A Reality Based Replacement for Quantum Mechanics

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Since a static electron has more electric field energy than its total energy, the static charge model for the electron is abandoned in favor of a dynamic charge model for the electron. In this new *Model of Reality* theory, a charged particle is modeled as a pulsating particle, turning its electric field on and off. This pulsation frequency is affected by the particle's acceleration, given by a De Broglie formula. Using this model for electrons, it is possible to explain the photoelectric effect with a continuous light wave and a non-acceleration resonance between the light wave and the pulsating electron (i.e., photons are not used). A reality-based, planetary atom description is possible with this model, as the electrons can circulate the nucleus in a way such that they "turn off" when they experience centripetal accelerations from the pulsating nucleus. In this way, this model overcomes the problem that planetary orbits of electrons should continuously radiate. The Bremsstrahlung cutoff frequency found in x-ray experiments can be explained in this model by the physics of pulsating particles generating radiation. If a pulsating particle is generating radiation, its emission frequency is limited by its Nyquist cutoff frequency, which is half the frequency of the electron's pulsation (again, photons are not used). Planck's "black-body", or thermal, radiation is described as agitation of and emission from outer electron orbits of atoms in solids. The typical infra-red radiation found in thermal radiation is due to the thermal disturbance of the outer infra-red frequencied orbits of the outer atomic electrons. As the temperature rises, the thermal agitations become more violent, disturbing deeper, and higher frequencied orbits, generating higher emission frequencies (again, photons are not used). Entanglement and the EPR paradox are resolved because the necessity to include "photons" in the theory is eliminated.

1. Dynamic Charge Structure

The electron's mass-energy is roughly 1/2 *MeV*. This mass-energy is the amount contained in a static electric field emanating from a charge with a radius roughly $r_e \approx 2 \times 10^{-13}$ *cm*. An electron, however, is known to be more like $r_e \approx 2 \times 10^{-16}$ *cm* or smaller. The electric field energy from such a small particle would be roughly 50 *MeV*. This is troublesome to say the least. If the resultant mass-energy of the electron is indeed just 1/2 *MeV*, then the mass function for a static electron must go negative below this "classical electron radius". This problem, along with the illogic of "renormalization", motivates us to abandon the static charge model for electrons, and insist that the electron structure be dynamic. After attempting many different scenarios, we have concluded that the only way for a dynamic electron structure to satisfy the photoelectric effect, electron interference experiments, non-radiating atomic orbits, etc., is for the electron to be a pulsating charge. That is, the electron is modeled as a pulsating charge, turning its electric field ON and OFF. And it must do so according to De Broglie. That is, the electron's pulsation frequency increases as it is accelerated, the final frequency dependent on the final energy of the accelerated electron (see Figure 1). The electron's pulsation length, λ, is given by the distance between pulsations, and the electron's pulsation frequency is given by a De Broglie-like formula:

$$E_e \approx \tfrac{1}{2} h\nu_e \qquad (1.1)$$

where E_e is the electron's kinetic energy, h is Planck's constant, and ν_e is the electron's pulsation frequency. The factor of ½ will become evident later, and notice that we use the approximation symbol here because when the electron is motionless (E_e=0), there is still a small pulsation frequency which we shall temporarily ignore for simplicity.

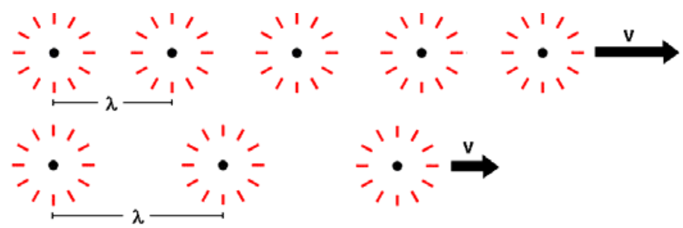

Fig. 1. The electron is modeled as a pulsating charge, its pulsation frequency following a De Broglie formula. That is, the faster the electron's velocity, the faster its electric field pulsates. The pulsation length, λ, is shown for the two cases.

The characteristics of this pulsating charge model were derived from a plausible pulsating solution to Einstein's field equations. Since this is beyond the scope of this paper, we will simply present these simple characteristics and describe their practical consequences:

1. The electric field of an electron turns ON and OFF. The field is OFF most of the time, only turning ON momentarily. While the field is ON, the electron is very susceptible to being accelerated by other electric fields. While the electron is OFF, it is still susceptible to acceleration, but less so than while it is ON.

2. The electron's pulsation frequency is increased by acceleration. As the electron is accelerated, its pulsation frequency increases, and the final frequency depends on the final kinetic energy, as given above in equation (1.1).

3. Even though its radial electric field is time dependent, the pulsating electron radiates no energy. One usually associates time varying electric fields with radiation energy, but not in this case. The reason there is no radiation is simply because spherically symmetric time varying fields do not radiate energy according to Maxwell's equations. For example, let $\mathbf{E}(\mathbf{r},t)$ be some strictly radial (i.e., spherically symmetric) time varying vector electric field. Keeping Maxwell's equations in mind, take its curl:

$$\nabla \times \mathbf{E}(\mathbf{r},t) \equiv 0 \tag{1.2}$$

The curl of a strictly radial function, time varying or not, is always zero. Thus, using Maxwell's equation

$$\nabla \times \mathbf{E}(\mathbf{r},t) + \frac{1}{c}\frac{\partial \mathbf{B}}{\partial t} = 0 \tag{1.3}$$

we see that $\partial \mathbf{B} / \partial t \equiv 0$. Actually, $\mathbf{B} \equiv 0$. Thus, there can be no radiation, and there can be no radiative energy flow since the Poynting vector is identically zero. The electron can constantly pulsate its electric field with no energy loss.

We now will use these simple characteristics of a charged particle as the foundation for a new reality-based explanation for the behaviors seen in microscopic systems, beginning with the photoelectric effect.

2. The Photoelectric Effect

Consider a free electron in a metal, pulsating with a certain frequency. When visible light is incident on the electron, what does it do? Remember this: if an electron is static, then when an oscillating electric force hits the electron, it simply moves up and down going *nowhere*. However, this is not true if the electron is pulsating. If the electron is pulsating just right, it might move either up or down. This depends on the correlation of electron pulsation with the light wave's oscillation. If the electron is ON with both peaks of (i.e., in phase with both peaks of) the light wave, then the electron will simply move UP and DOWN, also going nowhere [5]. However, if the electron is ON only during the UP part of the light wave, and OFF during the DOWN part of the light wave, then the electron will move upwards very rapidly [4]. It is influenced less by the down part of the light wave, since the electron is OFF. So the electron is accelerated upwards. But then the electron's pulsations start to quicken according to the De Broglie formula (1.1). The electron starts to pulsate faster and faster until it no longer is in phase with just the UP part of the light wave. When it becomes fast enough so that the electron is ON in phase with both peaks of the wave, the acceleration is over. The electron returns to just going UP and DOWN in its co-moving inertial frame. *A non-acceleration resonance has occurred!* [5,6]. This resonance occurs at the moment when ½ the electron's De Broglie frequency reaches the frequency of the light wave. The electron stops accelerating upwards when

$$\tfrac{1}{2}\nu_e = \nu_{light} \tag{2.1}$$

or, from equation (1.1), when

$$E_e \approx h\nu_{light} \tag{2.2}$$

where we have ignored the small "work function" for simplicity. Stop and imagine this for a moment. Packets of energy $h\nu_{light}$ given to electrons without using photons! No momentum considerations! We explain the photoelectric effect with simply a non-acceleration resonance between the electron pulsations and the light wave oscillations. This is significant since the photoelectric effect is known to be a transverse reaction rather than a "forward collision" type reaction. That is, the most probable direction for photo-ejection is in the 90° transverse [1,3] direction, contradicting the idea that photo-ejection is the result of a particle collision with a "photon" (which would tend to eject the electrons in the forward direction). This support for this new model for photo-ejections encourages us to continue exploring the possibilities for more *Model of Reality* based ideas for microscopic physics.

3. A Reality Based Planetary Atom

This new *Model of Reality* allows for a reality based description of a stable, non-radiating, planetary atom. The key is that the charges turn ON and OFF just at the right time to prevent radiation. Here is how it works in a simple hydrogen atom [7]:

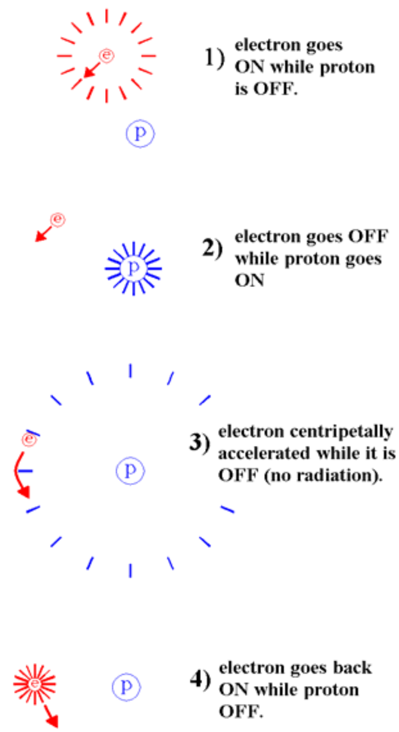

Fig. 2. Electron-proton synchronization

Why doesn't this atom radiate? Well, it is because the electron is only centripetally accelerated while OFF. We know that radiation is only generated by charges that are accelerated. Charges moving with uniform velocity do *not* radiate. This means that we have stable planetary atoms that actually have quasi-circular orbits, just as we have always imagined that they had. There is no reason to jump to illogical "matter probability waves" and complicated "wave functions". Atoms are simply coordinated pulsating charges with synchronization between the charges so they do not radiate.

The resonant frequencies found in a hydrogen spectrum can now be simply explained. We must conclude that the requirement that the electron only be ON while the proton is OFF establishes only certain allowed orbits. If the electron deviates from these allowed orbits, then it will be ON while the proton is ON, and in this case, it will radiate energy. This radiation friction and the huge increase in the force between them will disrupt the trajectory until the electron returns to an allowed orbit. Thus, we only have certain frequencies of allowed orbits. We start the new scenario by assuming that the electron orbits are quasi-circular (not necessarily the case, but most likely). Let ν_e be the unknown De Broglie frequency of the pulsating electron for some allowed orbit. Let ν_p be the De Broglie frequency for the proton. Then for stable, quasi-circular orbits we must have

$$n_p \nu_e = n_e \nu_p \tag{2.3}$$

or

$$n_p T_p = n_e T_e \tag{2.4}$$

where T_p and T_e are the pulsation periods for the electron and proton and n_p and n_e are integers. This condition keeps the electron in sync with the proton so that they never are ON at the same time. Since the electron's allowed orbits only have the proton's E field ON while the electron is in its OFF state, the average electric force between them may be different than the time averaged macroscopic Coulomb's Law. We write:

$$\frac{m_e V^2}{r} = k' \frac{e^2}{r^2} \tag{2.5}$$

where mV^2/r is is the average centripetal force on the electron, and k' is some fraction of the normal Coulomb force constant.

Next, we assume that the resonant frequencies of the hydrogen atom are simply the orbital frequencies of the electrons in their allowed orbits. That is, if an electron in a hydrogen atom were subject to a force that perturbed it, then it would tend to radiate electromagnetic energy that was at these resonant orbital frequencies. Conversely, if electromagnetic radiation were incident on an atomic electron at its resonant orbital frequency, then the atom would start to absorb energy from the resonant wave. To get the approximate radii of the corresponding electron orbits, we set $V = r\omega$, where ω is the orbital angular frequency of the electron. Solving for ω we get

$$\omega^2 = k' \frac{e^2}{m_e r^3} \tag{2.6}$$

Substituting in the empirical Rydberg relation gives:

$$r^3 = \frac{k' e^2}{4\pi^2 c^2 R^2 m_e} \left(\frac{1}{m^2} - \frac{1}{n^2} \right)^{-2} \tag{2.7}$$

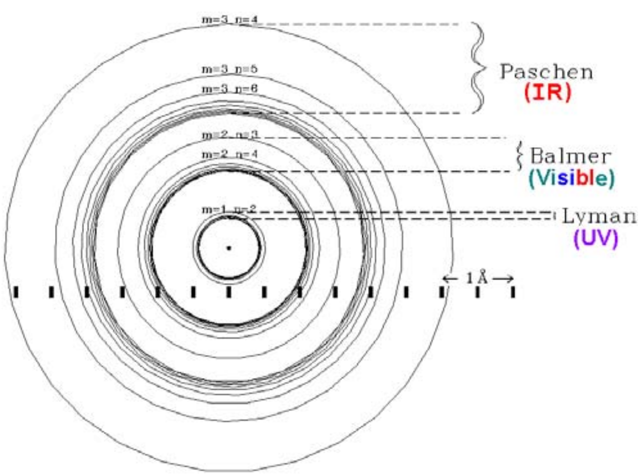

Fig. 3. The higher the orbital frequency, the smaller the orbital radius

The general trend in this new scenario is exact opposite that of the Bohr and Schrodinger atoms. In these theories, the 6th orbit corresponds to $36r_o$ (r_o=Bohr radius of .53A), or about 19 angstroms. It seems unlikely that such a large orbit would play much of a part in the Lyman series. But the (1,6) Lyman spectral line is strong. So in this new scenario, the higher the resonant orbital frequency is, the smaller the orbital radius as in Figure 3.

In this new scenario, these are the actual radii of the electronic orbits, with the exact orbital frequencies being the same as the resonant light frequencies**:**

Orbital Frequencies = Hydrogen Spectrum Frequencies

So if you heat hydrogen gas, or run a current through it, these orbits will be perturbed. These perturbations will disturb the orbits so that the electrons are accelerated while ON, and hence they will start to radiate at their natural frequencies!

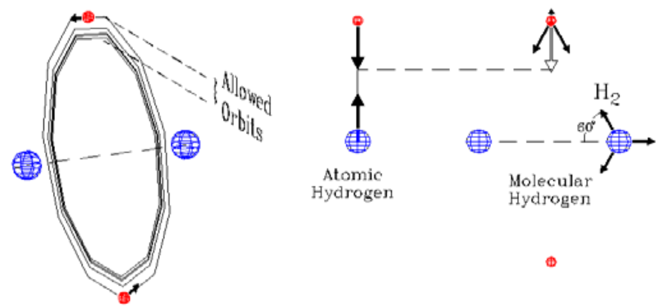

Fig. 4. The hydrogen molecule

We can now easily see how covalent bonds work. Shown below is a simple H_2 covalent bond. The hydrogen atom is a magnetic dipole. It is attracted to other hydrogen atoms like two magnets are attracted to each other. From a distance, the hydrogen atom appears electrically neutral. The magnetic forces still exist, though. Thus, two hydrogen atoms would be pulled towards each other with a relatively small magnetic force until the Coulomb forces come into play. If a collision occurs with a small enough separation distance, an H_2 molecule is formed by Coulomb forces. A stable hydrogen molecule can be constructed using only Coulomb attraction. The two electrons circulate in the same direction in between the two protons, their separation vectors forming two equilateral triangles (see the right side of figure 4). The four pulsating particles are synchronized, allowing only for certain electron orbits so that the stable molecule does not radiate. We finally are able to see a reality-based covalent bond. The two electrons are shared by and are in between the two hydrogen nuclei.

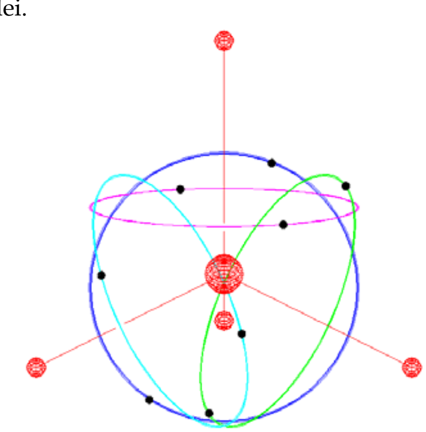

Fig. 5. The methane molecule. Each covalent bond consists of a pair of electrons orbiting in between the nuclei.

A set of four covalent bonds occurs in methane. *Model of Reality's* picture of covalent bonds in methane is shown in Figure 5. A pair of electrons orbits in between and holds the nuclei together just like the hydrogen molecule, with Coulomb forces. Note that this theory does not need to stoop to "hybrid orbitals" to explain methane.

4. The Bremsstrahlung X-ray Cutoff Frequency

Bremsstrahlung x-ray radiation is obtained by blasting an electron beam into a metal plate [12]. So imagine that a 25 KeV electron collides with a metal plate and goes through the following motion:

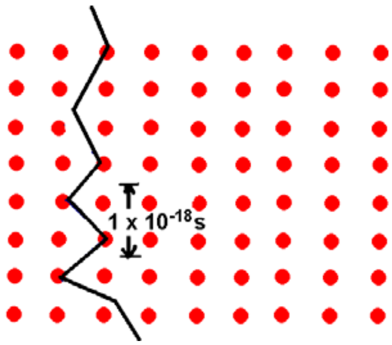

Fig. 6. Bremsstrahlung electron motion

For a brief moment in the diagram above, the Bremsstrahlung electron goes through an oscillatory motion with a period of about $1x10^{-18}$ seconds. This is certainly possible, as almost any random motion would be possible to imagine. Thus, the electron must briefly radiate with a frequency of $1x10^{18}$ *Hz*. There is just no logical way around this. And this radiation's frequency is below the limiting $\nu_{max}=E/h$. You want a 25 *keV* electron to radiate at a certain frequency below the limit? Well, just move it back and forth at a lower frequency, and it must radiate at this frequency. No way around it. So the question again becomes: *If the electron gets moved back and forth at a frequency higher than the limit, then why doesn't it radiate at this frequency?* The answer comes from the physics of pulsating electrons generating radiation. In this case there is a Nyquist Frequency Limit (NFL). Here is a simple explanation. Let's say that a Bremsstrahlung electron goes through the following motion:

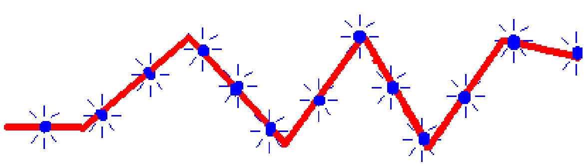

Fig. 7. Oscillatory Bremsstrahlung motion with pulsations shown

where we have included in the diagram where the Bremsstrahlung electron has pulsed ON proportional to De Broglie. We see that since the movement frequency is less than the De Broglie frequency, then the motion and radiation approximate what we usually associate with an oscillating charge. The radiation frequency closely approximates the movement frequency. No surprise here. The radiation is generated.

But now let's say that the Bremsstrahlung electron gets moved around much more radically with a much higher movement frequency, like this:

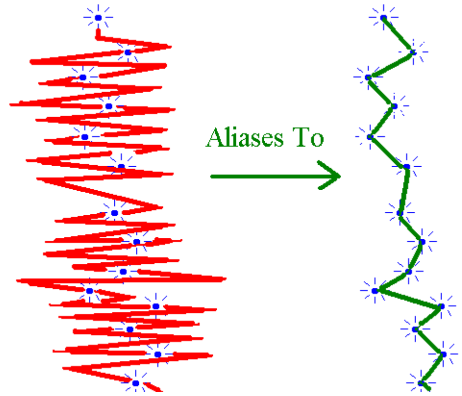

Fig. 8. Bremsstrahlung motion with aliasing to lower frequency.

We see that the movement frequency is much higher than the pulsation frequency, and the radiation cannot be generated at this frequency. The charge is "OFF" during much of the acceleration. Thus, the radiation cannot follow the movement, and the radiation is *aliased* down to a lower frequency. This emitted frequency limit is the Nyquist Frequency Limit. It is half the electron pulsation frequency (again we see the factor of ½) [2]. If an electron were pulsating at a certain frequency and generating radiation, we would expect the radiation to be limited to ½ that frequency, the NFL Bremsstahlung cutoff frequency, ν_{max} , derived from the following formula:

$$E_e = ½\, h\nu_{e(max)} = h\nu_{x-ray(max)}$$

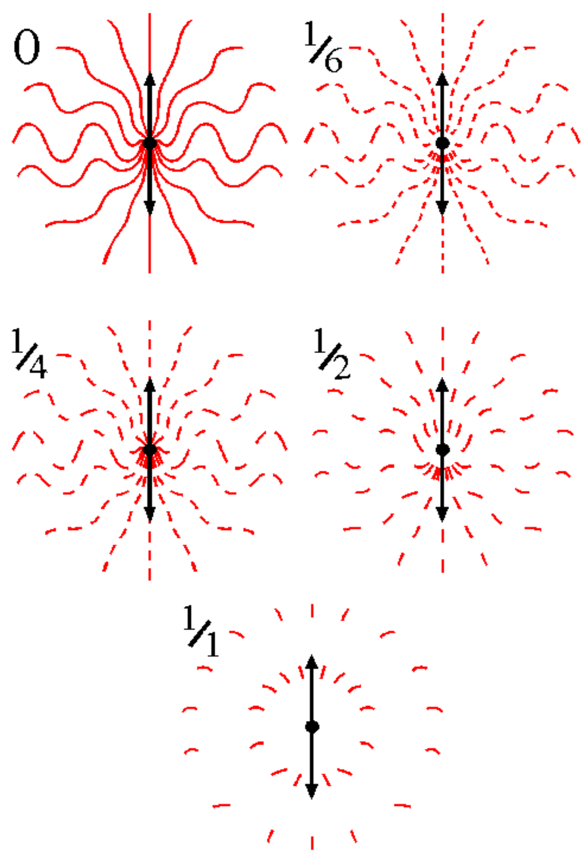

Fig. 9. A electron moves in an oscillatory fashion up and down with movement frequency v_{oscill} and emits radiation. The ratios between the oscillatory movement frequency, v_{oscill}, and the electron pulsation frequency, v_e , are 0, 1/6 (v_{oscill}=1/6 v_e), 1/4, 1/2, and 1/1 in this figure.

In Figure 9, we have drawn a hypothetical electron being accelerated in the vertical direction in an oscillatory manner. In the upper left hand corner we have drawn an electron that does not pulsate at all (labeled "0" for this reason). Notice that the emitted radiation exactly follows the accelerations. In the next drawing (labeled "1/6"), we have for this case $v_{oscill}=1/6\ v_e$, meaning that the oscillatory frequency is just 1/6 of the electron pulsation frequency. Notice that the emitted radiation is somewhat chopped, but still closely follows what would be expected for radiation. In the next drawing, we have $v_{oscill}=1/4\ v_e$, and we still see that the emitted radiation is being chopped, but it is still generated, the maximums and minimums of the radiaton still being visible. In the drawing labeled "1/2" we have that $v_{oscill}=1/2\ v_e$, we have reached the NFL for the emissions. We see that the maximums and minimums are barely generated. When we go past the NFL to a 1/1 ratio in the final drawing, we have that only the maximums are generated in this drawing and not the minimums. The radiation is then *not* emitted at the movement frequency. We are past the NFL Bremsstrahlung cutoff frequency and the movement frequency is aliased.

So imagine this for a moment. We have obtained a Bremsstahlung cutoff frequency without using "photons", while even allowing for thousands of bumps and ricochets to generate the maximum frequency (while a single unlikely interaction would be needed to produce a maximum frequencied "photon" in Quantum Mechanics (QM), converting nearly 100% of the electron energy all at once).

5. Thermal ("Blackbody") Radiation

We believe that thermal radiation has nothing to do with counting standing wave modes in cubical black cavities, like Planck used in his derivation and extension of the Raleigh-Jeans Law. It seems much simpler than that. We review thermal radiation: 1) Take a chunk of steel (without a black coating or a cavity) at room temperature. See that it emits infra-red radiation. 2) Take a torch and heat this steel and watch it as it glows red ("red-hot"). 3) Continue to heat the steel and watch it as it starts to glow **white** ("white hot"). 4) The steel melts before it can become "UV hot". So what is happening here? Clearly, this is an example of "thermal radiation", and clearly it has nothing to do with black coatings or cavities of any kind.

What really going on here? Well, when we discussed hydrogen, we saw that as the orbital radii became larger, the orbital resonant frequencies became lower. (Refer back to Figure 3) The same is true for larger atoms. The outer electron orbits in larger atoms would also have infra-red frequencies. So consider a solid's crystalline lattice at room temperature. The atoms have an average vibrational amplitude as shown in Figure 10.

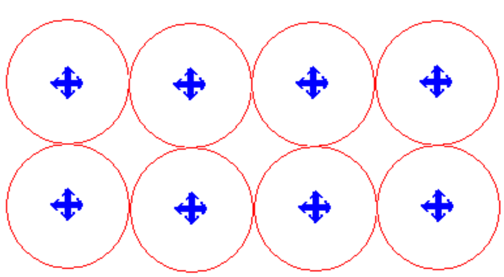

Fig. 10. Thermal vibrations of a lattice affecting outer IR orbitals

These room temperature vibrations would make their outer electron orbitals overlap. At this temperature, these affected orbitals are the outer infra-red frequencied orbitals, so these are the orbitals that are disturbed and radiate. Thus, we see mostly infra-red radiation at room temperature.

Next, as one heats the solid to a higher temperature, the amplitude of the thermal vibrations increases:

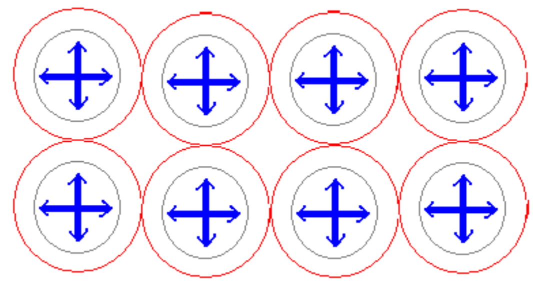

Fig. 11. More energetic thermal vibrations of a crystalline lattice affecting inner visible light orbitals.

We see that the next deeper layer of orbitals is disturbed. These would be the ones that have low visible frequencies. Thus the thermal radiation becomes visible red along with infra-red ("red hot"). As the lattice is heated to an even higher temperature, we have even deeper visible orbitals that have higher visible frequencies being disturbed. The solid becomes "white hot" with all visible frequencies. If one heats the object further, typically it melts. However, if it did not, then it would become "UV hot". Something like tantalum-hafnium-carbide, a material with an extremely high melting point (4500 °C) would emit plenty of UV radiation when heated nearly to its melting point, since the atoms would still be confined in a solid lattice, and their UV orbitals would start to be affected by the thermal agitations.

In our opinion, this explanation is the reality-based physics that we need to explain thermal radiation, and is superior to counting and "quantizing" standing wave modes in cubical blackbody cavities with black coatings as Planck did. That is, thermal radiation has nothing to do with cubical cavities, and nothing to do with black coatings. Thermal radiation is caused by thermal vibrations disturbing deeper and deeper atomic orbitals that have higher and higher frequencies. Indeed, both liquids and solids would emit thermal radiation, but liquid thermal emissions would have much different characteristics since their atoms would not be constrained by a crystalline lattice. Planck's theory cannot explain these thermal emission characteristics from liquids in a way that this new theory can.

6. Entanglement and the EPR Paradox

The famous EPR paper [8] started the "entanglement" discussions. Then came J.S. Bell's paper [9] and his now famous "Bell's Inequality". And finally Alain Aspect's experiments [10][11] using Bell's Inequality applied to "photons". The bottom line of all this came to the QM concept that

> *Bell's Inequality places restrictions on probabilities based on local realities. Since Bell's inequality is violated, then local reality is impossible.*

So here we find ourselves with another QM paradox:

Local Reality ≠ Reality

Apparently Bell and Aspect have proven that if photons exist, then there is no local reality. If one steps back and looks at this situation with a logical mind, one must conclude that something is wrong with this picture. Here is Bell and Aspect's logic:

1) *If photons exist then there is no local reality.*
2) *Therefore there is no local reality.*

Here is the correct logic:

1) *If photons exist then there is no local reality.*
2) *Therefore there are no photons.*

This logic seems more likely now, especially since we have developed explanations for the photoelectric effect, the Bremsstrahlung cutoff frequency, thermal radiation, etc., *without the use of* "photons" and in a reality-based way.

7. The Experiments

7.1. The Vectorial Photoelectric Effect Experiments

When one thinks of the photoelectric effect, one thinks of "photon" light particles being absorbed by electrons causing ejection. One would imagine that such particle absorptions would "knock out" these electrons in the forward direction, especially from metal vapor. This couldn't be further than the truth. In reality, the electron ejections are in the 90^o direction (transverse to the light) in potassium vapor [1]. It is curious that the electrons are just as likely to be ejected in the "backwards" direction (back towards the light source) as in the "forward" direction from the metal vapor. No "crystalline lattice" arguments are possible for QM in this case since there are no metal crystals. In addition, the electrons are ejected in the direction of the polarization of the incoming light [13]. The QM idea of "photon" particles has failed miserably in these polarized photoelectric experiments, because the wave nature of the light *must* be brought in to explain these experiments. However, these results are exactly what this new *Model of Reality* theory predicts. This new *Model of Reality* theory predicts a transverse electron ejection from metal vapor generally along the electric field of the incident polarized light. The packets of energy $h\nu$ obtained by the electrons come from an acceleration resonance with the light. The photon hypothesis has failed miserably according to these experiments.

7.2. The Cyclotron X-ray (Bremsstrahlung) Cutoff Frequency Experiment

In this new *Model of Reality* theory, the electron's structure is affected by acceleration, causing it to pulsate faster and faster. But what would happen if one accelerated an electron in one direction, then immediately accelerated it in the opposite direction? Logically, one might expect that these two accelerations might cancel each other, leading to little change in the electron's pulsation frequency. Well, this is exactly what happens in a cyclotron. When an electron enters a cyclotron, it is alternatively accelerated in opposite directions (going in a circular path), perhaps causing it to increase its pulsation frequency *much less* than if were accelerated linearly, like in a common x-ray generating apparatus. We wish to test this concept by doing a Bremsstrahlung cutoff frequency experiment as usual, except using a cyclotron to accelerate the electrons. In this experiment (which has not been done at the time of this writing), QM would predict that the cutoff frequency ($\nu = E_e / h$) would be the same, since it depends only on the energy of the electrons incident on a metal plate. However, in this new *Model of Reality* theory, the predicted cutoff frequency would be much lower ($\nu < E_e / h$) than the usual QM prediction. The experimental setup is shown in figure 12. It would consist of a cyclotron for the electron beam source instead of a linear accelerator. The electrons are smashed into the metal plate, generating electromagnetic radiation. *Model of Reality* predicts that perhaps the cutoff frequencies of the radiation would be lower than predicted by the "photon" formula: $\nu = E_e / h$.

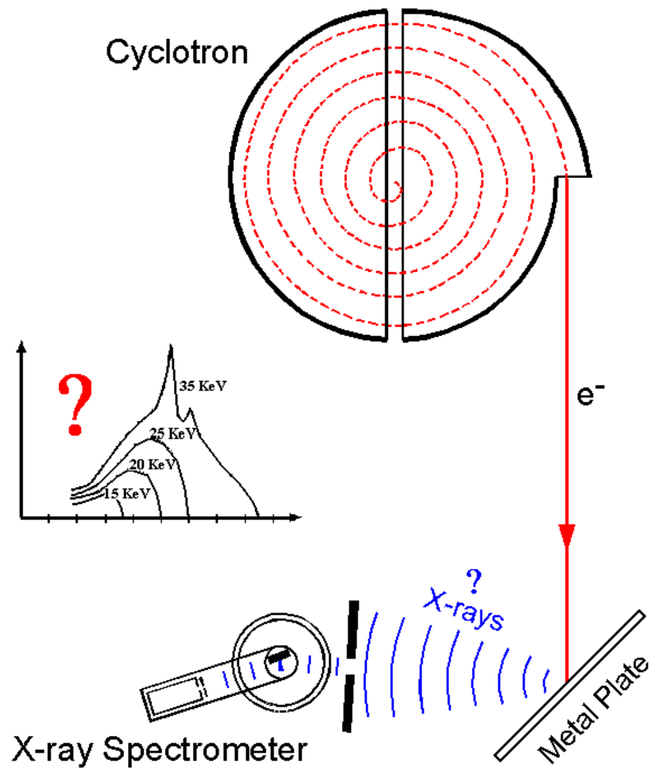

Fig. 12. An X-ray Bremsstrahlung experiment to find out if the cutoff frequencies for Bremsstrahlung electrons follow the "photon" theory of radiation, or the *Model of Reality* theory of radiation. The electron beam source is a cyclotron instead of a linear accelerator found in most x-ray machines. *Model of Reality* predicts that the cutoff frequencies could be lower.

7.3. Electron Interference in Electron Microscopes

In electron interference in electron microscopes, a charged filament is put into the electron beam path to create two paths for electrons to bend around and overlap before they strike the screen. This creates a diffraction pattern on the film screen. QM theory predicts a "probability wave" that interferes *right at the film screen*, causing an interference pattern at the screen. This new *Model of Reality* theory, however, predicts differently. It predicts that the pulsating electrons interfere *in flight before they hit the film screen* (in a reality based fashion), a major difference from the QM explanation[14]. This difference can thus be tested. If the solid angle of electron emission from electron gun is small, then the filament voltage can be increased to a point that the two paths on each side of the filament will be bent so much that a null region will be opened up in the middle of the pattern and no electrons will strike the center. In the ordinary electron interference experiment, both paths strike the pattern center. In this new scenario, the filament voltage is large enough to bend the two paths so that they do not hit the center. The setup is shown below:

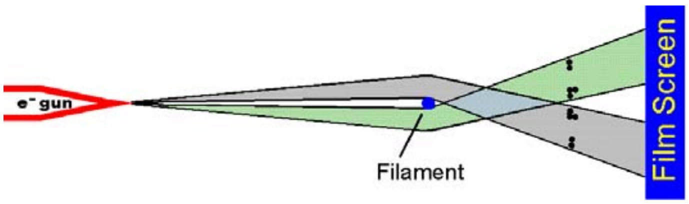

Fig. 13. An electron microscope has an electron gun that emits an electron beam with a very small solid angle. The charged filament bends the two paths so that they overlap.

In this scenario, the beam does not strike the center. According to QM, since the beam parts do not overlap at the film, there will be no "double slit" interference. According to this new *Model of Reality*, however, since the electrons interfere *while in flight*, there will still be interference in the outer regions even though they do not actually overlap right at the film. If there is still interference in the outer regions of the pattern even though the beam parts do not overlap, this will prove *Model of Reality* correct.

7.4. Other Model of Reality Based Experiments

There are several other possible experiments that can test this new Model of Reality theory, and we just mention them here for completeness. These include a new Stern-Gerlach experiment that shows that angular momentum is induced, not quantized. This is accomplished by using a magnetic field that has a large derivative but the magnetic field itself is small. Then there is a new hydrogen spectrum absorption experiment, where this new theory predicts that odd integral multiples of resonance hydrogen frequencies will still be absorbed by hydrogen gas. Next is the Lyman Absorption Experiment. QM theory predicts that if the Lyman $(1, \infty)$ line is absorbed by hydrogen gas, this corresponds to a complete ionization of the hydrogen atom. This new *Model of Reality* theory predicts that this frequency is just another resonance frequency, and not the special ionization frequency. To prove this, we illuminate hydrogen gas with successive Lyman hydrogen frequencies. QM predicts that only the Lyman $(1, \infty)$ line will cause complete ionization and increase a plate current in the gas. Our new *Model of Reality* theory predicts that if the Lyman $(1, \infty)$ line causes ionization, then so will the other lines. If the Lyman $(1, \infty)$ line does not cause ionization, then neither will the other lines. This is clearly different than QM.

8. Conclusion

When the founding fathers of quantum mechanics invented their theories, they were doing the best that they could with the information that they had. However, sometimes it is easier to see the whole picture after the whole picture is painted. Now that we have a much clearer picture of how the microscopic world works, and now that many paradoxes in quantum mechanics have emerged that make the theory seem impossible, it is time to consider a new set of explanations for microscopic phenomena that is reality-based. This new *Model of Reality* theory does not need to use photons for any of its explanations. We saw that the photoelectric effect is the result of a non-acceleration resonance. Planetary atoms are possible since quasi-circlular orbits in this scenario do not radiate. The new explanation for the Bremsstahlung x-ray cutoff frequency is superior to the one found in QM, where we use the Nyquist frequency limit. We found that thermal radiation is simply the disturbance of the outer orbitals of atoms in substances, and this theory explains the thermal radiation of liquids. Planck's theory, which was simply experiment-matched, comes from analyzing black cubical cavities in solids and does not make much sense when applied to other things like liquids. We hope the reader will allow this theory to be tested and evaluated strictly on its merits.

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