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The Brightness of the Sky

or, the spectacular fudge that is Rayleigh scattering

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To read a compression of my argument here, you may consult my later paper The Anti-Stokes Fudge.

In previous papers I have written new theory for why the sky is blue and why the Moon is so bright, so this paper is a natural continuance of that line of work. The mainstream doesn't even really have a current theory on this one. They use scattering in the atmosphere to explain the whiteness as well as the blue, but when it comes to explaining the brightness, we get next to nothing. We currently have neither proof nor disproof that the existing theories can explain the brightness. Basically, it is just assumed that the current mechanisms can match the luminosity we see at noon. As far as I can tell, this question hasn't even been asked, much less answered. No one looks at this one very closely, obviously, for if they did they would find what a mess it all is. Once again, what I find most shocking is that I am the one blowing the whistle here. How do these things exist for so long without someone on the inside taking violent exception to them? As you will see, all of the rules of physics and math are broken here in plain sight, so it is very hard to understand how these theories get published to start with, much less how they manage to persist for decades or centuries.

As usual, I will write this paper in a way that you can see my method of discovery: showing you what I find in the order I find it. This will allow you to see how I get over and behind these walls as quickly as I do, will allow you to tag along on the entire journey, and will make the writing and the reading a sort of mystery tour.

If you do a search on this, you get lots of hits on brightness of the night sky and measured brightness of the day sky, but almost no equations or theory. We are told that sky brightness is explained completely by Rayleigh scattering, but is it? Given all the problems I found with that theory in my paper on the blue sky, that is doubtful. And given the fudges we found on the brightness of celestial bodies, it becomes more doubtful. I would say it is much more likely that sky brightness is also an outcome of charge interaction, so I will follow that hypothesis in this paper, after I show the big cheats in the current math and theory.

When they say that the brightness matches the Rayleigh equations, they are not being honest. What they should say is that the *whiteness* matches the Rayleigh equations. We see that the sky is a mixture of white plus blue, and scattering does indeed explain the white. Scattering ensures that your eye will be receiving a mixture of wavelengths, and that mixture is seen as white. But scattering in no way explains the measured luminosity.

The luminosity on the Earth's surface is about 10,000 footcandles. But according to a paper at JGR, the luminosity at altitude is much lower:

The brightness of the daytime sky has been measured using rocket-borne stereocameras. An upper limit of 0.0075 candle/ft^2 was found for the brightness at altitudes ranging from 80 to 220 km. This limit is consistent with the brightness being due entirely to Rayleigh scattering. No evidence of high altitude clouds was found.

What do they mean by "this limit is consistent with the brightness being due entirely to Rayleigh scattering"? Well, they simply mean that if we are *given* the first number for brightness near the surface, then the brightness at altitude is consistent with that number, given the loss in atmospheric density. But they don't mean that the brightness at the surface is explained, because it isn't. The baseline brightness is never derived straight from equations, because—given current equations and theory—it can't be.

Even the Rayleigh equation is back-engineered to match the known brightness. What do I mean by that? Well, a lot of physical equations—including Newton's gravity equation—are written specifically to match data. And in a lot of cases, no harm done. If we want engineering equations to launch rockets or something, those are the kind of equations we need. But if we want theoretical equations that explain how fields work mechanically, those equations can really get in the way—as I have shown over and over and over. Newton's gravity equation, a thing of great beauty as a matter of heuristics, has turned out to be the greatest impediment to a unified field equation. It has been an impediment because it hides the real fields under a mathematical field. Because the equation was compressed as a matter of real fields, no one has ever seen that it contains the sum of two fields, not just one.

Well, the same thing applies here. The Rayleigh equation was written to match data. Here it is:

$$I = I_0 \frac{1+\cos^2\theta}{2R^2}\left(\frac{2\pi}{\lambda}\right)^4\left(\frac{n^2-1}{n^2+2}\right)^2\left(\frac{d}{2}\right)^6$$

The diameter of the scattering particle is d, *theta* is the angle of deflection, R is the distance from the particle, the wavelength of the incident photon is in the denominator, n is the refractive index of the scattering particle (which is 1.0003 for air), I_0 is the intensity of the incoming photons, and I is the intensity of the scattered energy.

Just as Newton chose the inverse square instead of the inverse cube because it matched data, Rayleigh and others chose these coefficients because they matched data. For what mechanical reason does the intensity of the scattered light vary as the sixth power of the particle size, and vary inversely with the fourth power of the wavelength? No mechanical reason. Those numbers are chosen because that is what matches data.

The reason that hides theory can be seen in the way it impacts my new theory. I will propose that charge interaction is the cause here, and this equation has no way to refute that. If this equation were *already* the expression of a firm mechanical interaction of any kind, then it would automatically refute any alternative theory. The mainstream would be able to say, "No, it can't be charge interaction, because we have already matched data with this equation, and this is a scattering equation." But since the equation doesn't come with any mechanics, they can't say that. "Rayleigh scattering" is just a name they came up with to fit this equation. But if you ask them exactly what scattering is and why the equation must be written that way as a matter of real collisions, they have no answer. Which means the equation is wide open for re-interpretation. If someone like me can come along and explain those numbers mechanically, with real field interactions, then the equation automatically becomes mine. In that case, the equation is no longer a "Rayleigh scattering" equation, it is now a "Mathis charge interaction" equation. I trust you see the logic of that. Math that matches data is not physics. Math that matches data is a *precursor* to physics. But until you can explain why the equation works, you don't have physics. A floating equation like the one above is just sitting around waiting for a real physicist to claim it.

But that equation doesn't even match data, as I will now show. It might match very restricted local data, but it is actually upside down to the total field. To show that, I have to return to the definition of scattering. Scattering is supposed to conserve energy. In elastic scattering, we simply have deflection of a field of particles by another field of particles. Here, photons are deflected by ions, molecules, or the charge fields of those ions and molecules. When that happens, energy should be conserved. So it should be quite surprising that the intensity of an incoming beam of light should be changed by the 4th or 6th power of anything. Using poolball mechanics, we would not expect such a change. Instead, we would expect only a slight dimming. An atmosphere made of anything should reflect some portion of incoming light, which would diminish any initial intensity. Absorption of light would cause the same diminution, but since an atmosphere can't absorb indefinitely, we would also expect emission of photons. In fact, over any length of time we would expect a balance of photons absorbed and photons emitted. Otherwise the atmosphere would constantly gain energy and mass.

But the Rayleigh equation doesn't show a slight dimming. Rayleigh scattering requires that $d << \lambda$ in the equation above, which implies a large loss of intensity at each particle. Since $d << \lambda$, we should find that $I << I_0$. Even if we apply it to a field of particles with a low density, it implies great dimming. Although this might match the very localized data they were initially looking at, it doesn't match light coming from the Sun. For one thing, the total luminosity at the surface of the Earth can't be explained by scattering incoming sunlight, since there simply isn't enough visible sunlight hitting the Earth. I have to think they know that. The Rayleigh equations would have to represent a *boost* of incoming visible radiation to make it match the visible radiation we see at the surface. Since the Rayleigh equation should indicate a dimming, not a boost, the equation is upside down to the data.

In fact, they *do* know that, which is precisely why they use the Rayleigh equation to fudge such a huge effect here from each scattering particle. They know that although normal scattering should create a slight dimming, what they need to match data is a big brightening. So they boost the effect from each particle, and sum up from there. They then find a way to flip the equation over, showing a big

brightening instead of a big dimming. That is why they need to take the diameter to the 6th power and bring in a fudge with R. It isn't physics, mechanics, or even good math, it is just a gigantic push toward known data.

You will say, "Prove it. Do you have some data they are hiding from us?" I don't have to prove it with hidden data from SOHO or something like that, I can prove it straight from logic and from the numbers above. Even without any numbers from scientific papers or orbiting satellites, we know that it gets darker as you go higher in the atmosphere. Every high-altitude pilot knows that. We are told that is caused by the thinner atmosphere, which doesn't scatter as much. OK, so that means that lower altitudes scatter more, and they scatter more because they are denser. See the problem yet? According to the Rayleigh equation we just studied, *each* particle should cause a dimming. A denser atmosphere is composed of more particles, therefore a denser atmosphere should cause greater dimming. More and more photons should be reflected up or scattered to the sides (where they would also escape back into space). So this scattering mechanism and equation are both opposite to data. A denser atmosphere should reflect or absorb more, but they have a denser atmosphere reflecting *less*. Increasing brightness at lower altitudes contradicts any logical application of scattering.

They even admit that, in a way:

The amount of Rayleigh scattering from a single particle can also be expressed as a cross section σ. For example, the major constituent of the atmosphere, nitrogen, has a Rayleigh cross section of 5.1×10^{-31} m^2 at a wavelength of 532 nm (green light). This means that at atmospheric pressure, about a fraction 10^{-5} of light will be scattered for every meter of travel.

Yes, that fraction of light is scattered, but they want you to think that adds to brightness. It doesn't. It causes dimming. If you run the equation, what you find is that $I = 10^{-5} I_0$. In being scattered, the light has *lost* intensity, as we would expect. And you can't then add the scattered light to the original incoming light, although that is the only way the current equations could work. That would imply that the scattered light was both scattered and not scattered, you see.

If it is not clear what I mean by that, let me state it even more directly. They have given you an equation for the light that is scattered. But what about the light that isn't scattered? You will say it just continues on down with the original intensity. Yes, each ray or photon does, but what about the total rays or total photons? To calculate the intensity or luminosity of all incoming light, we have to sum all the rays or photons. Well, if some of those ray or photons are scattered, then we have to subtract them from the total. We then have rays that were scattered and rays that were not. For every ray that is scattered, we have fewer rays *not* scattered. As those unscattered rays become fewer, the total intensity of those rays drops. Therefore, if we sum the *total* intensity or luminosity as we go down, it must drop according to the mainstream equations.

You also get the same result if you assume all light is scattered. If all light is scattered, then all original intensity light I_0 has become scattered light I. And if that happens, your total intensity has dropped by 100,000 times. That is what I meant by a big dimming. The Rayleigh equation, *read right*, indicates a big dimming, not a brightening of any kind.

The only way the equation could work is if the atmosphere boosted the intensity, with denser atmosphere boosting the intensity more. That would cause the gradient we see. But since the gradient we see is upside down to the equation, the equation cannot explain it. The Rayleigh equation cannot explain greater brightness near the Earth.

I can't stress this analysis enough, since mainstream physics has been under an illusion or delusion caused by this math for a long time. I encourage you to study the mainstream mechanism, and notice that they *do* use the Rayleigh equation to give them an increase in brightness. They calculate an intensity I, giving that to the scattered intensity. They then add that to their incoming intensity I_0, to get a boosted total intensity $I + I_0$. But if the intensity I_0 was scattered, becoming I, it can't still exist as I_0, can it? It can't be both scattered and non-scattered.

You see, current theory pretends that a nitrogen molecule can interact with some photon or ray, but also not interact with it. The incoming photon just induces the magnetic field of the nitrogen molecule to create energy out of nothing, the intensity of that energy is calculated by the Rayleigh equation, and then the incoming photon continues on as before, with no loss of energy. So we then have both the created energy and the original energy. After the interaction, we don't have I, we have $I + I_0$. That is a spectacular fudge.

As more proof that I am right in this, we can take the "elastic scattering" link at Wikipedia. There we find this:

In this scattering process [optical elastic scattering], the energy (and therefore the wavelength) of the incident photon is conserved and only its direction is changed.

But that is an obvious fudge. What they should say is that in the scattering process, the energy of the incident photon is *preserved because they want to preserve it.* It isn't conserved. Energy conservation would imply that the total energy of the system stays the same, but here it doesn't. The Rayleigh equation gives us an energy from scattering, as we have seen. If that energy doesn't come from the incident photon, where does it come from? That is what I mean by a magic production of energy. The interaction causes no energy or intensity loss in the incident photon, but an energy gain in the field. From studying the Rayleigh equation, you would have thought that it was the incident photon that was being scattered, but that is not so. The incident photon is only redirected, at some small angle. The *angle* is then turned magically into real energy and field intensity. This makes the current definition of scattering something like this:

SCATTERING: photon redirection plus the magical production of energy.

We should ask what the scattered intensity I applies to. What body gains that intensity? Not the incident photon, clearly, since its energy is "conserved." Not the molecule of nitrogen, since it had no brightness to begin with. You cannot increase the brightness of something that is not shining, and molecules do not have their own brightness, according to current theory. According to the theory of optics, brightness, intensity, and luminosity are qualities of light. We have to bounce light off of nitrogen in order to see it at all.

What about charge? Is current theory claiming that the magnetic field carries off the new scattered intensity I? How could it do that? According to Wikipedia,

The oscillating electric field of a light wave acts on the charges within a particle, causing them to move at the same frequency. The particle therefore becomes a small radiating dipole whose radiation we see as scattered light.

Aha, so the nitrogen becomes a radiating dipole, and it creates the scattered light. And where does it get the energy to do that? It doesn't take any energy from the incident photon, so we have something

from nothing here. Notice that they have conveniently switched from a photon to a light wave, so that they can manufacture an oscillating electric field. Does a single photon have an oscillating electric field? If so, how does it create that? And how is that oscillating electric field transferred to the nitrogen, with no energy loss? The light causes the charges within the nitrogen to move at the same frequency, but there is no equal and opposite reaction on the light? The light transfers 10^{-5} of its energy to the nitrogen, but loses no energy in the transfer?

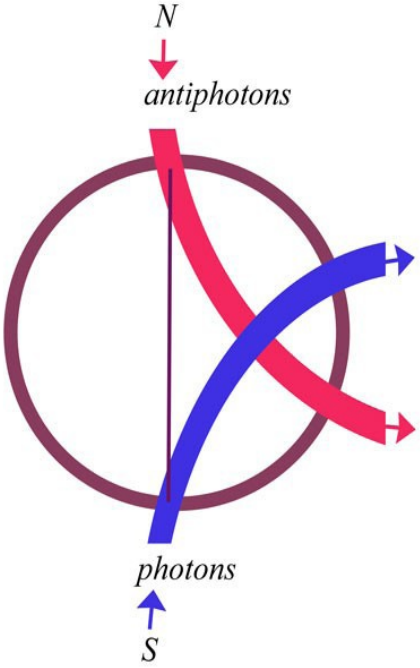
We are told that the nitrogen emits radiation that we see as scattered light. So the thing that is carrying off the scattered intensity I is this radiation. I suppose this radiation must be in the form of photons? Which means the incident photon hits or interacts with the nitrogen molecule, inducing it to emit one or more photons? So we get at least two photons where we only had one? With no loss of energy from the first photon? Brilliant!

This is why every explanation of Rayleigh scattering you have ever seen is so thin. Not only do they have almost nothing, what they have is upside down to very conspicuous data. So of course they are going to hide and misdirect.

But even if they could reverse the equation somehow, making each particle increase the intensity of the light that hit it, they would have to give some explanation of that. According to them, how could a photon coming *down* from the Sun hit a particle in the atmosphere, be deflected, and continue on *down* with an *increased* energy? How does that conserve energy? Wouldn't that make the atmosphere an infinite well of mysterious energy? As we have seen, yes. That is what they do. According to the current theory, the air in the atmosphere is able to create scattered energy from nothing. Incoming photons induce this energy creation with no transfer of energy. This is just one more "virtual" interaction, akin to messenger photons. The incoming photon just sends a message to the nitrogen via semaphore to scatter some energy.

I hope you are beginning to see that the brightness of the atmosphere is a huge mystery, one that has never been explained by the mainstream. Like the brightness of the Moon, it is another gigantic piece of data that is strongly negative to current theory. Rather than admit that and post it as a question, they hide it. They build big equations to conceal it. They then borrow energy from the vacuum while you aren't looking, creating new photons from nothing. Borrowing from the vacuum isn't only a trick used in symmetry breaking and other esoteric problems. It is used here in Rayleigh scattering, though it is (somewhat) better concealed.

I will show you how to solve this mystery. I think you will be shocked at how simple it is. All we need is my charge field. I have shown that the Earth is recycling charge that it gets from the Sun. Some light and heat comes directly from the Sun, without being recycled through the Earth. But what turns out to be a majority of the charge from the Sun is taken in by the Earth at her poles, recycled through the core, and emitted most heavily near the equator (or 30°N and S, to be more precise). It is the Earth's spin, combined with the spherical shape, that allows for this charge channeling.



All bodies channel charge like this, from the electron to the proton to the nucleus to the Moon to the Sun to the Galaxy.

Since charge is made of real photons, we have a field of photons rising up from the surface of the Earth at all times. Since these photons are rather small as photons go, and since they peak in the infrared, they get mistaken for heat in many situations, and are given to many other causes. But I have shown they are best understood as charge—the same charge that is represented by the minus sign on the electron.

Once we have this field, the gradient of brightness is easy to explain. Since the charge is emitted by the Earth, its density falls off with altitude, by the surface area equation. In other words, we have denser charge nearer the surface. It is this charge field that incoming light is mainly interacting with. Yes, molecules in the atmosphere then rechannel this charge, and charge fields are always denser near matter. But when it gets right down to it, what we have here is another charge interaction. Without rising charge, there is no way to explain the brightness gradient on the Earth.

The mainstream has never been able to explain what really happens at boundaries, which is why they get squishy anytime a question is asked about mechanics. Since they don't understand the charge field, they don't understand what really happens with what they call scattering. Do photons really hit electrons or protons? They don't know, so they forbid the question. But I can tell you. Yes, photons are hitting everything all the time. But when a photon hits a larger particle like a proton, we can only get redirection and therefore diffusion. We can't get anything that would explain an energy boost or that would explain the brightness gradient we see in the atmosphere. We can only get that when photons hit other photons.

In many other places I have told my readers that photons don't collide much, and if they do it is edge to edge. Normally that is true. Photon fields are mainly interpenetrable. Photons are about 6 billion

times smaller than protons, so the odds of a direct collision are quite low. But there is one place that the odds of an edge hit go way up: the nuclear boundary. I have shown how the nucleus channels charge, and the nuclear interior is a pretty tight and dense place, even for photons. The photons that are channeled through the nucleus are forced to go through some small channels, and the photon densities become very high. Therefore, as the photons exit the nucleus, we find a few places on the nuclear boundary where photon collisions become great enough to really count. The photons are exiting the nucleus in such a tight group that their odds of hitting an outside (incoming) photon are pretty good. It is in these places that most photon hits take place. This is the mechanism for the sort of scattering we see in the atmosphere.

As with the brightness of the Moon and of the Solar corona, what we have with atmospheric brightness is a meeting of spins. All photons are spinning, and they can be spinning either left or right. This applies to both visible photons and charge photons. The Earth is recycling about 2/3rds charge photons and 1/3rd antiphotons. So about 2/3rds of the photons in the rising field will be left-spinners, say. Now, 2/3rds of the visible photons coming down will also be left spinners, since they traveled from the Sun along with the charge photons. But since they are moving in the opposite direction, they will *look like* right spinners to the photons coming up. If these photons going up meet the photons going down, we get spin cancellations. But that isn't what is happening, at least not here. These photon fields are too tenuous to collide. We need one more step. What happens is that the charge field going up is recycled through the nuclei of the atmospheric molecules, creating dense pockets of charge at the nuclear boundaries. And this recycling reverses the photons a second time. The photons coming out of the atmospheric nuclei are now right spinners, and they meet the right spinners coming down. If we have photon collisions at the nuclear boundary, the spins now augment. The charge photons will transfer some of their spin to the photons coming down, giving them a higher total energy. This is the mechanism for increased brightness.

A reader will or should have a couple of questions here. You will ask, "Why does this spin transfer change the energy? Shouldn't it just change the magnetism of the photons? Haven't you told us photon spin causes the magnetic field?" Yes, the outer spin of the photons does cause the magnetic field, but that is when lots of photons hit ions, making them spin more or less. But since a photon's energy is determined by its spin radius, a spin augmentation will also cause an energy augmentation of the photon itself. When two photons collide, the spins actually meet, like cogs. One photon can therefore transfer energy to another, in a strictly mechanical fashion. The cogs "lock" for a moment, and one photon gains spin energy while the other loses it.

Your next question may concern the transfer. You may ask, "To get more visible light, shouldn't we be turning infrared photons into visible photons? Your interaction wouldn't give us any more visible light, it would just give us more UV light or violet light or something. You say that the charge photons give their energy to the visible light. Isn't that backwards?" No, it isn't necessarily backwards, and I did that on purpose. If we let visible photons turn infrared photons to visible photons, then we lose a visible photon for every one we create, you see. We get no increase. But if charge photons make visible photons more energetic, we automatically have more intensity to work with in the total field, which we can then translate into luminosity later, by other means. Actually, this whole question is sort of splitting hairs, since you could make it work either way. The important thing is to increase the total energy in the photon field, and either transfer would do that.

A similar question is this one: "Isn't your transfer from charge photons to visible photons an instance of energy going uphill? Since charge photons are less energetic than visible photons, the transfer would have to go from visible to charge, right?" Well, if we look at individual transfers, yes. Given one

charge photon and one visible photon, the single transfer would have to go from the second to the first. I was trying to take a shortcut to show you how the field works as a whole. The charge field gives us a way to add to the total energy of the visible field, explaining the increase in intensity and therefore brightness. But if we want to talk about individual transfers, we do let visible photons boost infrared photons into the visible range. If we then sum across all such transfers, we find the visible photons giving more visible energy to charge photons than charge photons are taking from the visible. We have an increase in the total number of visible photons and a corresponding decrease in the total number of charge photons. This is where the increase in brightness comes from, and it also explains the greater brightness nearer the surface.

Notice that it also explains the blue. I have already hit this in that previous paper, but it has come up again here already, in the explanation above, and I wanted to point that out. In the first question, my reader says, "Your interaction wouldn't give us any more visible light, it would just give us more UV light or violet light or something." Or something. Try blue light. While the charge field is increasing the brightness of the sky, it is also shifting the median wavelength toward blue, by exactly the mechanism my reader is proposing. See my earlier paper for more on this.

[*Addendum: July 2014*: It may help some of you to connect this to laser technology. If you know something about how lasers are created but not much about Rayleigh scattering, this may turn a light on in your head. In creating a laser, you first have to send the light through what is called a "gain medium." As it says at Wikipedia:

The gain medium is a material with properties that allow it to amplify light by stimulated emission. Light of a specific wavelength that passes through the gain medium is amplified (increases in power).

Historical gain media were ammonia or hydrogen. But you not only have to send the light through a medium, you have to *energize* the medium. Normally this is done with an electric current or by another source of light at a different frequency. This process of adding energy is called "pumping."

This process of pumping is important to us here, because you should ask yourself why they have to pump the medium. They have to pump it because otherwise the incoming light won't be boosted. You can't just send light through ammonia or hydrogen and get a boost. Why not? Obviously, because that would imply more energy out than in. The ammonia would then be some sort of miraculous over-unity device.

But notice that with the current explanation of Rayleigh scattering, the atmosphere becomes just this sort of miraculous over-unity medium, which is able to boost the energy of light without being pumped. My theory solves this, because the Earth's charge field supplies the pump. Once we add the Earth's charge field coming up into the atmosphere from below, we not only have the source of the pump, we automatically have the right field flux. The Earth's charge field is denser nearer the Earth, so we do not have to fudge the equations to get this flux. We get it naturally from the already occurring fields.

You should also ask yourself why they need the gain medium in lasers. Why pump the ammonia? Why not just send the light through an electrical field? Well, again, the laser works a lot like the atmosphere. The laser needs the ammonia just like the atmosphere needs the nitrogen. The charge field or electrical field isn't enough, because by itself the field isn't focused in the right way to cause the effect. To get either effect, you need to send the charge field *through* the nucleus. The nucleus then focuses it. It is this focusing that allows for later interactions in the field. So without the nucleus channeling charge, neither lasers nor atmospheric effects—nor anything else—can be explained

mechanically. You have to have both the charge field and the matter field. In the atmosphere, you have the Earth's charge field coming up from below, being channeling up through the nitrogen nuclei, and then meeting sunlight coming down. Only this pumped field can explain Rayleigh scattering.]

In conclusion, we now have a mechanism that explains the gradient of atmospheric brightness, while conserving energy. Given the right answer, we can see that mainstream theory was generally on the right track, they just didn't have enough cars on their train. They tried to use the charge field, as you see, which was was a step in the right direction. But because they didn't know about charge recycling, their vectors were messed up from the beginning, forcing them to break conservation laws and pull photons out of nowhere. They were missing an entire field, and the only way they could make up for that was by waving a magic wand over the charge field of nitrogen, forcing it to produce the necessary energy at the last moment, with no mechanism.

I said above that I could claim the Rayleigh equation if I could find a better explanation. But you now see why I don't wish to claim it. It is a fudge at every point, and needs to be trashed. Just for a start, we can already see that the replacement equation must contain an expression of the Earth's charge field rising. That will allow the coefficients in the current equation to be reduced. In the new equation, we won't find a wavelength either, since I have previously shown that photon and charge energy should be written in terms of the photon radius, not the wavelength. We won't need a fudgable refraction coefficient either, since we can better express that with density. Given my new nuclear diagrams, we will be able to express the charge characteristics of nitrogen and other molecules straight from baryon densities and configurations. I haven't got an equation to show you yet, since, like you, I just got here on this problem. But I will keep working on it. As you see, I am pretty near having all the cards in my hand, and it shouldn't take much longer.

March 3, 2014: I have now rewritten the Rayleigh equation from the ground up.