Quantum tunneling: a Classical interpretation

We have shown throughout “The Imagineer’s chronicles” that there are many theoretical advantages to define our universe in terms of four *spatial* dimensions instead of four-dimensional space-time. One is that it would allow one understand how particles can tunnel or move through potential barriers that are higher than their energy in terms of the laws of classical physics.

Wikipedia defines quantum tunneling as a microscopic phenomenon in which a particle violates the principles of classical mechanics by penetrating or passing through a potential energy barrier or impedance higher than its potential energy. A barrier, in terms of quantum tunneling, may be a form of energy state analogous to a "hill" or incline in classical mechanics, which classically suggests that passage through or over such a barrier would be impossible without sufficient energy. However, on the quantum scale, objects exhibit wave-like behavior. Therefore, in quantum theory, quanta moving against a potential energy "hill" can be described by their wave function, which represents the probability amplitude of finding that particle in a certain location at either side of the "hill". If this function describes the particle as being on the other side of the "hill", then there is the probability that it has moved *through*, rather than *over* it, and has thus "tunneled".

However, does this behavior really violate the laws of classical mechanics because there are numerous examples of how energy can be relocated or tunneled through what appears to be an impenetrable barrier for the potent energy of the mediums associated with the transmission of that energy? For example, classical wave mechanics tells us that a wave on the surface of water can be transmitted or "tunnel" through a flexible steel plate separating two volumes of water. This plate acts as a potential energy barrier between the water in each tank because it is "higher than the potential energy" of the water in each of the two volumes. This demonstrates that due to the spatial properties of a wave, its energy can penetrate or be transmitted to other side by the flexing of the steel plate without the water having to go over it.

However as was showed in the article "Why is mass quantized?" Oct 4, 2007 on can define the properties of a particle in terms of a resonant system or "structure" generated by a wave on a "surface" of a three-dimensional space manifold with respect to fourth *spatial* dimension.
However, this means the wave properties of a particle could tunnel through a potential energy barrier that had an energy "higher" than it and still not violate the laws of classical mechanics for the same reason as the energy associated with the wave, in the earlier example could tunnel though a potential energy barrier that was higher than its potential energy and not violate the laws of classical mechanics.

The reason why quantum tunneling appears to contradict the laws of Classical Mechanics is that it does not define a particle in terms of its wave properties but only in terms of a rigid structure associated with its mass. However, as was shown in the article "Why is mass quantized?" a particle can be defined in terms of the dynamics of a resonant wave on a "surface" of a three-dimensional space manifold with respect a fourth *spatial* dimension. This is why, as was mentioned in the Wikipedia article "On quantum scale, objects, or particles exhibit wave-like behavior."

This means, on a quantum level a particle does not have the rigid structure classical mechanics associates with a particle but a dynamic spatial one associated with a wave. Therefore, its energy can "tunnel" through a potential barrier or impedance higher than that of the particle similar to how the energy of a water wave can tunnel through the flexible steel plate in the earlier example. The probability function quantum mechanics uses to predict whether or not a particle will tunnel through a potential energy barrier can be thought of as a measure of the energy distribution in the space surrounding a particle because as was shown in the article "Why is mass quantized?" a particle volume would be defined by wave properties.

Therefore, according to classical mechanics its position could not be determined with an accuracy smaller than the wavelength of the resonant system associated with a particle. Additionally it would be time variant with respect to waves “position” when it was measured. This means classical mechanics tells us that a particle can be observed on either side of an energy barrier if the "energy width" of that barrier is smaller or near the wavelength of a particle.

This shows because particles have wave-like properties on a quantum scale they can quantum tunnel or penetrate through a potential barrier or impedance higher than the energy of the particle without violating the laws of classical mechanics.