QUIZ - 1

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Graded Quiz • 30 min

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1. [Answer O, X] — 1 point

Schrödinger equation describes the evolution of a quantum probabilities.

- ○ O
- ◉ X

2. Suppose that a qubit is prepared in a state $|0\rangle$. Then, a measurement is performed in the basis $|\pm\rangle = (|0\rangle \pm |1\rangle)/\sqrt{2}$. What is the probability of obtaining outcome $+$. — 1 point

- ○ (a) 0
- ◉ (b) $1/2$
- ○ (c) 1

3. Suppose that a qubit is prepared in a state $|+\rangle = (|0\rangle + |1\rangle)/\sqrt{2}$. A measurement is performed in the computation basis $\{|0\rangle, |1\rangle\}$. Find the expectation value of an observable $Z = |0\rangle\langle 0| - |1\rangle\langle 1|$. — 1 point

- ○ (a) $-1/2$
- ◉ (b) 0
- ○ (c) $1/2$

4. For Pauli matrix X, compute the eigenvectors. — 1 point

- ○ (a) $\{|0\rangle, |1\rangle\}$
- ◉ (b) $\{|+\rangle, |-\rangle\}$, where $|\pm\rangle = (|0\rangle \pm |1\rangle)\sqrt{2}$
- ○ (c) $\{|+i\rangle, |-i\rangle\}$, where $|\pm i\rangle = (|0\rangle \pm i|1\rangle)\sqrt{2}$

5. For a state $|+\rangle = (|0\rangle + |1\rangle)/\sqrt{2}$, suppose that a phase operation $P(\phi) = |0\rangle\langle 0| + e^{i\phi}|1\rangle\langle 1|$ is applied. When a measurement is performed in the basis $|\pm\rangle = (|0\rangle \pm |1\rangle)/\sqrt{2}$, find the angle ϕ such that the probability of obtaining out $+$ is zero. — 1 point

- ○ (a) $\phi = 0$
- ○ (b) $\phi = \pi/2$
- ◉ (c) $\phi = \pi$

***** Extra question: *****

Quantum theory provides predictions about statistics of measurement outcomes.

Ans: X