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What has Entanglement in common with Tunneling?

Günter Nimtz and Horst Aichmann*
II. Physikalisches Institut, Universität zu Köln,
**Zur Bitz 1, Bad Nauheim/Germany*

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Recently the illusion of time and space was observed in tunneling [1]. Is this illusion the basis for entanglement? Incidentally: tunneling a barrier takes place in no time and displays no locality. In the tunneling process the wave packet enters the potential barrier and in no time the wave packet is leaving the barrier. Both wave packets appear at the same time and no localization of the wave packet is observed inside the barrier. The entanglement presents this illusion of time and space [1].

Text

Both tunneling and entanglement are quantum mechanical phenomena. Entanglement – a spooky action as called by Einstein – displays some properties similar to the tunneling process. Both phenomena transfer signal changes and with that – information in zero time [2,3]. In tunneling the exit wave packet of the potential barrier is correlated instantaneously with the wave packet at the barrier entrance [3]. Both wave packets have the same properties independent of the barrier length, see e.g. modern fiber communication [4]. In the entanglement process two partial wave packets are coupled with different quantum mechanical states. The spooky action in the case of entanglement was interpreted by several theoretical studies on the probability of quantum mechanics e.g.[5- 6]. See Heisenberg's Uncertainty Principle.

1) a) $\Delta x \cdot \Delta p \leq h$ b) $\Delta E \cdot \Delta t \leq h/2$

Where h is the Planck Constant, x a real space coordinate, p the momentum, E the particles energy, t the time . In tunneling the entrance wave packet was instantaneously transmitted to the exit. There is no change of the wave packet as mentioned above. In entanglement different quantum mechanical states are defined instantaneously.

Which nuclear interaction force may be in charge of the repulsive potential of the two entangled states? In the case of entanglement the space between the two elements with the different states has no influence on the waves in question. As Brillouin conjectured that all waves behave identically [1]. Like in the tunneling process there is no dependency of barrier length on the zero tunneling time of the wave packet.

The distance between the two different states wave packets in the case of entanglement has no influence on the corresponding wave packets in question. Similar to that there is no dependency of the potential barrier length on the zero tunneling time and localization of the transmitted wave packet. The two different states of the wave packets in the case of entanglement has no influence on the waves in question.

These two non classical properties allow interaction with no time and non local. Both phenomena present the illusion of time and space as shown e.g. for the 1-dimensional tunneling of photons [1]. Obviously, entanglement presents an example for the Illusion of time and space.

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