The Quantum Ocean

When a physicist talks about the micro or quantum world, where atoms and nuclei fill the landscape, discussion usually leads to discreteness of energy levels, probability wave functions, and weird things like tunnelling of particles through energy wells, and maybe even coupling of particles. What will be attempted here is to talk about what may actually be going on in the quantum level.

In the quantum realm, the entities that dominate are the fundamental particles, protons, neutrons and electrons, combinations of these to form atoms, and combinations of atoms to form molecules. These interact by electromagnetic fields that dominate over the gravitational field. Also present is electromagnetic radiation that at this level, has an effect on these three quantum level entities in such a way, that they can push around and change the physical state of these entities.

For the following discussion, it is considered that all the entities on the quantum level are free and unbound. ie as a gas or plasma.

All the electric and magnetic as well as gravitational fields seen on the human scale originate at the quantum level. The fundamental particles, atoms and molecules interact with each other largely via their electromagnetic fields, seemingly pushing and pulling each other around according to some random form of motion. This can be considered that this is due to to energy being exchanged, and the physical state of the interacting entities are thus modified. The EM radiation on the quantum level can be considered as also doing the same. It may be considered that EM radiation is an electromagnetic field carried in the form of a photon, and hence the interaction on the atomic and nuclear scale of photons with fundamental and atomic entities.

This gas or plasma like scenario has EM radiation and EM fields originating from near and far such as that a resultant electromagnetic field is generated. Consider that this resultant electromagnetic field is a physical form of a space, where like an ocean. of waves, the energy of this space, with the peaks being high energy values, and troughs, low energy values of this space. The movement of waves represents the movement of energy within this ocean. It may be considered that the EM radiation are the waves in this analogy.

Consider that the entities of the fundamental particles, are like single balls floating in this ocean, and atoms and molecules are like groups of balls floating in this ocean. The inverse of the size of these balls represents the mass (ie heavier objects are small, and light large) and the displacement of ocean water around it, represents the electromagnetic field it contributes to the background EM fields. Consider that since an electron and a proton have the same electric charge, but different masses, they will displace the same EM field about each other in an opposing manner , but have a different density of mass.

Consider that these EM waves in this EM ocean pushes these masses about as the masses interact with the peaks and troughs in such a manner that they follow a path of least action. That is, a path to the lowest energy level in the local vicinity of space that the mass resides in. Consider that the rate or magnitude of interaction and motion is greatest for the lowest mass as the interaction of EM field has a the greatest effect on an entity of low mass.

Thus an electron, represented by say, a beach ball can be pushed around more easily by a modest wave, whereas a proton, represented by a tennis ball is not as easy to change. Higher waves, and hence energy, have larger effects on individual entities. Now consider a group of balls representing a molecule has one of its balls (atom) hit by a high energy wave. The ball is knocked away from the others and floats on is own.

In each of these scenarios of waves hitting elementary particles or atoms, the wave that hits the elementary particle or atom interacts with the wave by absorbing the wave in some manner such that it effects the particle regional EM field and the particle reacts to the resultant EM field around it causing it to change its motion or quantum physical .state.

Now consider two of these entities interacting with each other. Two electrons approach each other, their EM fields modify the EM ocean around them, but as they approach, they slow down, stop, and reverse direction, or are deflected away from each other. A collision has just occurred between two particles. The EM fields each particle interacting with each other in such a way that the modified EM ocean that results from their EM fields repels them from each other. The higher the velocity of the electrons, the closer they can approach each other as if there is some form of rate of interaction, or the energy of motion is a method to overcome the EM field that causes the electrons to be repelled from each other.

Consider that as one of these entities is hit by a EM wave (interacts with) the EM wave is absorbed into the EM field about the entity such that the resultant EM field or wave around the entity changes the direction of its motion. This absorption of energy from the ocean could be in the form of a EM wave that travels with the entity being part of or riding with it. Perhaps analogous in some manner to a surfer riding a wave.

Consider that as one of these entities hits a wave (interacts with) that is in the opposite direction of its motion and slows down, it, adds or gives up energy to the ocean in the form of a EM wave that travels away from it.

Consider now the interaction of the quantum ocean with itself. In the natural world, it is found that the superposition of EM waves occur resulting in higher or lower amplitudes of EM waves. On the quantum ocean this superposition of waves creates waves of high intensity, not high energy. What this means is that on this quantum ocean, there can be a single wave that has a high density of EM energy, but has the same height of a single wave of the same EM energy. This single “wave” of high EM energy can deliver a large amount of energy if all of it is “absorbed” by any single entity, where as a “wave” of many smaller EM energies superposed upon each other can only deliver an amount of energy of a single smaller EM energy. What this means is that the likely hood or probability of that delivery or interaction of a single transfer of energy increases due to the intensity, or number of smaller energies, or that there can be, if permitted multiple smaller energy transfer interactions.

EM waves of different energy or height on this ocean, superimposed upon each other form a chaotic behaviour similar to the oceans of the earth, but adding energies of multiple EM waves do not result in an increase in the amplitudes of waves on the quantum ocean. This is because the amplitude of a quantum ocean wave represents energy of the EM wave, not intensity or amplitude, which is represented as a wave density. Thus, this quantum ocean is different to the oceans of water or liquids on earth, has energy density as well as energy. Thus a EM waves superimpose in the real world increasing the EM amplitude, will have the waves on the quantum ocean increasing or decreasing their densities as they interact with each other.

Consider on the quantum ocean, the individual waves look more like some kind of isolated mountain peak than a travelling wall of water as on earth. the diameter of these represent a wavelength of the EM wave. Differences in wavelengths of EM waves in the real world are represented the same on the quantum ocean. Small wavelengths have large energies, and will have small wavelengths and high amplitudes in the quantum ocean. The small wavelength of the quantum ocean wave reflect a property of the wave that those with smaller wavelengths, though having a large energy, are more less likely to interact than a larger wavelength due to the smaller cross-section they occupy in space. This permits high energy EM waves to penetrate molecules without impediment as they pass through the gaps of the molecules or atoms and not interact with the atoms that make up the molecule. The smaller wavelengths or cross-section can also mean that a lower probability of interaction with individual fundamental entities such as electrons.

Now consider two quantum ocean EM waves as described above interacting with each other by “colliding” head on. Consider that the EM waves in the quantum ocean have some form of self interaction where if a certain energy or wave density is present, the interacting EM waves produce a particle that has a property of mass. For two EM waves, if the energy density increases such that there is some form of self interaction one or a pair of particles are produced. If the resultant interaction results in a one or pair of particles, these particles would have mass and a possible charge. The resultant particle properties are added to the quantum ocean landscape, and the EM radiation that created them, subtracted.

If however, there is an instability of the self interaction of a quantum ocean particle, it then transforms back into the quantum ocean either as a new particle of self interaction and/or a quantum ocean wave.

Thus the quantum ocean is not just about pushing particles and the interaction of particles with the EM waves and other particles, but also the creation, destruction and decay of particles of matter.

Consider the principles as outlined in the section, Quantum Maths. If the quantum ocean and space are at a level such that there is a smallest permissible wavelength that corresponds to the smallest permissible area or volume of space, then movement of all entities and EM waves would not be smooth in this ocean. It would be jerky and similar for any particle or EM wave governed by the graininess of the space that makes up the quantum ocean. This space would look like, say a hexagonal grid for a 2D space, and to move an appreciable distance would be similar to that of Brownian motion. Space would itself thus be quantised.

This all contributes to an overall unpredictability of the absolute behaviour of any individual or group of particles. Even if all of the initial conditions of all the particles and EM radiation in the universe were known, the exact paths and behaviours would not be known. The quantum maths that describes such a system is equivalent to the principles of chaos theory. Any small deviation in calculations or error in values will increase over time, causing divergence of prediction from observation to increase with each iterative step. Here small deviations in prediction can be due to such things as the superposition of EM waves creating a pair of particles, or the decay or annihilation there of. It may be that other properties exist on the quantum level as well that make this unpredictability and uncertain due to the sensitivity of outcomes opon the input parameters.

On the human level, living creatures modify the physical universe by the very act of living. Living creatures do not obey any laws of physics that govern mechanical behaviour and decision. That is determined by mental thoughts, and these on the smallest scale of the universe can change the universe.

The quantum ocean described above results in a range of possible values for any entity or EM interaction to occur. This range of possible outcomes for a single interaction can have a certain probability of one particular outcome for all possible inputs. By building up a probability distribution function, this can be used to predict behaviour or results of directly related phenomenon or physical states. eg the spectrum of atomic atoms and nuclei.

What is important here is that on the quantum scale, interactions between entities and EM radiation are significant

and often cause large step wise transitions from one physical state to the next.

A human wanting to measure a quantum value uses a probe to do so. In the case of an electron moving in this quantum ocean, a photon of sufficient energy is used to detect the electrons position, and then to, or to, observe a photon emitted from the electron. In doing so the photons physical state is modified, ie its motion. The observed photon will have taken a certain path to the observer through this quantum ocean, giving a certain degree of accuracy of the electrons location, but the motion is not known due to photon changing the electrons initial motion, either increasing or reducing its velocity, and even its direction.

In other words, by just simply trying to observe on the smallest scales the most fundamental of physical entities and properties of matter, the method of observation changes the conditions that are present in what is trying to be observed and measured, thus potentially interfering with the physical entity properties or processes that is being probed. Those physical entity properties or processes that exist on and in the quantum ocean on the quantum level of particles and the energy fields that they exist in and are a part of.

Quantum Ocean of Gravity.

It is common among Physicists that a theory on quantum gravity is difficult to postulate, formulate and merge with the quantum theory that describes the physics on the atomic and sub atomic level.

Consider that on the atomic and sub atomic level in which quantum physics deals with, that the Quantum effects are due to, as described in the section the quantum Ocean above, the EM fields that exist and interact with those of the atomic particles. Consider that gravitational fields exist on this level also, and that there are fluctuations of the gravitational field that also exist due to the past locations and motions of mass charged particles.

Consider that the gravitational field on this level is much weaker than that of the EM fields present, and that the mass charge of particles is also much lower than that of the atomic particles. This creates a gravitational quantum ocean that acts just like that of the EM field, but is so weak in comparison so as to be drowned out by it, and in effect, not noticeable in experiment, or observable in any physical phenomenon. Even if EM fields did not exist at all, the mass charge of an electron or proton would generate a gravitational field that is so small that it would not interact with other gravitational fields of individual electrons or protons or small groupings thereof.

However, as the scale of physical processes becomes larger, and the net EM field becomes negligible and close enough to zero, and if there are a large enough number of individual particles such that the gravitational field and it fluctuations are large enough to be comparable to, or greater than that of the EM field, quantum like effects may be observed to occur on individual particles, though this effect would not be as observed in the atoms and molecules due to gravity being attractive only.

The observable quantum effects would be gravitational observable effects, not the observable effects involving EM radiation like the Heisenberg uncertainty principle to measure position and location of an atomic particle. The first kind of quantum effect would be something similar to Brownian motion, where an unpredictability of the location of a mass in a large enough fluctuating gravitational field would bounce around and be unpredictable.

But the greatest form of quantum gravity is within the realm of massively moving and in particular, rotating bodies that create gravitational waves. Other bodies interacting with the gravity wave would interact in a manner that is similar to that of a particle interacting with an EM field.

But because such large bodies can have a very large and infinite range of configurations, this would again not resemble EM quantum physics in terms of having the same predetermined probabilistic outcomes, or the same consistent phenomenon occurring, such as a EM spectrum of an atom.

Consider that within a massive enough body like a star or neutron star, quantum gravitational effects would be things like the differentiation of masses of the elements.

In other words, Quantum gravitational effects only occur on the macro level, and even then are what we readily see. Such Quantum gravitational effects also would be of such a long duration for normal planetary and stellar masses, that they may only be observable on a time scale as large as years, centuries and even millions of years. To observe on a smaller time scale, super massive objects may need to be common and in close vicinity of each other.

Quantum States

Idea : It is commonly stated by many physicists and within many journals and texts that all forms of matter and of the fields that is associated with matter can exist in many different quantum states, or forms simultaneously until "observed" where upon it collapses into the quantum state that it is observed.

Consider that if in fact, the so called many physical quantum states of matter is in fact one unknown quantum physical state, and that by the act of observation, the conditions upon which this one single quantum state is changed to a new quantum state. That is, the act of observing changes the conditions by which the entity being observed was in, and that the act of observation in itself, does not always have the exact same observational conditions to obtain the exact same result, but by repeating the experimental observation, a range of results is recorded, and upon analysis, a graph or function of probability is obtained.

This is similar to the chaotic behaviour of a system in chaos theory where the final result is highly sensitive to the smallest of initial conditions, and like chaos theory, those initial conditions are largely unknown. This results in that any outcome from any initial input into a system is not precise and falls within a range of values, of which any measurement can be viewed as a probability of outcome. Eg the weather on a macro scale, or the location of an electron observed in an experiment.

Thus in quantum physics, because knowledge of the exact condition and quantum state of matter is by and large unknown, and cannot be known with a high degree of accuracy, a probability of distribution of quantum states needs to be incorporated, and then a probability of results or observations is then predicted.