

Quantum Time Evolution

Two particles are under the influence of an interaction with a Hamiltonian that is proportional to \hat{S}_z . At $t = 0$, one particle is in the state $|+\rangle$ and the other is in the state $|+\rangle_x$.

1. What state is each particle in at a later time t ?
2. What is the probability that you would measure $S_x = \frac{\hbar}{2}$ state at time t ? Does this probability change with time?
3. What is the probability that you would measure $S_z = \frac{\hbar}{2}$ at time t ? Does this probability change with time?
4. Given a Hamiltonian, how would you determine which states are stationary states (states where no probabilities change with time)? Under what circumstances do measurement probabilities change with time?