Lecture 17 — Concept Test 1

A particle is prepared in the state

$$|\phi\rangle = 0.1\,|A\rangle - i\,0.5\,|B\rangle + c\,|C\rangle$$

What is the probability that a measurement will result in the value associated with state $|B\rangle$?

1. -0.5
2. -0.25
3. $i\,0.5$
4. $i\,0.25$
5. 0.5
6. 0.25

Lecture 17 — Concept Test 2

A particle is prepared in the state

$$|\phi\rangle = 0.1\,|A\rangle - 0.5\,i\,|B\rangle + c\,|C\rangle$$

Which of the following is a possible value for the coefficient c?

1. $-\sqrt{0.74}$
2. 0.74
3. $0.74i$
4. 0.4
5. $0.9 + 0.5\,i$
6. $\sqrt{0.4}$

Lecture 17 — Concept Test 3

A ball is spinning with an angular momentum with magnitude L and pointing in the $+z$-direction (toward the ceiling), so that $L_z = +L$. We now measure the component of spin angular momentum in the x direction, i.e., the horizontal component. What will we find for L_x?

1. 0
2. $L/2$
3. L
4. Either $-L/2$ or $L/2$
5. Either $-L$ or L
6. Anything between $-L$ and L

Lecture 17 — Concept Test 4

Consider an electron with its spin oriented along the $+z$ direction, so $|\psi\rangle = |+z\rangle$. If you measure S_z you will get $+\hbar/2$.

What will you get if you measure the x component of the spin angular momentum?

1. 0
2. $+\hbar/2$
3. $-\hbar/2$
4. Either $+\hbar/2$ or $-\hbar/2$, but you don't know which.

Lecture 17 — Concept Test 5

What can you do to flip a proton's spin such that its magnetic field points in the direction opposite an external magnetic field?

1. You don't have to do anything. It naturally wants to point in that direction.
2. Send in a photon with energy $\mu_p B$
3. Send in a photon with energy $2\mu_p B$
4. Send in a photon with energy $-\mu_p B$
5. There isn't anything you can do to flip the proton.