The First Step to a Theory of Everything, the Riddle of Electric Charge

David Martin Degner
East Anchorage, Alaska
DMD.TheArcticWildRose@gmail.com

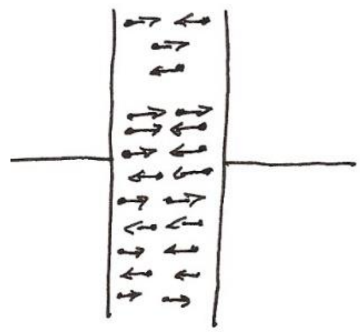
Abstract: What is the difference between a positive charge, protons, and a negative charge, electrons? What is the electric field made of? Why do like charges, +/+ and −/−, repel each other and unlike charges, +/−, attract each other? It turns out that there is a simple answer to these questions, and by simple I mean it is at the 5th or 6th grade level. The key idea is to observe the symmetries of +/+, −/−, and +/− charge configurations relative to the particle of which electric fields are made. And when we answer these questions it will turn out that the particle we "invent" or "discover" is the particle of which everything in the universe is made. By everything I mean electric fields, magnetic fields, photon fields, gravity fields, electrons, protons, neutrons, electricity, forces, both pushes and pulls, dark matter, and dark energy—ergo a TOE. Of course, that TOE will have some complex and subtle aspects or parts.

The ideas we need to introduce, that can be done at the 5th or 6th grade level, and will be made real and apparent in the capacitor graphics:

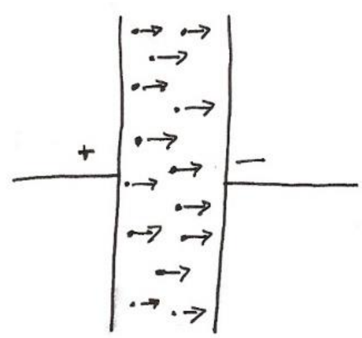
1. The most important properties of any system are the physical dimensions followed closely by symmetry and beauty.
2. The integers, have magnitude and go to infinity.
3. The real numbers, have magnitude and a decimal point, go to infinity, and are points on a number line.
4. Vectors have magnitude and direction, the direction represented by a short line with a head and a tail, the tail is attached to a point in space or in our case here a particle.
5. Vector fields are defined by a rule that attaches a vector to points in space.
6. Capacitors, what we will treat as positive and negative charges, have two plates with charge on the surface of the plates, we won't get into the solid-state physics involved but will just think of the positive plate as representing protons and the negative plate as representing electrons. The graphics represent cross sections of the capacitors.
7. The geometric ideas of normal or perpendicular, parallel, and anti-parallel.
8. Hypothesize the N particle, very small like a point, that has vectors associated with it—a vector for velocity, a vector for the electric field, and a vector for the magnetic field.

Like charges repel and unlike charges attract. This is the central riddle of the electric field force and is the single most important phenomena to interpret in all of physics since it is the first step to the TOE. Electrons and protons are held together to form atoms through electric fields. To see how attractive and repulsive forces arise between charges is the single most important insight into elementary particle physics.

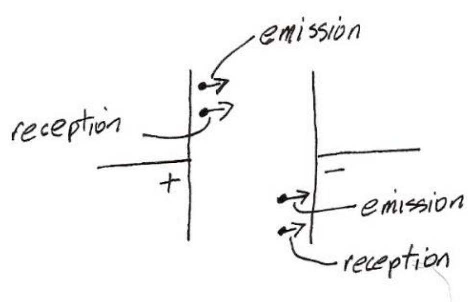
Consider a parallel plate capacitor. What is happening on each plate is that they are emitting the N particle, as a very small point-like particle, that has velocity the speed of light, is emitted normal to the surface, and receives the N particles emitted from the other plate. The arrow represents the direction of the velocity of the N particles. ½ are moving left and ½ are moving right. The N particle is so small that there are no collisions between the point-like N particles.



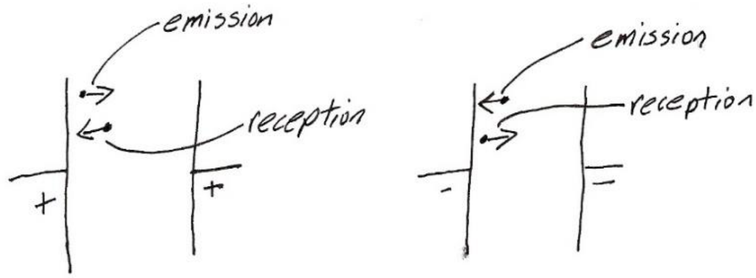
Now hypothesize there is a vector associated with the N particle that represents the direction of the electric field that I will call the **E** vector. The particles emitted from the positive plate have the **E** vector parallel to the velocity vector of the particle and the particles emitted from the negative plate have the **E** vector anti-parallel to the velocity vector of the particle. In this graphic the arrow represents the direction of the **E** vector. They all point in the same direction.



Now the symmetry of the attractive electrical force is apparent. What is going on at the positive plate is exactly like what is going on at the negative plate. Both receive and emit the N particle with the **E** vector pointing in the same direction and both feel an attractive force.



Now consider a repulsive force between like charges. Note there is no net electric field in the space between plates because ½ of the particles **E** vector point in one direction and ½ the particles **E** vector point in the opposite direction. In positive/positive and negative/negative exchanges both plates receive and emit the N particle with the **E** vector pointing in opposite directions and both feel a repulsive force. Then what is going on at each plate when both plates are positive and what is going on at each plate when both plates are negative have this same symmetry.



The difference between a positive and negative charge is they emit the N particle backwards from each other, rotated by 180 degrees with respect to the velocity vector. The **E** vector is parallel to the velocity vector for emission from positive charges and anti-parallel to the velocity vector for emission from negative charges.

I will leave it as an exercise for the reader to find the symmetries of **N** and **S** magnetic fields and the N particle. When you do that you will immediately know what photons are, and after a little thought have deep insight into gravity fields.

If you just want to go to the rest of the TOE, that includes a classical and beautiful quantum mechanics, it can be found on pages 62 to 91 of a 215 page novel I wrote titled **A string theorist meets the fisherman's son**, A String Theorist Meets the Fisherman's Son, viXra.org e-Print archive, viXra:2105.0123, and a paper titled **The N Particle Model**, 56 pages, circa July 2009, The N Particle Model, viXra.org e-Print archive, viXra:0907.0009.