Quantum Superposition, Parallel Universes and Time Travel

(draft version)

The Universe seems to avoid all paradoxes arising from time travel through two distinct mechanisms. The first mechanism is implemented through the existence of an infinite number of parallel Universes. The second one is known as quantum superposition. Therefore, it seems that nature must be in an undefined stated to allow time travel without paradoxes.

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What happened if a particle (or an antiparticle) or anything else violates or tries to violate causality? Does the universe take into account all possible histories arising from causality violations? The answer might be yes. One mechanism the universe possesses to take into account or to accommodate a consistent history at the quantum level, is quantum superposition.

Standard Definition of Quantum Superposition

Quantum superposition is a quantum mechanical phenomenon by which particles and bodies exist in a superposition of several quantum states. The superposition of quantum states suddenly collapses* into a given quantum state when a measurement is carried out. Experiments performed by NIST researchers confirmed that a beryllium atom confined to a tiny electromagnetic box can be in two different places and have two different values of spin at the same time.

* The collapse of the wave function is the disappearance of the phenomenon of superposition, meaning that the 50%-50% (e.g. 50% spin up and 50% spin down before observation) probability of each state before observation suddenly changes to either 0%-100% (e.g. spin up is observed) or 100%-0% (e.g. spin down is observed) when the observation is made.

Another mechanism is the existence of parallel universes. In other words the universe takes into account all possible consequences of time travel through, at least, two interconnected mechanisms: (1) quantum superposition (fine tuning), and (2) parallel universes (coarse tuning). Thus we can extend the definition of quantum superposition as follows

Extended Definition of Quantum Superposition

Quantum superposition is one of the mechanisms by which the Universe, and all parallel universes, can "resolve" paradoxes arising from time travel so that each universe will exhibit a consistent history from the macroscopic point of view of its observers.

This interplay between time travel and quantum superposition explains the collapse of the wave function or, equivalently, the disappearance of the phenomenon of superposition. When we perform a measurement, quantum superposition must disappear because some of the changes imposed by time travel (performed by all entities in the universe and in other parallel universes) will take effect in our universe at the exact time we perform the measurement (relative to the observer performing the measurement). Our universe and all parallel universes will adjust their quantum states through the collapse of wave functions so that the history of each of them (universes) appears consistent to its observers (only one history per universe). This is the **time travel and superposition connection conjecture (**or **time travel- superposition interplay conjecture)**. In other words, the history of the universe, when it is not observed, is, to certain extent, open or undefined so that the universe can adjust to the changes imposed by time travel (due to antiparticles and all other possible time travellers) so that the observation or measurement will always produce a consistent history. This means, for example, that stuff (including people) will not disappear before our eyes because of time travel effects. Thus time travel and superposition "work together" to keep consistency by avoiding grandparent-type paradoxes to occur in each and every parallel universe.
