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The Bohr Magneton

and Bohr's second and third biggest mistakes

by Miles Mathis

Abstract: I will show several problems with the derivation of the Bohr Magneton. Using that analysis, I will look again at the Bohr equation, showing that it too is compromised in several ways. This means the entire Bohr model has to be reworked, changing the mechanical and mathematical foundations of quantum mechanics and quantum electrodynamics. After this reworking, we find that the Bohr radius and Coulomb's constant are the same number. Coulomb's constant is shown to be a simple scaling transform, taking us directly to the Bohr radius. Finally, I show that the current .1% gap between the Bohr magneton and the experimental value for the magnetic moment of the electron is caused by the unified field. That is to say, this paper provides proof of older papers where I PREDICT a .1% variance in the field at the surface of the Earth. My foundational E/M field is .009545, which is almost exactly .1% of 9.8.

See http://milesmathis.com for references

Why is the Bohr Magneton not equal to the measured magnetic moment of the electron? In experiment, we find that the values are off by .1%. QED has no simple answer for this. I do.

QED proposes to explain the error by once again pouring Dirac's virtual sea on the problem and once again waving the magic wand. The electron is said to be interacting with virtual photons, giving it a precession and thereby a *g*-factor. All this is just one more fudge, however. Anytime you see the word "virtual" in modern physics, it means you have left the path of reason. I will show the simple mathematical reason for the error.

The Bohr magneton was first proposed by Procopiu in 1913. It is not a particle, but rather an expression of the magnetic field created by the individual electron. We have a simple equation for it:

$\mu_B = eh/2\pi 2m_e$

Unfortunately, as I said, this gives us a number that fails by about .1%. To see why, we must study this equation more closely. We can do this by looking at angular momentum, and the easiest way to do that is by returning to Bohr's simple math, which I first critiqued in another paper.

$L = nh/2\pi = rmv$

We let n = 1, since we are studying the first electron in the hydrogen atom. So,

$\mu_B = eL/2m_e = erv/2$

We find that this equation yields the wrong number. Why? Because the math is wrong. As I showed in my paper called *Bohr's First Big Mistake*, the equation L = rmv is wrong. Current theory tries to cover this by never including momentum or velocity variables, but they were there in the beginning. Look at what tangential velocity we get, for starters:

$\mu_B = erv/2$

$v = 2\mu_B/er = 2(9.274 \times 10^{-24}\ J{\bullet}T^{-1}/(1.602 \times 10^{-19}C)(5.29 \times 10^{-11}m)$

$v = 2.19 \times 10^6 m/s$

Mirroring current assumptions, I used the Bohr radius for r. That is well under c. Why? Why doesn't the electron maximize its orbital speed? I will be told that it is because v is not the orbital speed, ω is. Well, v = rω. So,

$\omega = 4.14 \times 10^{16}/s$

Is that over c? Nobody knows, because nobody understands angular speed.

You can't just multiply or divide by a radius to make a linear velocity into an angular velocity. That doesn't make any sense, mathematically or mechanically. Look at the equations for momentum and angular momentum closely:

$p = mv$

$L = rmv$

If the radius is greater than one, the effective angular velocity will be more than the linear velocity. If the radius is less than one, the effective angular velocity will be less than the linear velocity. That is a flagrant example of illogical scaling.

The history of physics fudges over this problem by creating a moment of inertia, but the moment of inertia is a ghost. It is the attempt to hide the fact that $v = r\omega$ is wrong. You would not have a moment of inertia without $v = r\omega$.

Where does that equation come from? It comes from $2\pi r/t$. If $v = 2\pi r/t$, and $\omega = 2\pi/t$, then v must equal $r\omega$. But, as I have shown, $v \neq 2\pi r/t$. In the historical derivations, v is defined as the tangential velocity. But $2\pi r/t$ is not the tangential velocity; it is the orbital velocity. The orbital velocity curves and the tangential velocity does not. The tangential velocity is a straight line vector with its tail on the curve, but it does not follow the curve.

If $v = 2\pi r/t$, then v is *already* an angular velocity. An orbital velocity and an angular velocity are the same thing. They both curve. Therefore, in going from $2\pi r/t$ to ω, you aren't really going from a linear expression to an angular expression. You are going from one angular expression, expressed in meters, to another angular expression, expressed in radians.

None of the angular momentum equations in books make any sense, so I developed my own equation to do this, going back to Newton to find the method. You can see my derivation in my paper on $a = v^2/r$. In my equation, v really is the tangential velocity, and therefore it is not equal to $2\pi r/t$. It is equal to x/t.

$$\omega = \sqrt{[2r\sqrt{v^2 + r^2}) - 2r^2]}$$

This equation is logical, because using it we find that the angular velocity is always less than the tangential velocity. We don't have any misdirection with moments of inertia, and we don't have the illogic of having the variables change in different ways for different values of r. We have a logical progression, since as we get larger, the angular velocity approaches the tangential velocity. Obviously, this is because it loses it curvature as it increases, becoming more like the straight-line vector. By the same token, at small scales, the angular velocity gets very small compared to the tangential velocity, and this is because the curvature is so great.

Using my new equation for ω,

$$L = m\omega = h/2\pi$$

$$\mu_B = e\omega/2$$

Basically, this is just telling us that the electrical energy of the electron is about twice its magnetic energy. But we already knew that from my stacked spins. The electrical field is the z-spin and the magnetic field is the y-spin. Z has twice the radius as Y, so it has nearly twice the energy (with ω as a scaling variable).

Now we just solve

$$\omega = 2(9.283 \times 10^{-24})/1.602 \times 10^{-19}$$

$$\boldsymbol{\omega_{eY} = 1.16 \times 10^{-4} m/s}$$

$$r = \sqrt{[\omega^4/(4v^2 - 4\omega^2)]}$$

If we use c for v, we find,

$$\mathbf{r_{eY} = 2.24 \times 10^{-17} m}$$

And now we see that the radius hidden under Bohr's bad math is the radius of the electron, not the radius of the orbit. This proves my point about the Z and Y spins, since those spins belong to the electron, not the orbit. But we should have known that long before. All the angular momenta have to apply to the electron, not the orbit. If the orbit was the primary cause of the various fields of the electron, then the orbit itself would show a magnetic moment and an electrical field, and so on. And if it did that, the atom wouldn't be neutral, it would be an ion. Besides, we know that free electrons also have electrical fields and magnetic fields. So it cannot be the orbit that has all the angular momentum. The angular momentum and the magnetic moment belong to the electron, so the radius must also.

And the velocity must also belong to the electron. That is, it belongs to the spin, not to the orbit. The velocity in this equation is not a velocity of the electron in orbit, it is the velocity of the spin. It is the tangential velocity on the surface of the spin, or the linear velocity a point on the surface of the spin border would be going if it weren't going in a circle. The magnetic moment, like the charge, belongs to the electron, not to the orbit!

I will be told that the orbit must have a momentum of its own, angular or otherwise. Yes, there must be orbital energy, but we need not calculate an angular momentum. The only thing in the orbit is the electron, so there is no mass inside the sphere. The only thing inside the orbit is the nucleus, and it is not moving relative to the orbit, so it creates no angular momentum. This being true, we only have to look at mass and momentum at the tangent. If we do that, we don't have to be concerned with angular anything. The electron transmits energy from the tangent, by emission, and this emission is emitted during a very small interval of the orbit. The emission leaves the electron in a straight-line vector, so we don't have angular momentum involved. We can use the tangential velocity directly, and compute the momentum linearly, with $p = mc$. But this momentum does not contribute to either the electric or magnetic field. This momentum contributes to the linear energy of the emission, not its spin energy. Magnetism is not caused by linear energy, it is caused by spin energy. So we don't have to be concerned with the orbital energy.

Remember, electrical energy and charge are two different things. Charge is the force of bombardment, by the emission. Charge is carried mainly by the linear energy of the emission: its mass and velocity. The electrical field is carried by the z-spin of the emission, and the emission gets its z-spin from the z-spin of the electron. The magnetic field is carried by the y-spin of the emission, and its gets its y-spin from the y-spin of the electron.

Now, the electron does interact with the field outside the orbit, but this is not a virtual field. It is the emission field of other quanta. The vacuum is awash with emission, and this emission acts as a friction on the orbit. But this doesn't cause a precession or a *g*-factor. It causes the electron to have a z-spin that is opposed to its orbit, like a set of spinning cogs. The electron has a linear momentum, or tangential momentum of

$$p = mc = 2.7 \times 10^{-22} m^2/s$$

The z-spin has an opposite momentum of about 10^{-34}. This acts as a slight drag on the linear momentum, but only in the 12^{th} decimal point. So it could not cause a .1% change in the magnetic moment. In fact, it changes nothing in the magnetic field, since the magnetic field is under the electric field. Only the orbital momentum and the electric field could be affected.

But why is the experimental number for the Bohr magneton .1% wrong? Is it just that Bohr's numbers were different than current numbers? Is it a problem of the virtual field, explained by the *g*-factor? No. It is caused by the unifed field. In another paper I derive a solid number for the summed charge field of the Earth. This is not the electrical field of the Earth or the magnetic field. It is what I call the foundational E/M field, caused by the emission of photons by all matter in the field. It causes the electric and magnetic fields, but is not equivalent to either one. It's direction is straight out from the Earth, radially; and it is always repulsive. All bodies create this field, and it is always in vector opposition to gravity proper. This field, with gravity, makes up the unified field. The average field strength at the surface of the Earth for this field is $.009545 \text{ m/s}^2$. This number was arrived at by rather simple math, by comparing the fields of the Earth and Moon. I will not repeat the math here: you will have to take the link to see it. The important thing here is that the number just quoted gives us almost precisely a .1% correction to the unified field, and therefore to the Bohr magneton. We just divide that number by 9.8 to find a .1% correction, you see. We get .0974%, which is close enough for me in this problem. The reason this solves the problem of the Bohr magneton is that the experiments have all been run on the surface of the Earth, in a field not known to exist until now. This charge field has been hidden in Newton's equation, as part of the gravitational field. Newton's equation gives us the total field, but not the constituent fields. Likewise for Einstein's field equations. The charge field is ignored at the macro-level. But since I have proved that there is a charge field in vector opposition to gravity existing at all points on the Earth, this gives us a simple explanation of the error in the Bohr magneton. This charge field must obviously affect the magnetic field of the electron directly, by straight bombardment of charge photons. This gives us the simple mechanical cause of the .1% error, with all the necessary math. As a matter of fact, all the historical and current experiments on the electron that show this .1% error are now proof of my theory. I predicted a .1% variance several years ago in the linked paper, before knowing of or studying the Bohr magneton. I have now found the pre-existing proof of it here, and have explicitly shown the necessary connection of the two numbers.

Finally, let's check that value for the electron radius. Actually, what I found above is the radius of the magnetic spin. I have shown that the magnetic spin is the third or y-spin, and that it has 4 times the radius of the particle itself. Therefore the radius of the electron proper is

$r_e = 5.6 \times 10^{-18} \text{m}$

The electric field radius is the z-spin, and that must be

$\mathbf{r_{eZ} = 4.48 \times 10^{-17} m}$

It is this radius that is the effective border of the electron, since due to the end-over-end spin, the mass will inhabit this entire radius, during motion. In another paper, I found the radius of the proton to be about 10^{-13}m, and the proton is known to have a mass of about 1836 times the electron. Using those numbers, we get

$r = 5.45 \times 10^{-17} \text{m}$

Which is very close. We can use my number to calculate a more exact radius for the proton, assuming it has the same density as the electron.

$\mathbf{r_P = 8.23 \times 10^{-14} m}$

Of course this means the Bohr radius is wrong as well. Bohr's math is completely comprised by now, so everything has to be redone. The problem with angular velocity has infected all the math, and nothing will stand. Let's correct the Bohr equation:

$mv^2/r = ke^2/r^2$

First of all, $a \neq v^2/r$. If we want to use the angular velocity, we must use this equation

$a = \omega^2/2r$

Which gives us,

$m\omega^2/2 = ke^2/r$

Using Bohr's method, we find

$L = m\omega = h/2\pi$

$\omega = h/2\pi m$

$h\omega/4\pi = ke^2/r$

$\omega = 4\pi ke^2/hr$

$h/2\pi m = 4\pi ke^2/hr$

$r = 8\pi^2 mke^2/h^2$

This gives us the *inverse* of Bohr's radius. You can see that because of the correction to the equation $L = rmv$, we get the radius on the wrong side of the equation, skewing the math. This means that Bohr's math depends on using that false equation. If you use the right math for angular momentum, the rest of Bohr's math fails. It fails because $L = h/2\pi$ applies to the electron, but Bohr is trying to apply r and $m\omega$ to the orbit. So these substitutions we are making can't work.

Think of the orbit like a big spinning particle, of radius r. That big particle has an angular momentum. The electron also has an angular momentum. Bohr has conflated the two. His equations are a mixing of both values.

So he has made two big errors. One, he has used the wrong equation for angular momentum, based on a mistaking of tangential and orbital velocity. Two, he has a false equality. If our first equation ($m\omega^2/2 = ke^2/r$) is correct, then the angular velocity ω must apply to the orbit, not to the electron. If it applies to the orbit, then $m\omega \neq h/2\pi$. This is because $h/2\pi$ applies to the electron *in* orbit, not to the orbit.

We will also see in subsequent papers that Schrodinger's equations do not solve this problem. Schrodinger has Bohr's principal quantum number and also a separate angular momentum quantum number, but he does not assign these physically. Because we don't get the mechanics, the math is unclear. And Schrodinger's equations retain the errors of Bohr in going from linear to angular velocity. That is, Schrodinger still uses a false angular momentum equation. $L = rmv$ was not corrected by Schrodinger, and it has never been corrected since.

Can we still find a Bohr radius? Let us assume that the first equation is right, after correcting the momentum equation.

$m\omega^2/2 = ke^2/r$

But we have two unknowns, r and ω, and only one equation. We can't solve without another equation, and Bohr's momentum equations are false. Let us first try using c for v. We will assume the tangential velocity of the electron is maximized.

So we simply return to the equation $\omega = \sqrt{[2r\sqrt{v^2 + r^2) - 2r^2]}$, using c for v. Since the electron is bigger than the photon, it must have a limit just under c, but since that limit is in the fifth decimal point of c, we will ignore it here.

$\omega = \sqrt{[2r\sqrt{c^2 + r^2) - 2r^2]}$

$m\omega^2/2 = ke^2/r$

$r\sqrt{c^2 + r^2) - r^2 = ke^2/mr$

We can simplify that by noticing that the left side will be dominated by c, allowing us to omit values of r.

$cr = ke^2/mr$

$r = \sqrt{ke^2/cm]} = 9.19 \times 10^{-4}m$

That's way too large, so we know something is still wrong. Let's try using Bohr's radius to find the angular velocity.

$\omega = \sqrt{2ke^2/mr]} = 3.09 \times 10^6 m/s$

Interesting that that is almost what we got for the *tangential* velocity v using Bohr's math above: remember that using the Bohr radius, we found $v = 2.19 \times 10^6 m/s$. But if we use the right velocity equations, we find

$r^2 = \omega^4/(4v^2 - 4\omega^2)$

$v = \omega^2\sqrt{[4r^2 + \omega^2]} = 3 \times 10^{19} m/s$

So that can't be right either. From these calculations, it would appear that the Bohr radius is either greater than or equal to about a millimeter, or we are using the wrong values for the electron, or the equation is still wrong.

It turns out that the equation is still wrong. The problem is simple: the constant k doesn't apply at the quantum level. Coulomb's equation is for use at the macro-level, and the constant is a scaling constant.

Just as I showed with G in another paper, k takes us from one level of size to another, so that we can compare fields that have different mediating particles or accelerations. Coulomb was working with little steel balls, not electrons, and his balls were nine orders of magnitude larger than the orbital radius of the electron, as you will see.

I showed that G is a scaling constant that takes us from the size of emitted photons to the size of the atom. Yes, the *B*-photon is G times smaller than the proton. We find it in Newton's equation, of all places, because Newton's equation is actually a unified field equation in disguise. It contains both the gravitational acceleration and the foundational E/M field (or charge field). Well, the same applies to Coulomb's equation. It looks just like Newton's equation because it is the same unified field equation in a different disguise. Newton's equation is hiding the E/M field, and Coulomb's equation is hiding the gravitational field. Because neither Newton nor Coulomb understood the fields under their equations, they only provided us a math that works. Their equations work because they compress the unified field into one field, and the transform between the two fields is the constant.

Since in Bohr's equation the field is the actual field the electron is moving in, we don't need a transform or a scaling constant. The electron is already moving at the proper scale. In the little illustration in the book, we see the electron circling the nucleus, and the electron and the orbital radius are in the same field. We have to do very little scaling (between the charge and the field it is in) in order to draw the picture, and this is not beside the point. The proton is actually repulsing the electron down that very radius.

And so we get this very simple equation:

$r = \sqrt{e^2/mc]} = 9 \times 10^{-9}m$

Fireworks should be going off in your head, because I have just proved that **the Bohr radius is the same number as Coulomb's constant**! The value of Coulomb's constant is 8.988 x 10^9. That is a scaling transform that takes us directly from the Bohr radius to our own world. I have proved my postulate.

I have already shown that a misreading of the scattering equations means we have the atomic size 100 times too small, so my new equation also fits that prediction and correction perfectly. The Bohr radius is 100 times larger than we thought, and you can now see all the math and logic behind the correction.