rho}$ has two eigenvalues ...".

Problem 5.4, p. 252, Eq.(5.234) $\gamma_1 \rightarrow \gamma_\phi$

Chapter 6

Quantum Error-Correction Codes

Section 6.3.4, p. 288. Eq. (6.75)

$$\hat{U}(|0\rangle \otimes |\alpha\rangle) = |0\rangle \otimes |\alpha_0\rangle + |1\rangle \otimes \hat{A}\,|\alpha_1\rangle = \cdots$$

must be changed to

$$\hat{U}(|0\rangle \otimes |\alpha\rangle) = |0\rangle \otimes |\alpha_0\rangle + |1\rangle \otimes \hat{A}\,|\alpha_0\rangle = \cdots .$$

Section 6.4, p. 298, above Eq. (6.101) "whence" → "hence".

Appendix A

Linear Algebra

Appendix A.1.2, p. 351, above Eq. (A.5) "Whence u is orthogonal ..." $\rightarrow$ "Hence u is orthogonal ...".

Appendix A.4.1, p. 364, above Eq. (A.55) "Whence, $\hat{A} \geq 0$." $\rightarrow$ "Hence, $\hat{A} \geq 0$."

Appendix B

Superoperators

Appendix B.2.3 between Eqs. (B.30) and (B.31) $\{v_j\} \to \{|v_j\rangle\}$ and $|w_k\rangle \to \{|w_k\rangle\}$

Eq. (B.56) $|\Psi\rangle\langle\Psi|$ should be replaced by $|\Phi\rangle\langle\Phi|$.

Appendix B.4, p. 393, the second last line "Whence, transposition ..." $\to$ "Hence, transposition ...".

Appendix F

Solutions

Problem 6.7, p. 422, the display equation between (F.58) and (F.59) $\hat{W}$ must be replaced with $\hat{P}'''$, i.e.,

$$\cdots(\hat{Z}\otimes\hat{W})\cdots \quad \to \quad \cdots(\hat{Z}\otimes\hat{P}''')\cdots$$