Quantum entangalment

An epr pair is a pair of qubits(or quantum bits) that are in a bell state together

Epr pairs are a perticular case of entangled pairs of Qbits

Quantum entangalment is a physical phenomenan which occurs when pairs or groups of particals are generated or intract in ways such that the quantum state of each patical cannot be described independently of the stste of the other

entangalment is a crucial important resource for quantum computing

typically we use four canonical forms of the bell pairs

they represent all the ways that we can choose to have corelations or anticorrelations between qbit 0/1 sates of the computational basis and the +/- states of the X basis.

these four ststes form a complete basis for two q bits

so any states,entangled or not can be expressed as the superposition of Bell states

because of this Bell ststes can sometimes make our maths easier which is another reason they are used so much

elementary cases of uses of EPR are in as bellow

(1)teleportation

(2)Superdense coading

(3)and upon those pieces peopel have built more sophisticated applications

For bell state when we measure first qubit, the second qbit is detwrmined. However if two qbits are far apart then the second qbit must have had a determinedstate in some time intervel before measurement,since the speed of light is finate.

Moreover this holds in any basis.