

1. inquiry

- (1) Density matrices are a way to represent states. A density matrix is used to represent mixed states ie if you dont know the state of a system but you know that it is one among a bunch of states, you can weight the projectors of each state and sum them up to get their corresponding density matrix. This raises a few questions:
 - (a) why projectors
 - (b) why sum the scaled projectors
 - (c) why scale them probabilities
- (2) The density matrix of a pure state with probability 1 is just the projector of that state. The entries in the projectors of such states get us information about the probability of that basis state occurring; this interpretation works for the diagonal elements, but what about the off diagonal elements which are coefficients of outer product of orthogonal basis states?
- (3) Why sum the projectors? because it is a linear combination? why? because they are all the different possibilities? Then how is the linearity in the superposition of a pure state distinct from the linearity in the different pure states of a mixed state?

2. notes

- (1) What are density matrices? Alternative formulation to represent quantum states.
- (2) Properties of density matrices:
 - (a) hermiticity
 - (b) positive semi definite
 - (c) trace 1
 - (d) projector