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# Errata: A Quantum Computation Workbook

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## 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

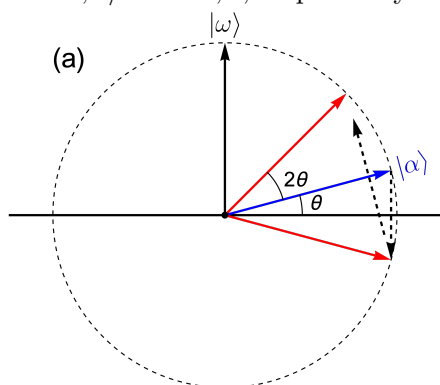
What is the probability  $p_0$  to find the *second* qubit in  $|0\rangle$  (regardless of the *first* qubit)? Similarly, what is the probability  $p_1$  to find the *second* qubit in the state  $|1\rangle$ ?

# Chapter 4

## Quantum Algorithms

**Fig. 4.4b** “... with respect to  $\omega$  ...”  $\rightarrow$  “... with respect to  $|v\rangle$  ...”

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



**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 (...), ...”  $\rightarrow$  “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  $\mathcal{F}_m(\hat{\rho})$ ” must reads as “...probabilities  $\text{Tr } \mathcal{F}_m(\hat{\rho})$ ”.

**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

$$\frac{d\hat{\rho}}{dt} = \dots .$$

**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)**

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

must be changed to

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

**Section 6.4, p. 298, above Eq. (6.101)** “whence”  $\rightarrow$  “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)**  $\{v_j\} \rightarrow \{|v_j\rangle\}$  and  $|w_k\rangle \rightarrow \{|w_k\rangle\}$

**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 ...”  $\rightarrow$  “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.,

$$\dots(\hat{Z} \otimes \hat{W})\dots \rightarrow \dots(\hat{Z} \otimes \hat{P}''')\dots$$