

How the Electrostatic Force Works

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A fundamental question in physics is how do opposite charges attract and similar charges repel. What exactly is 'charge' and what exists between these charges that allows the transmission of these forces? This paper explains the electrostatic force as being the result of phased wave interactions between positive and negative charges. These waves are mediated by a special neutrally charged medium which transmits both normal electromagnetic waves and the special high frequency waves which make up the electrostatic force.

1. The fundamental question of attraction

A fundamental question is why do opposite charges attract and similar charges repel. Why should anything be attracted or repelled from each other? The key is to understanding the electrostatic force is to understand what causes attractive and repulsive forces in our common experience. If you take a vacuum cleaner and point it at an object, you can see that it attracts objects to it. So we can easily understand attractive forces appear when an object is between a region of low pressure (the vacuum) and higher pressure (normal room pressure). Similarly, if we take leaf blower and blow on an object, we see that objects are repelled from a region of high pressure. These objects attract or repel each other without touching. This is similar to how charges attract or repel each other without touching. Therefore, we should try to understand the attraction of a positive and negative charge as somehow creating a region of low pressure between the charges which causes them to be sucked together. Similarly, we should understand that the repulsion of similar charges as somehow creating a region of high pressure between the identical charges.

2. Attraction between objects require a medium

In order to have regions of high or low pressure, we need some sort of medium like air which can fill all of space. But since we know that the electromagnetic force works even in a complete vacuum, it can't possibly be air that creates the high or low pressure. It must be something else which is very difficult to detect. It is something which fills even a vacuum. The medium that fills all of space has been referred to as the "aether". However, no one has been able to propose what this aether is composed of or how to detect it. We will go back to this, but for now let's just postulate the existence of such an aether which acts like air which can be compressed and create regions of high or low pressure. Assuming we have a medium capable of creating regions of high and low pressure, how do we change the pressure between a positive and negative charges? Somehow we need to make the pressure between similar charges higher and pressure between opposite charges low.

One characteristic of almost anything is that everything has a resonant frequency. So if you hit a bell, it will ring out its particular resonant frequency. No matter how hard or how frequently, you hit the bell, it will always ring out with the same frequency. So it not difficult to assume that positrons and electrons also have a resonant frequency. If you hit a positron or an electron, it will ring like a bell. The ambient thermal energy (temperature) causes all particles like positrons and electrons to constantly run

into each other. You can think of it like a box of bells that you shake around. The shaking will cause the bells to ring in their resonant frequency. As long as you keep shaking the box, the bells will continue to ring and convert the random shaking of the box into the specific resonant frequency of the bells. So how does help create regions of low or high pressure?

3. Phased wave differences create pressure differentials

It is proposed that positrons and electrons ring very similarly, except that they are 180 degrees out of phase which means that the waves from the positron are cancelled by the waves from the electron. So between a positron and electron, the waves are cancelled, which creates a region of low pressure between them. This causes the particles to appear to be attracted to one another. Similarly, between two electrons, the waves add up creating a region of high pressure between them which pushes the particles apart. So we have attraction of opposite charges and repulsion of similar charges.

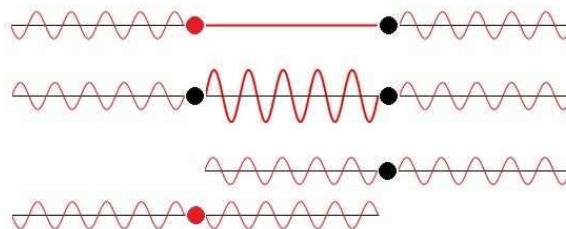


Figure 1. Phased waves either cancel or add

In Figure 1, the first line shows the interaction of opposite charges. The red and black charges ring at identical frequencies, but in opposite phases. Between the charges, the waves cancel which creates a region of low pressure compared to outside of the charges. This causes the red and black charges to be pushed together. The second line shows identical black charges which are in phase and between the charges, the waves add and create a region of high pressure between them. This high pressure region causes the similar charges to be pushed apart. The third and fourth line show the waves emitted by independent red and black charges so you can more easily see how these waves cancel each other.

4. All charges must be in sync and exactly out of phase

A problem for this model is that in order for this phase cancellation/addition to work, all positrons and electrons in the entire

universe would have to be exactly 180 degrees out of phase and every positron and electron in the universe would have to be in exact sync with each other. That would seem to require a massive coincidence. However, I think the reason why they are exactly 180 degrees out of phase has to do with smallest amount of space you can have and the smallest amount of time you can have.

I don't believe that either space or time is infinitely divisible. The smallest amount of space is determined by the size of the electron. If it rings with a resonant frequency like a bell, then it must have at least 2 states. It must have a larger state and a smaller state. Lets say for simplification that the larger state is twice as big as the smaller state. So, I can picture the electron as:

XX - the bigger state or
X - the smaller state.

The rate at which it switches between states is set by the resonant frequency. It cannot switch states any faster than this. This rate is set as a fundamental universal constant for all positrons and electrons in the universe and is set by the properties of electrons and positrons. All positrons/electrons are switching at this fastest possible rate.

The trick here is that if they are all switching at the fastest possible rate, then I would assert that they would all have to switch in unison. If they were not in unison, then that would imply that there is some unit of time smaller than the minimum set by the resonant frequency of positrons and electrons. Now, that's not terribly convincing since I think you could imagine some electron starting a fractionally bit sooner than another electron and it wouldn't be in phase. But if we believe in a creation moment in the universe, then we might think they were all started at the same time. Once started, they could never shift out of exact synchronicity.

5. God's clock keeps everything in sync

Another possibility to consider is that the universe runs on a universal clock. Let's call it God's clock. It ticks away just like the clock in your personal computer and nothing can happen faster than that clock tick in the system. If you consider the electron state as being like a memory bit with a value of either 1 (big state) or a 0 (little state), then in God's computer, all these 1's and 0's could only exchange values at God's clock rate. Furthermore, when God started up his universe computer, all the memory bits were randomly set to 50% 1's and 50% 0's. The 1's became electrons and the 0's became positrons and they have been forever locked into their phase from the start of the universe. It is entirely possible that we might be able to find God's clock experimentally. In theory, it is experimentally possible to measure the high frequency resonant EM wave generated by the electrons and positrons (it is probably in the range of 10^{20} Hz). It should also be experimentally possible to measure the phase differences between positrons and electrons. It may also be possible to show that God's clock is immune to any relativity time dilation effects. This should be a clock which should not slow down depending on how fast the clock is travelling or even if it is in a gravitational field. The clock is running as fast as it possibly can and sets an absolute time base, so it should be the same everywhere in the universe.

6. A physical explanation for attraction between charges

So we can now easily see the physical mechanism that charges use to attract and repel each other. They simply generate waves which are either in phase or out of phase and these phase interactions create regions of high or low pressure. This explanation does not require the use of virtual "exchange" particles or postulate the existence of vortices, toruses, rings or infinite sinks or sources as other theories have suggested. Instead, all we need to believe is that positrons and electrons ring like bells and generate waves in the surrounding medium which either add or cancel. These are concepts that we are familiar with in the real world, so it isn't much of a leap to think that this can happen. If you still think it is unlikely that phased waves could generate a $1/r^2$ force like the electrostatic force, it has actually been experimentally proven that such phased waves can generate $1/r^2$ forces. The experiment is described in the link:

<http://historical.library.cornell.edu/cgi-bin/cul.math/docviewer?did=02780002&view=50&frames=0&seq=11>

This is an article written by Vihelm Bjerknes in 1905 called 'Fields of Force'.

If you click on the link and then click on "Body of Text" in the lower left corner, you can read the entire book. This paper describes it as the 'Bjerknes forces' and the experiment used pulsating spheres in water to show that the pulsing spheres would be either attracted or repelled depending on the phase of the spheres with a $1/r^2$ force - a force which is identical to the electrostatic force. So it is quite clear that phased wave interactions can generate an electrostatic-like force

The results obtained by Bjerknes using an incompressible fluid differed from the expected electrostatic case in that spheres that pulsed in phase were attracted instead of repelled. This work was later extended by A.H. Leahy for spheres in a compressible medium. For this system, the results are reversed, the law being now that of attraction in the case of unlike phases, and of repulsion in the case of like phases. This paper can be found at:

<http://franklinhu.com/AHLeahy.pdf>

6. What is the medium for the phased waves

So now that we have established the mechanism behind the electrostatic force, what about the details of what are these waves and what is the medium that these waves are traveling through? Thus far, the "aether" through which the electromagnetic waves travel though has escaped detection. It is often thought that that the aether doesn't exist due to experiments like the Michelson Morley experiments which failed to detect a moving aether medium. However, none of these experiments started with an understanding of what the aether was actually composed of and how can you find something when you don't even know what you're looking for? So what is the aether made out of? Is it made up of some exotic type of matter that we don't recognize? I don't think the aether is made out of any exotic matter. In fact, I think it is made out of something rather mundane and common. Here is the simple answer.

The aether is made out of a dipole particle made up of a positron and an electron.

That's it - nothing complicated or exotic, just an ordinary positron and electron which join together to form a composite dipole particle which I call a "poselectron". The way to understand why a positron and electron would form a stable particle is that an electron or positron is like a sphere which pulses and gets larger and smaller. It is the shrinking and growing sphere that pushes particles in waves. This sphere will have a measurable greatest diameter (D_{big}) and smallest diameter (D_{small}). The difference in diameter will determine the wavelength that is created by the pulsing sphere.

When there are large distances between positrons and electrons, we can see that the waves either add or subtract in the medium between them. But what would happen if we reduced the distance to between the particles to be equal to the sum of the distance of the smallest and largest sphere diameters? This would happen if we took a positron and electron and spaced them in an area which is $D_{big} + D_{small}$ in length. In this case, there is no more space for there to be a "medium", there is nothing (not even an aether) between the two particles. Since the positron and electron are out of phase, the positron grows and the electron shrinks and then vice-versa as the electron grows, the positron shrinks.

The result is that the positron/electron pair do not change in dimension as they pulse. They keep the same $D_{big} + D_{small}$ dimension. Since they are not getting larger or smaller, it doesn't create waves outside of the particles, so therefore, do not create regions of higher pressure that would push the particles inwards. There is no medium to compress between the positron/electron pair, so there is no outward pressure either. The net effect is that there is zero force between the electron/positron pair. There is no repelling force keeping them apart, there is simply no force at all. However, as soon as the particles drift apart, aether particles fill the spaces between them and the normal inverse square laws take over and they are brought together again when there is again zero force between them.

So the natural tendency for independent positrons and electrons will be for them to form a poselectron particle. When the universe was created, just about all the positrons and electrons formed pairs and completely filled all of space with these particles. It is these poselectron particles that make up the "aether". These poselectron particles fill up all of space like water fills a cup and they form an elastic medium through which light waves travel. These poselectron particles then act like a medium like air or water and can transmit waves.

7. Evidence for the existence of the poselectron

The evidence for the poselectron as being the particle of the aether comes from [pair-production experiments](#). In these experiments, gamma rays are injected in what appears to be empty space and a positron and electron pop out of nowhere. This is given as an example of "converting energy into mass". But how can something that is "motion" like a wave, possibly create ponderable "matter"? There is no mechanism that is given for how this miracle occurs. It is much less miraculous to think that the positron and electron were there in a poselectron particle and the gamma ray just gave the particle enough energy to split it apart into a separate positron and electron.

The reverse is also true. When you take a positron and electron and allow them to collide, it is thought that the particles are completely annihilated and "matter" is converted to "energy". Normally matter and energy are completely "conserved" in any reaction. This would be a simultaneous violation of both the conservation of mass and energy, but in this case it seems to be OK for conventional scientists since two wrongs make a "right". Rather than rely on this magical "conversion" from mass to energy, it is clearer to think of a positron and electron as being strongly attracted to each other. They are so strongly attracted that they accelerate towards each other at the fastest possible speed allowed. This fastest speed turns out to be the speed of light. So the positron gains the kinetic energy of $1/2mv^2$ and the electron also gains the same kinetic energy $1/2mv^2$. Since the particles are at light speed their kinetic energy is $1/2mc^2$. When the particles collide, they do so in an inelastic collision and stick together. The kinetic energy drops to zero. Conservation of energy demands that the energy be conserved, so the kinetic energy is released back into the environment in the form of electromagnetic energy as gamma rays. The energy of these gamma rays is equal to the kinetic energy of the positron $1/2mc^2$ + the kinetic energy of the electron $1/2mc^2$ which equals $E = mc^2$. This is actually where this formula comes from. It is simply the energy of 2 particles heading at the speed of light colliding into each other. This is why the equation contains the speed of light and why the equation looks like the kinetic energy formula because it is just a relation for the kinetic energy of a particle accelerated to the speed of light.

Once the particles collide and form the poselectron particle it is completely undetectable since it is a neutrally charged particle and is completely surrounded by identical particles. The newly formed poselectron finds the ultimate hiding place in the aether. However, since the poselectron is made out of ordinary matter and we know the properties of electrons and positrons, we should be able to conduct experiments which can find this particle. When this experiment is done, we will have found the particle that makes up the aether.

So now the explanation of the electrostatic force is complete. We have a neutrally charged medium made out of a sea of poselectron particles. In this sea we have independent charges which emit a resonant frequency into the medium. The interactions of these waves create either attraction or repulsion. So now we have a clear common sense picture of what causes the attraction and repulsion due to a simple pressure differential. We can now see that the "photons" which are really just electromagnetic waves, really do cause the attractive/repelling force. The photons don't go back and forth as is stated in the Standard Model, but they just go forward like waves in a pond and interact with other waves to create pressure differentials.

8. The energy source for the electromagnetic force

This model also shows the "energy source" for the electromagnetic force. Mainstream science will deny that the forces we observe in electrostatic, magnetic and gravity fields require an "energy source". However, if you consider a particle moving in space and the only way to change its speed or direction is by the application of some "energy" from somewhere. Particles simply don't change their motion by themselves. The source of the energy comes from the surrounding ambient thermal energy - which is quite abundant at room temperatures. The speed of an air molecule at room temperature is something like 3000 mph. That's

a lot of energy. A prediction of this theory would be that if you managed to remove all of the ambient thermal energy of an object and reduce its temperature to absolute zero, all electrostatic, magnetic and gravitational fields would cease to exist.

We do see some odd behavior of materials which are close to these temperatures like the super fluidity of liquid helium – a fluid capable of flowing up beaker walls seemingly in defiance of gravity. There have also been experiments showing that the ionization energy of an atom (the amount of energy it takes to remove an electron from an atom) drops in ultracold environments. Perhaps this is due to a weakening of the electrostatic force at these temperatures. In conclusion, the electrostatic force is simply caused by phased electromagnetic waves in the aether which either add or cancel and creates regions of low or high pressure which attract or repel positrons and electrons. This is a simple and fully mechanical explanation for how these forces arise which is supported by experiments.

This work on the electrostatic field is part of my Theory of Everything which links virtually all the forces as being electrostatic and mediated by the poselectron sea.

<http://franklinhu.com/theory.html>

I welcome your comments. Please send them to franklinhu@yahoo.com