

Recitation Density Matrix
Quantum 521

1. Consider a mixture of spin-1/2 particles, 3/4 of the particles in the pure state $|+Z\rangle$ and 1/4 of the particles in the pure state $|+X\rangle$. Find the expectation value of the three spin operators.
2. Prove that the time evolution of the density operator (in the usual Schrödinger picture) is

$$\rho(t) = U(t, t_0)\rho(t_0)U^\dagger(t, t_0)$$