

More Ket Practice

Physics II: Modern Physics
College of the Atlantic

1. Let $|\psi\rangle = C(-3i|+\rangle + 2|-\rangle)$. Find the C that makes $\langle\psi|\psi\rangle = 1$.

2. Suppose an atom is in a state described by

$$|\psi\rangle = \frac{3}{5}|+\rangle + \frac{4i}{5}|-\rangle. \quad (1)$$

(a) If one performs a z-spin measurement on this atom, what is the probability that the result would be +1?

(b) If one performs a z-spin measurement on this atom, what is the probability that the result would be -1?

3. The x states are given by:

$$|+\rangle_x = \frac{1}{\sqrt{2}}(|+\rangle + |-\rangle). \quad (2)$$

$$|-\rangle_x = \frac{1}{\sqrt{2}}(|+\rangle - |-\rangle). \quad (3)$$

(a) What is ${}_x\langle + | - \rangle_x$?

(b) Suppose a system is in the +z state and one performs an x-spin measurement. What is the probability of measuring an x-spin value of +?

4. The y states are given by:

$$|+\rangle_y = \frac{1}{\sqrt{2}}(|+\rangle + i|-\rangle). \quad (4)$$

$$|-\rangle_y = \frac{1}{\sqrt{2}}(|+\rangle - i|-\rangle). \quad (5)$$

(a) Suppose a system is in the +z state and one performs a y-spin measurement. What is the probability of measuring an y-spin value of +?

(b) Suppose a system is in the +x state and one performs a y-spin measurement. What is the probability of measuring an y-spin value of +?