

EPR- Einstein-Podolsky-Rose

So according to quantum entanglement, the quantum state of one particle affects the state of the other. Let us take object1 to be in state a and object2 to be in state b. and both are in entanglement. When both states aren't measured, they are in a superposition of both a,b. But when the state of object1,2 are measured with a split second gap, obj1 must send information to the object2 to change its state accordingly. Lets suppose these 2 objects are far apart in the universe. This means the information must travel very fast, faster than the speed of light. But according to the theory of relativity, nothing can travel faster than light. Hence quantum superposition, a basic theory of quantum mechanics is invalid. This is called the epr paradox. Formulated by Einstein, Podolsky and Rose.

This paradox was solved by Bell. He came up with an experiment to see if particles can travel faster than light. When the experiment was proved right, quantum mechanics was also proved to be right.

Hence came the concept of bell states or epr pairs. They are the maximum entangled quantum state of two qbits.