More than Gravity

Redefining what moves the planets and influences everything in our solar system

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Executive Summary

- The planets are positioned in a quantized order. We found a simple equation that accurately predicts the velocity of planetary orbits and distances from the Sun.

- The physical mechanism that appears to be moving the planets is the solar wind. It imparts position and direction to the orbits of the planets; it puts all of the moons in the solar system in locked orbits that rotate with the planets; and we believe that it creates the force on the surface of planets that is called gravity.

- The 400 year old equation for gravity and the assumption that the gravitational constant is universal are no longer valid.

- This theory is based on observational data. It explains why gravitational waves and gravitons have never been observed. It does not rely on invisible forces or require the existence of other unobserved extensions of the equation for gravity such as black holes or a complicated formation of the universe where things are assumed to have happened billions of years ago.

- It appears that the solar wind moves all of the planets, and is responsible for the natural log and the quantization at the atomic level.

- This theory may be the most substantial upgrade to the scientific understanding of our solar system since it was discovered that the planets orbit the Sun.

Introduction

Ever since humankind discovered that the Earth and the planets revolved around the Sun, there was a question about what force was responsible for this. Since the days of Newton, science has held onto the notion that an invisible force, which we have never been able to detect, controls planetary motion. There are complicated theories about black holes that have never been seen, densities of planets that have never been measured, and subatomic particles that have never been detected.

However, it is simpler than all of that and right in front of us. The Sun and the solar wind are the most powerful forces in our solar system. They are physically moving the planets. In fact, the solar wind spins outward in a spiral at over a million miles per hour that controls the velocity and distances that planets revolve around the Sun. The Sun via the solar wind quantizes the orbits of the planets – their position and speed.

The solar wind also leads to the natural log and other phenomenon from the very large scale down to the atomic level. This is clearly a different idea than the current view that has been held for over 400 years. We have been working on this for close 50 years and thanks to satellite explorations of space have data that just was not available when theories long ago were developed. We think that we have many of the pieces but there are certainly many more to be found. We set this up as a web site, rather as some authoritative book so that there would be plenty of opportunity for dialog. The name for this web site, www.MorethanGravity.com was chosen because we believe there is far more to this subject than is commonly understood. Whether you are a scientific expert in your field or just have a general interest in how our solar system works, we appreciate your comments.

THE SOLAR SYSTEM

Planets Behaving Like Atoms (Quantized Order)

Many would expect (and it seems reasonable) that the forces we see on Earth in our smallest particles such as atoms would also exist in large systems like our solar system. In science today, the theories that describe the atom over the past century in quantum mechanics do not agree with the theory of gravity described over 400 years ago by Isaac Newton. Using current data, it turns out that the planets in our solar system have a discrete or quantized order similar to the atom. Here we show that the distance, velocity, and position of the planets are quantized – and are driven by the solar wind.

The idea that there is order in the way the planets are positioned is not new. One of the world's most famous astronomers, Johannes Kepler (1571-1630) who developed the laws which govern the motion of our planets searched extensively for a relationship between the planetary positions and the Sun and was convinced that the planets were positioned in a given sequence. Later, Johann Titius (1776) found an empirical relationship among the planets. Johann Bode made this relationship famous during his time and was able to convince astronomers to search for some of the missing planets that were indicated in the relationship often called "Bode's Law." This led to the discovery of Uranus in 1781, and the largest asteroids Ceres and Pallas in 1801 and 1802.

Many have commented on the planets having some sort of order. Visually, it looks as though they have some sort of order. A planet and some very large asteroids were discovered this way. Following this line of thinking, we looked at the planets as if they were ordered in a quantized way similar to an atom and discovered some amazing things. We found a simple relationship that accurately predicts the distances and the velocities of the planets. We looked at the Sun and found that the only constant in our equations for planetary distances and velocities was related to the differential rotation of the Sun and the solar wind. And as we looked further, it appears that this is the physical mechanism that is moving the planets. All of this is based on applying a new theory to previous observations. It is all pretty amazing.

Let's start with the distance between the planets and the Sun. We guessed that if the solar system was like an atom, that planetary distance would be quantized. This is to say that we thought that the planets would have definite positions and that they would be either in the position or it would be empty. In a mathematical sense, this would be represented by a numerical integer ordering (0,1,2,3,…). If the first planet, Mercury was in the 0 orbital, how would the rest of the planets line up? Amazingly well we found.

If we predict the distance from the surface of the Sun to each planet in this quantized approach, the results are astounding. If D equals the mean distance to the surface of the Sun, and d_0 as the distance to Mercury, we can describe the relationship that orders the planets mathematically as:

$$D=d_0S^n$$

Each planetary position can be predicted from this equation in a simple calculation as we increase the integer (or planet number) n. S is the solar factor, which equals 1.387. The solar factor is found in the differential rotation of the Sun and the profile of the solar wind which we will discuss later.

We found that the velocity of planetary bodies can be described by an almost identical equation:

$$V=v_0 S^{-\sqrt{n}}$$

Similar to the quantized orbits that exist within an atom, the planetary bodies are either there or not. Mercury is in the zero orbital. The next orbital is missing a planet. The second, third, and fourth orbitals are occupied by Venus, Earth, and Mars respectively. The fifth orbital is missing. The sixth orbital is filled with Ceres. Ceres is described as either the largest of all asteroids or a minor planet (with a diameter a little less than half that of Pluto), depending on who describes it. Ceres was discovered in 1801 as astronomers searched for the missing planets that the Titius-Bode Law predicted would exist.

The seventh orbital is missing. The eighth orbital is filled by the largest planet, Jupiter. The ninth orbital is missing. Orbital's ten through fourteen are filled with Saturn, Chiron, Uranus, Neptune, and Pluto. Once thought to be Planet X, Chiron is a comet like body. The other planets, or now minor planet in the case of Pluto, are well known.

We graph the predicted and observed distances and velocities of the planets. As you can see in Figures 1 & 2, there is an amazing correlation between the predictions and observations. In fact, the dots representing the predicted distances are overlapping the actual observations in all cases, and in some cases completely cover them.

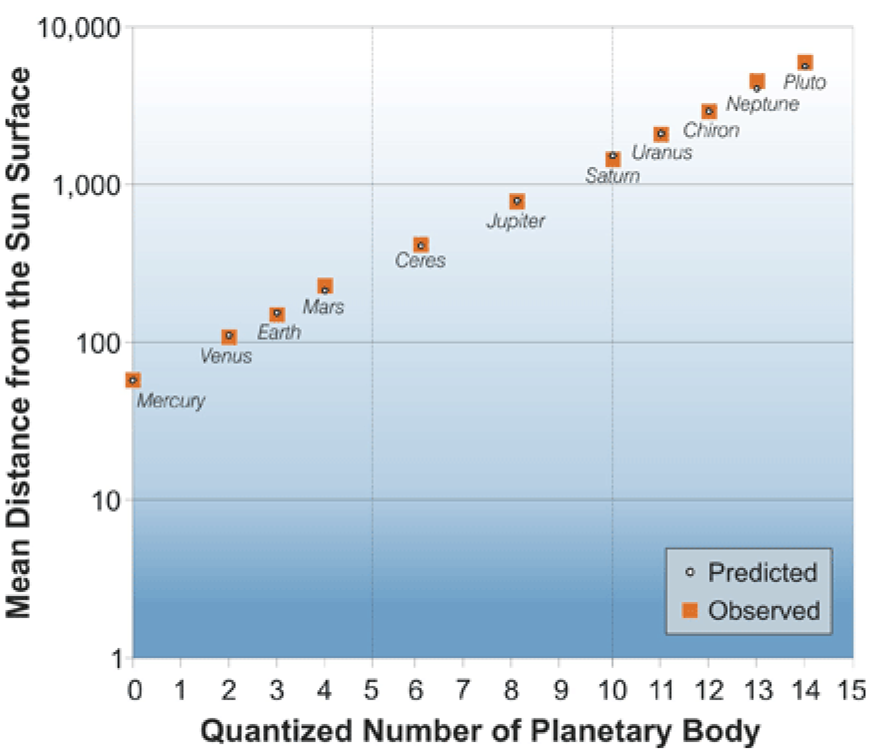


Figure 1: Comparing Predicted Planetary Distances to Observed Distances

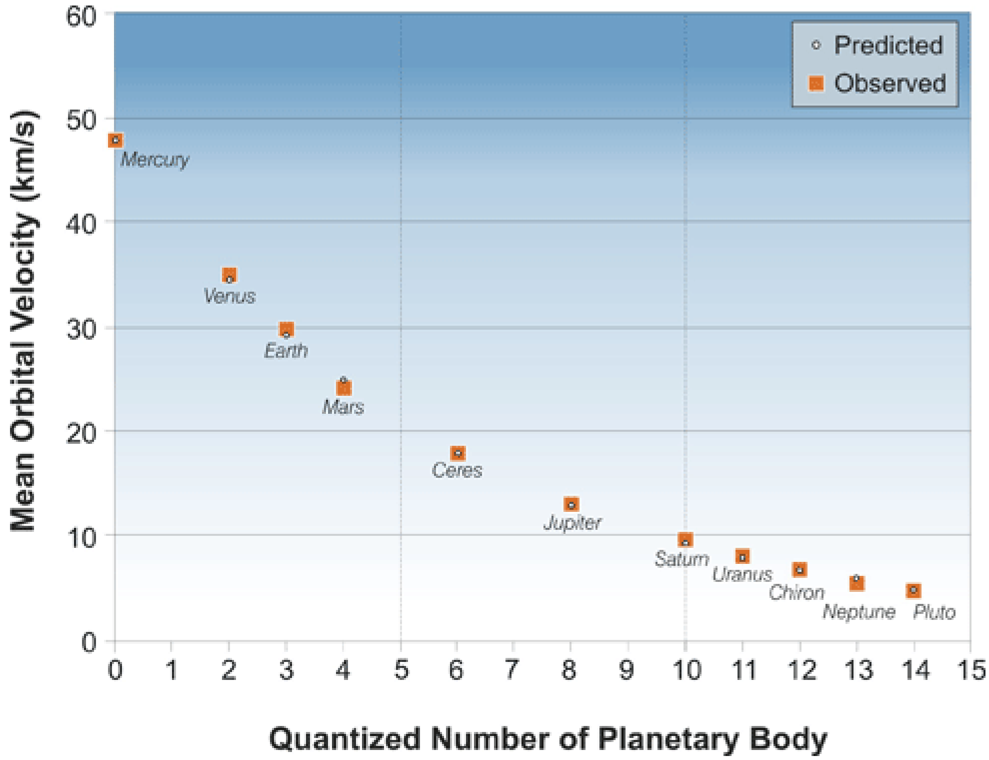


Figure 2: Comparing Predicted Planetary Orbit Velocities to Observed Velocities

For those that prefer tabular data, we have included the following tables that the graphs are based on in Tables 1 & 2. There is tremendous consistency between the predictions and the observations. If you are comparing the distance tables to standard astronomic tables, you will note a small difference in the distances. We are using the distance to the surface of the Sun rather than its center. As we will show in the next sections, the force responsible for the ordering and movement of the planets is the solar wind which originates from the surface of the Sun.

Table 1. Mean orbital velocities of planetary bodies - Predicted vs. Observed				
Planetary Body	Quantized number (n)	Predicted Velocity	Observed Velocity	Difference
Mercury	0	47.87	47.87	0.0%
Venus	2	34.51	35.02	-1.5%

Earth	3	29.31	29.79	-2.2%
Mars	4	24.88	24.13	3.1%
Ceres	6	17.94	17.9	0.2%
Jupiter	8	12.93	13.07	-1.0%
Saturn	10	9.33	9.67	-3.6%
Chiron	11	7.92	8.1	-2.2%
Uranus	12	6.72	6.83	-1.6%
Neptune	13	5.71	5.48	4.2%
Pluto	14	4.85	4.75	2.1%
(observed data from Beatty, et al. 1999)				

Table 2. Mean orbital distance of planetary bodies - Predicted vs. Observed				
Planetary Body	Quantized number (n)	Predicted Distance from formula (10^6 km)	Observed Mean Distance (10^6 km) from surface of Sun	Difference
Mercury	0	57.2	57.2	0%
Venus	2	110.1	107.5	2.4%
Earth	3	152.7	148.9	2.5%
Mars	4	211.7	227.2	-6.8%
Ceres	6	407.4	413.2	-1.4%
Jupiter	8	783.6	777.6	0.8%
Saturn	10	1507.6	1428.7	5.5%
Chiron	11	2091.0	2051.2	1.9%
Uranus	12	2900.2	2874.3	0.9%
Neptune	13	4022.6	4503.8	-10.7%
Pluto	14	5579.3	5915.1	-5.7%
(observed data from Beatty, et al. 1999)				

As seen in the graphs and the tables, there is a very strong relationship between the calculated and observed values for planetary velocities and distances. The average absolute error for the velocity predictions is 2.1% and 3.8% for distances. This is 3 to 6 times better than the average absolute error of over 13% for Bode's Law that was used to find several planetary bodies.

To put these planetary distances and velocities in a more common day example, let's imaging that each prediction of distance or velocity is a golf shot on a 300 yard hole. The green that we are hitting to is a circle that extends 60 feet from the hole. 18 out of 20 shots land on the green. One shot (prediction) lands on the fringe of the green. The worst shot comes up short traveling 268 yards. Of the 18 out of 20 shots that hit the green, 13 are under 25 feet to the hole. This is better than the best human golfer can do, and shows a very strong correlation between our predictions and real world observations.

The Solar Wind – It's No Vacuum

At the time of Newton and even Einstein, space was thought to be a vacuum where nothing existed. Since 1959, with the detection of the solar wind, and many satellite observations since – it is clearly not a vacuum out in space. As the Sun spins, it shoots out approximately 160 Billion tons of highly charged particles every day at very high speed. These particles, much more highly charged than we typically see on Earth, travel at speeds over a million miles per hour in a spiraling path to the end of our solar system.

These highly charged, highly energetic particles are the solar wind. The solar wind is pervasive in our solar system and travels in a path following the magnetic flux lines created by the Sun's differential rotation, providing the force in the direction of the planetary orbits and defining the ecliptic region (where all the planets orbit). Coming from the surface of the Sun, near the solar corona, these highly charged particles are something of a plasma, stripped of their outer electrons. Interestingly, the solar corona which floats visibly during a solar eclipse does not fall to the solar surface – disobeying the law of gravity. Clearly there is something more than gravity at work here.

Sun's Rotation/Solar Wind is the Solar Factor

From the section Planets Behaving like Atoms and the excellent correlation in Figures 1 & 2, the planets appear to be ordered. The calculations predicting distances and velocities of the planets both share a single constant, the solar factor of 1.387

Constants are often used in science, however caution should be used when viewing constants as they can mask the physical realities yet still “work”. The gravitational constant is one such constant (see Gravity is Empirically Measured) where there is no physical explanation to why there is the constant. Our theory is more convincing because there are physical observations that support the constant used in our equations.

The planets are ordered in a power series of 1.387 – where does this come from? It turns out this is found in two places – the Sun’s rotation and the solar wind, and that these are related in the simplest power series of all. The differential rotation of the Sun is 1.387 and the dramatic break in the solar wind speeds (at the ecliptic where the planets all orbit) is 1.387^2

The Sun has a differential rotation as shown in Figure 3. As measured by Sun spots and other surface features, the Sun rotates much faster at its equator, than it does at its poles. The differential rotation of the Sun is 35.5 days/25.6 days or 1.387. This is the first piece of the solar factor.

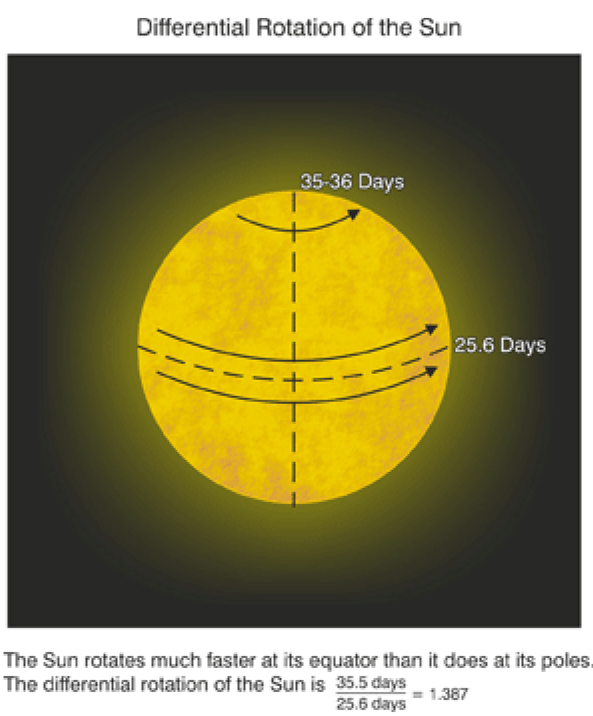


Figure 3: Differential Rotation of the Sun - the Solar Factor

The differential rotation of the Sun is responsible for the pattern the solar wind exhibits. As the Sun spins it releases a great number of particles. The particles ejected in the equatorial region of the Sun, the ecliptic, where all of the planets orbit the Sun, forms the slow solar wind. (The slow solar wind is not very slow – at 3,000 times the fastest wind on Earth, a category 5 tornado, this “slow” solar wind is traveling at nearly one million miles per hour.)

The solar wind then has a very dramatic break between the slow and the fast solar wind as shown in Figure 4 (Data from NASA Goddard Space Flight Center, NSSDC, CohoWeb 4/94 – 3/96 daily averages.) From a velocity of 400 km/second, the solar wind speed jumps to 770 km/second. This steep dramatic increase in the solar wind speed at about 20 degrees on either side of the Sun’s equator also is the same range as the ecliptic. All planets orbit the Sun in the slow solar wind speed and no planets exist in the fast solar wind zones. The ratio of the fast solar wind to the slow solar wind is 770 / 400 or 1.387^2. This further confirms the solar factor and its exponential nature with the very simplest of power series of 1.387.

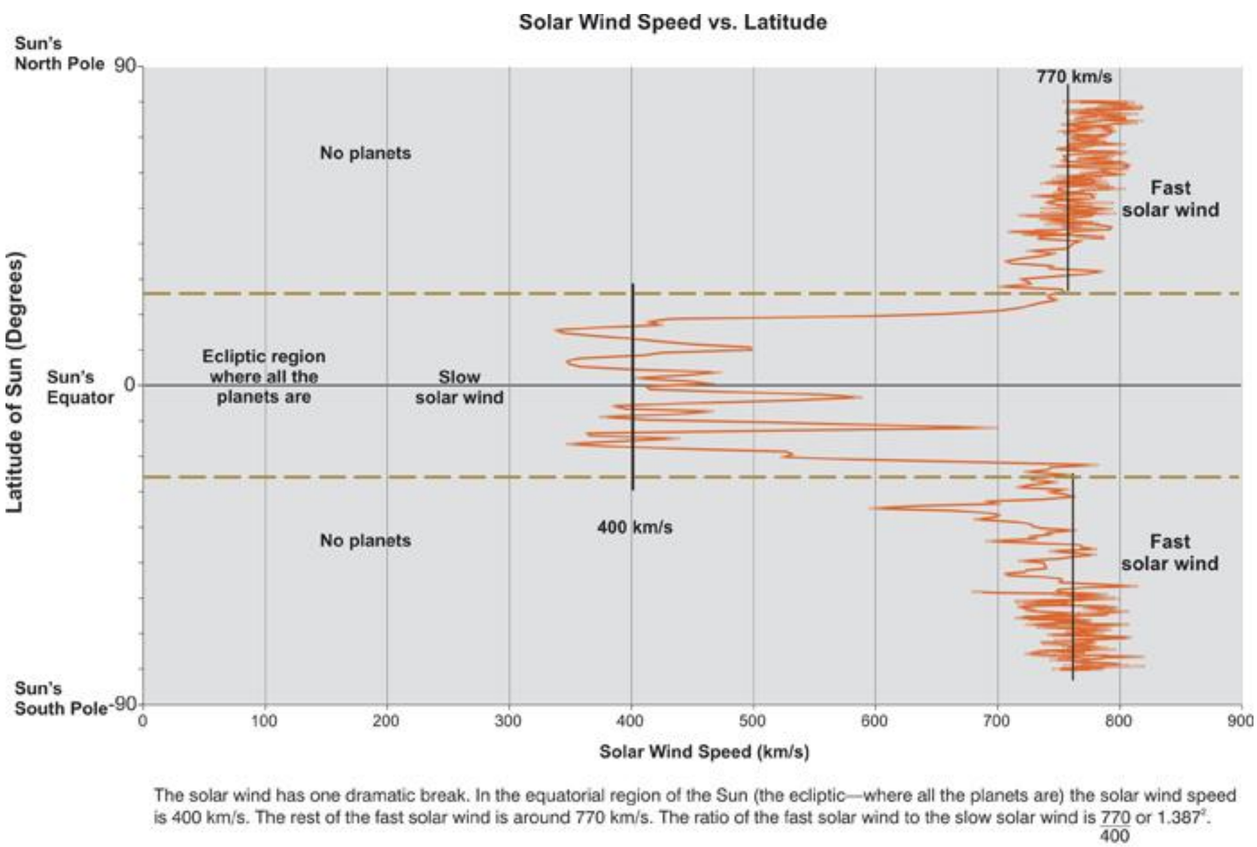


Figure 4: Profile of the Solar Wind

The fact that we can observe this constant, the solar factor, in both the Sun's differential rotation that is in a simple power series with the solar wind gives even more evidence that we are dealing with something that is clearly more than gravity.

Solar Wind - Force in the Direction of Orbits and Defining the Ecliptic

When we first found the formulas that allowed us to accurately predict the planets distances and velocities, we thought the differential rotation of the Sun was in some way associated but did not see a physical mechanism. At that point, we suspected that the equation for gravity might not be a unique solution and that Newton missed something in his original formation of his equation. It was only in examining the solar wind that we observed a physical force moving in just the right manner in all three dimensions to explain how our solar system works.

With the solar wind we have observational data that explains how our solar system works that no longer relies on invisible forces. The solar wind provides a physical mechanism that:

- provides force in the direction that the planets orbit
- excludes planetary orbits except in the slow solar wind
- and is a mechanism that can provide the planetary order observed

The solar wind operates differently than the rays of the Sun. The light from the Sun moves outward in straight lines as shown in Figure 5.

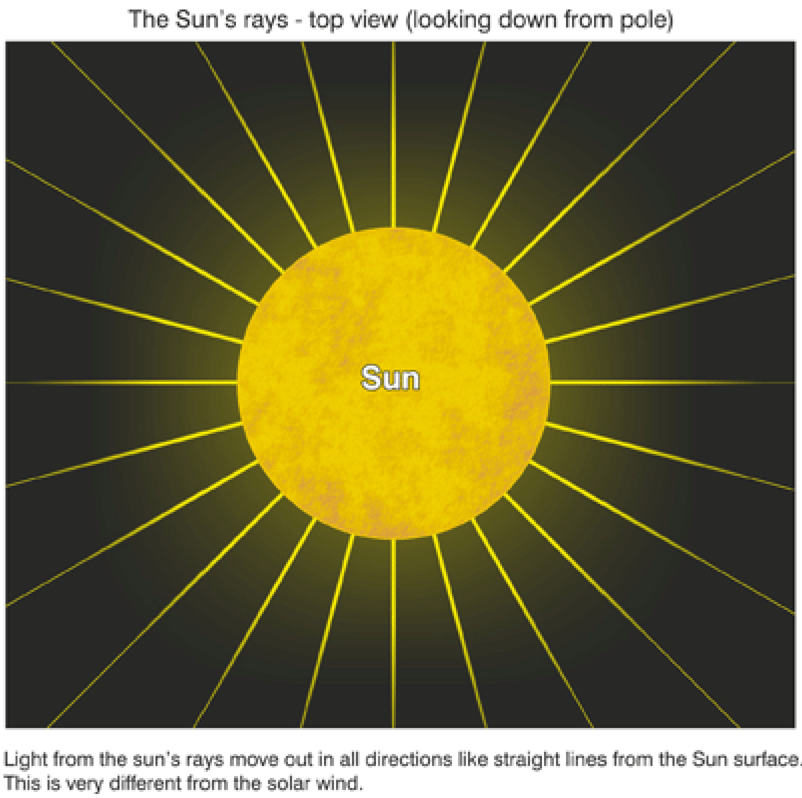
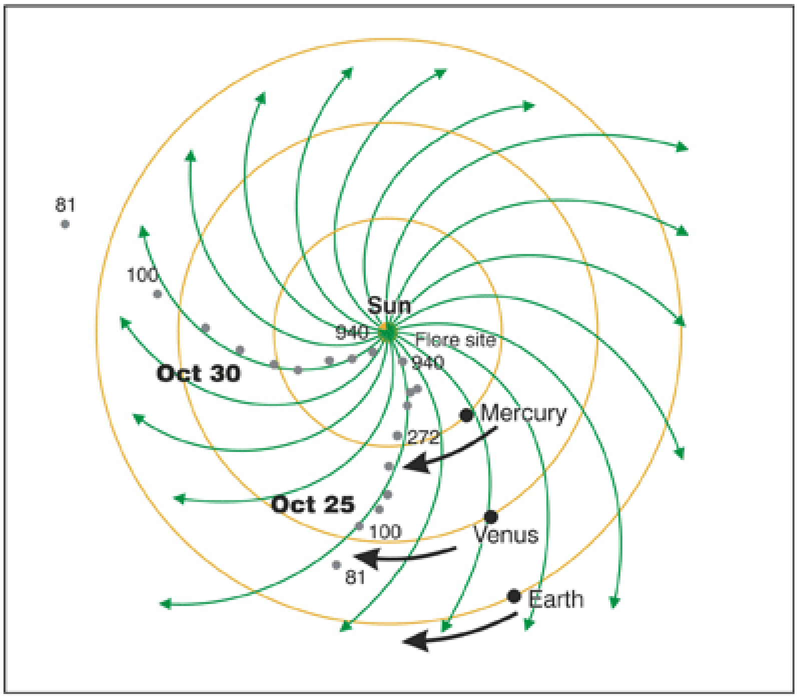


Figure 5: The Sun's rays move out in straight lines

The solar wind however moves out in a spiral, along magnetic flux lines that are formed by the twisting of the differential rotation of the Sun. The solar wind follows the magnetic flux lines that are created in the twisting of the Sun's differential rotation. This approximates a pattern of Archimedean spiral as shown in Figure 6 (Reiner 1994). In this way, the solar wind follows a distinct pattern in which the force of the solar wind is in the direction that all of the planets orbit.

View from the North Ecliptic Pole - Ulysses Radio Observations



All the planets orbit the sun in the same direction as the sun spins. This is the same direction that the solar wind moves. The solar wind flows along magnetic lines of flux that is roughly approximate by an Archimedean Spiral.

Figure 6: The Solar wind moves out in a spiral - the same direction that all the planets orbit

The solar wind also has pulses of highly charged particles that flow out on these magnetic flux lines. The pulses, called Coronal Mass Ejections (CMEs) are the most powerful explosions in our solar system. A CME will shoot 1-10 Billion tons of particles out. These particles travel along the spiral that has been set by the magnetic flux lines, acting like a pulse and catching up to some of the slower moving particles.

The scale of these forces is absolutely enormous. CMEs are the most powerful explosions in our solar system, packing the force of a billion megaton nuclear bomb. To put this in perspective a 50 megaton bomb is the largest ever detonated on Earth and 5,000 megatons is approximately the global nuclear arsenal. One Coronal Mass Ejection has 20 million times more force than the largest nuclear bomb ever detonated on Earth. These CMEs occur very frequently – varying from several per day to once every fifth day.

These CMEs contain such enormous energy it should not be hard to imagine that they have sufficient energy to move the planets. Looking at the path they take, swirling out from the Sun along the magnetic flux lines, the energy of the CMEs and the solar wind is in the same direction as the orbits of the planets.

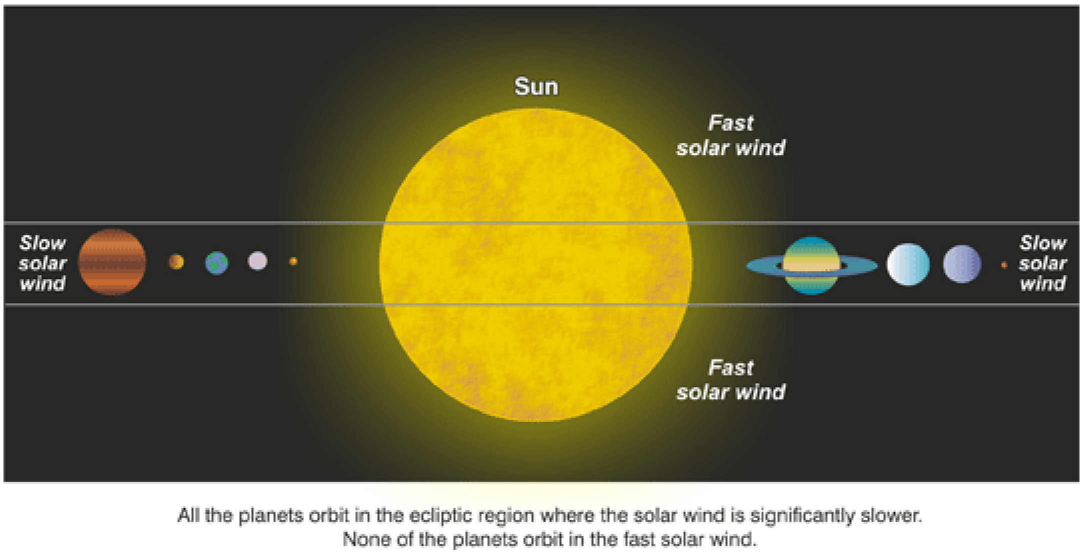


Figure 7: All of the Planets are in the ecliptic region - in area of the slow solar wind speed

As we look at the Sun from its poles to its equator in Figure 7, we see the other influence that it has on the planets. All the planets orbit the Sun in the slow solar wind and none of the orbits exist in the fast solar wind. The chance that it is random that the planets all rotate the same way and in this same plane (the ecliptic) is 1 in 30 Billion.

1 in 30 Billion Chance it is Random

The equation for gravity does not require that the planets orbit in any particular direction. Any direction of orbit is just as likely as another. A random pattern of orbits would be most likely such as shown in Figure 8.

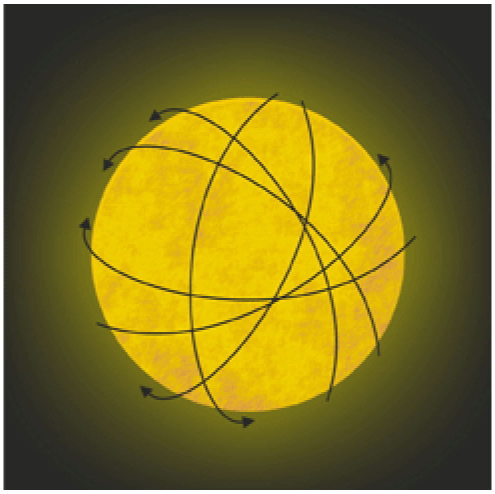


Figure 8: If the equation for gravity controlled the planetary orbits we would expect they would be randomly distributed

Let's look at the probability of a couple simple things surrounding the formula for universal gravity. The first one is the direction of orbit of the planets with respect to the rotation of the Sun. All of the planets orbit around the Sun in the same direction as the Sun rotates. There is nothing in the formula for gravity that says the planets should orbit the same way as the Sun rotates. In fact we would expect a random distribution of planets, about half would orbit the Sun in one direction and about half would orbit in the other direction.

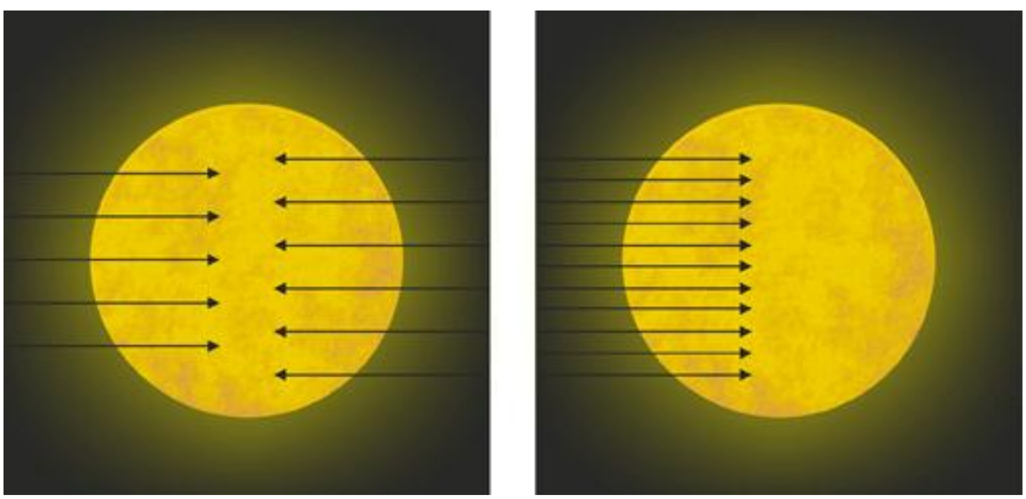


Figure 9: If the orbits were random, a) we would expect them to go in different directions however b) all of the planets orbit the Sun in the same direction.

If the equation for gravity controls the movement of the planets there is an equal likelihood that a planet would orbit the Sun in either direction as shown in Figure 9a. However, all planets orbit the Sun in the same direction as shown in Figure 9b.

For the eleven planets and bodies that we describe in the ordered positions, the chance that all eleven would be orbiting in the same direction as the Sun randomly is 0.5^{11} or a 0.049% probability. This also means that a theory that describes why all of these planets orbit the Sun in the same direction is 99.951% more likely to be correct than one that does not. This calculation is only for the direction of the orbital rotation of the planets.

The plane that the planets all rotate on may be even more telling. All of the planets and bodies rotate in the ecliptic region that is 20 degrees on either side of the Sun's equator. (This ecliptic region is also where the solar wind is substantially lower in speed than at any other latitude of the Sun.) Out of the possible 90 degrees, all the planets exist within a narrow 20 degrees. The equation for gravity does not indicate that this should occur and we would expect that they would be equally likely to rotate on any plane with respect to the Sun as shown in Figure 10.

Figure 10: If the equation for gravity controlled planetary orbits we would expect to see the planets distributed throughout space

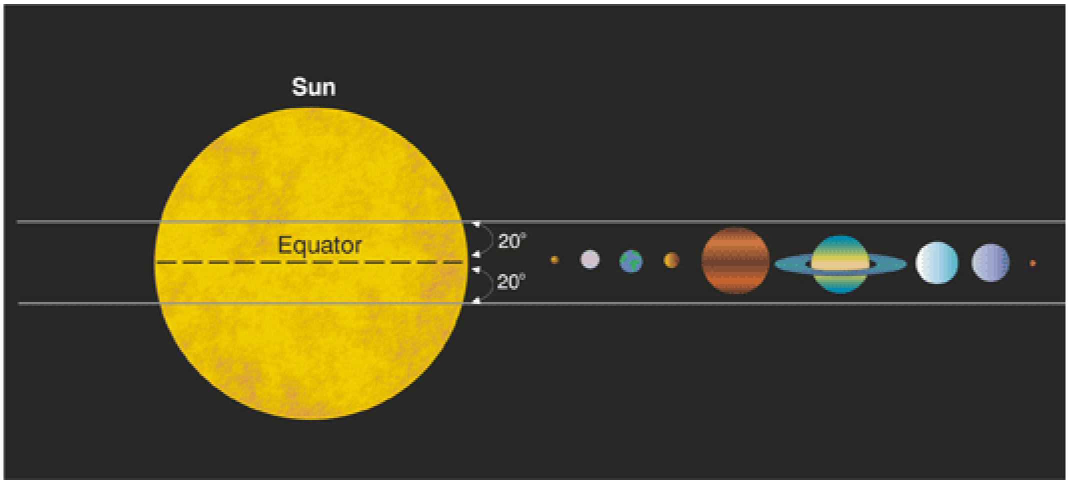


Figure 11: All of the planets orbit the Sun in a narrow band within 20 degrees of the solar equator where the solar wind is slower.

Again in Figure 11, we see that all of the planets do not orbit randomly. The chance that all of the planets would randomly rotate in the ecliptic would be $(20/90)^{11}$ or 0.0000065%. That also means that there is a 99.9999935% chance that this is not a random distribution. The combined chance that it is not random that they all rotate in the same direction and in this narrow 20 degree band is 99.99999999

The equation for gravity does not have direction to it, so it is logical to think that there should be a random distribution. However the combined chance of both all the planets orbiting in the same direction as the Sun's rotation and the orbits all occurring in the ecliptic region where the solar wind is slowest is less than one in 30 billion. The probability that this is not random is greater than 99.99999999%. To put this in more common terms, there is a remote possibility that this might be random. However you are 100 times more likely to get struck by lightning…twice.

Gravity was Assumed to be Universal – But It's Not

There is clearly a force that when we jump in the air brings us back to the ground. We are not arguing with this common use of the word gravity. We know that this force exists – we just think it comes from the Sun in the form of the solar wind and is not caused by something that is invisible to measurement.

Every planet has a force that attracts objects to them. When we say that there is something more than gravity responsible for what moves the planets, specifically we are referring to the over 400 year old equation of $F=Gm_1m_2/d^2$. There have been tremendous advances in science since then such as space travel and the discovery of the solar wind. This old theory of gravity does not match up with observations in a variety of ways which we will discuss in more detail. These include a number of huge gaps:

- Gravity does not work at the really large scale. There is a large missing mass in the universe which has been explained by dark matter such as black holes – which have also never been detected.
- Gravity does not work at the really small scale. There is a particle that must be in the atom, the graviton which has never been detected.
- Gravitational waves have never been detected.
- Gravitational theory works for things like space travel because it empirically measures the force of a planet, rather than predicting it.
- Many theories of the creation of the universe are explanations of this old mathematical formula. For example, in the section where we explain why there is only a 1 in 30 Billion chance that it could be random that all the planets orbit the same direction in the ecliptic plane, there is a theory that this is because of the formation of the solar system 5 billion years ago. Like these other things, there is little or no observational data to support this theory.

The conclusion that we reach from these many significant holes in the 400 year old theory that are not supported by observation is that there is clearly something more than gravity at work.

Missing Mass and Dark Matter

At the really big scale, at the scale of the universe itself, the law of gravity has a glaring hole. In a survey of the universe there appears to be a big problem of missing mass. Counting all of the stars and galaxies that have been observed with all of the best observations from the world's best scientists and observatories, only a couple percent of the mass that needs to exist, does in fact exist if the law of gravity applies to the universe.

In an attempt to explain what cannot be seen, some theoretical physicists have pushed a theory forth that the equation for gravity still works. They say that this unobservable missing matter that represents something like 95% of the universe is invisible to us. This they describe as dark matter or black holes

where gravity exists at a near infinite extreme. While this is all very elegant from a mathematical and theoretical perspective, there are no actual observations of black holes.

Typically scientific theory is used to help to explain observations. In this case of missing mass (and a number of others involving the law of gravity, such as gravitational waves and the graviton) theory is being defended in the absence of observation. In these cases, via some sort of rationalization we are told that it exists, but we just cannot see it. The kind of science that makes more sense to us is that if it cannot be seen or detected in any way, it probably does not exist.

Atomic Particles – the Graviton Never Detected

At the really small scale, at the scale of subatomic particles, the law of gravity does not work. If the law of gravity is to apply to the atom, a particle called the graviton must exist. This particle has never been detected. Many other subatomic particles have been observed. The lack of finding the graviton has not been for the lack of trying. So either today's best scientists working for decades with billions of dollars of equipment need to look a little longer, or this subatomic particle does not exist. It is fairly widely believed that the theory of gravity does not apply inside the atom.

Since the atom is the basis for everything in the universe, and the theory of gravity does not work at the atomic level, the universal theory of gravity is not universal at all. Never detecting the graviton, together with never detecting the missing mass of the universe, and never detecting a single gravitational wave, means that there is very little observational information to support the universal theory of gravity. We think that this absence of observations of gravity together with observations on how the planets are ordered by the solar wind clearly point to something that is more than gravity.

Gravitational Waves Have Never Been Detected

The general theory of relativity in 1916 predicts that gravitational waves exist. Almost 100 years later a gravitational wave is yet to be detected. A gravitational wave shares a couple similarities with dark matter and the graviton. First, all of these must exist for the law of gravity (and its' modification by general relativity) to be correct. Second, all of these have never been detected.

If the theory gravity is correct, we should be able to detect gravitational waves everywhere. There have been so many technological advances that have occurred in the last 400 years that it seems somewhat unreasonable to think that gravity is something that is invisible to detection. We think that the world has great scientists. The problem it seems is that a very old equation for gravity is staying in place even though it is not supported by current observations.

Gravity is Determined Empirically

We just went through three big problems with the theory of gravity - gravity does not work at the small scale of the atom; gravity does not work at the large scale of the universe; and gravitational waves have never been detected. So how come gravity "works" for things like space travel – doesn't this prove that the theory of gravity is correct? Clearly, there is a force that brings us back to the ground when we jump which is typically called gravity. It is in the equation gravity, and how it has been applied where we see something more at work.

The equation for gravity has been a useful tool for over 400 years. It works because of the way that mankind has empirically measured the force that is "gravity" for each planet. The equation for gravity can be partially correct and still "work". That sounds a little strange and warrants further explanation. Most of this strangeness comes from what is assumed.

The equation for gravity states that the force F = the gravitational constant G * mass of the first body m_1 * mass of the second body m_2 / square of the distance d^2. Part of the equation is observed fact. The force varies with the inverse square of the distance. This comes from geometry and must be true. The rest of the terms in the equation are either assumed or determined empirically. Typically mentioned only in a couple a sentences in college physics text books, the gravitational constant is "assumed" to be universal. Everything that has occurred from this point on has been inferred or assumed (based on the assumption of that the equation for gravity is correct.)

No one has ever weighed a planet. In a science book or even a dictionary it is easy to look up the mass of any planet. The mass of the planet is listed to a bunch of significant digits, as though it had been weighed very carefully. A density is also listed for each of these planets with at least three significant digits. The problem with all of this scientific accuracy is that it is not accurate. All of the values for masses of the moons, their planets, their suns, and their galaxies are all assumed and calculated from one another. The reason for this is that one mass is so much greater than any mass that mankind can

control. For example, the Space Shuttle is one of the bigger things we have been able to send into space. It has a mass of 100,000 kg. Compared to the Earth which is calculated to have a mass of 5.9742 $x10^{24}$ there is difference of 59×10^{19} or 59 trillion trillion times. So the mass of what we are using to test the theory of gravity is too small to test the change. In fact, the equation for gravity is used to determine the mass of the planet, so there is no way to test it. The density of the planet is calculated from its' mass, which is determined by the equation for gravity which is assumed to be correct. This is how all of these calculations have been made. The equation for gravity "works" because the formula is used to determine the mass of all the planetary bodies. This is to also say that the gravity of each planetary body is determined empirically. The equation "works" because a relative force (or gravity) is determined for every planetary body and the inverse square law applies to the distance. The mass of the big bodies are never validated. Since mankind cannot move a planet to test this, the body measuring is always too small compared to the planet and the equation for gravity is used to do the measuring. In essence, what is being measured is the surface pull of a planet – the masses and densities of planets are worked out to fit the equation for gravity.

All of the measurements are based on a single assumption that the equation for gravity is correct and the gravitational constant is universal. All of the planetary gravities that have been measured should be correct, however the masses and densities may be incorrect. In another section on observations of planet densities we point out what look like some likely inconsistencies that have been introduced through the use of the formula for gravity being both the measuring tool and assumed to be universal.

In Newton's *Principia*, (Newton, 1687) he found that if he took the distance from the earth to the moon and divided it by the earth's radius and squared it he came up with the dimensionless number 3660.

Distance to moon $d_m = 3.84 \times 10^5$ km Radius of the earth $r_e = 6.38 \text{ X } 10^3$ km.

$d_m / r_e = 60.2$ Square the ratio and you get 3660.

This alone would not mean anything without finding another ratio, which he did and this was gravity on the earth divided the angular velocity of the moon, which is the velocity of moon squared v^2 divided by distance to the moon which is dm.

The mean orbital velocity of the moon is 1.02 km per sec. Gravity is 9.8 m/ second^2.

$g/v^2/r$ This ratio comes out also to 3660.

This gave Newton the idea that helped him form the equation for gravity. When we originally questioned how could gravity predict a number of things correctly, but at the same time was not able to explain other observations - we asked how could that be? We said that if Newton would have found

another ratio of 3660 - what would he have done with this relationship? He could come up with another universal constant and then another to make various predictions since he now had three ratios all 3660. He could have three universal constants and three theories. We looked for another 3660 and found it, which is shown below:

$(rot_{earth}/rot_{moon})^{3/2}(r_{earth}/r_{moon})$

Here the velocity of the rotations of the earth and the moon at their equators (rot) and their radiuses (r) are used to come up with another 3660.

This said that A = B = C. This said there was much more to gravity then what Newton thought. It also pointed out that there was a something else causing the attraction of two objects. The idea to build a theory on three different premises did not make any sense. There had to be a more driving force. When we found the solar wind and the solar differential rotation we felt it is probably responsible for Newton's ratio as well as the additional one we added.

After this logic we looked for a ratio that would bring the solar wind to gravity existing on the moon and the earth and we found another amazing relationship. This new relationship that brings us back to the influence of the solar wind and the differential rotation of the sun that Newton could not have developed because he did not have the data. The ratio of the surface gravity on earth, g_{earth} to the surface gravity of the moon g_{moon} is related to their radii in the following manner:

$$g_{earth}/g_{moon} = (r_{earth} / r_{moon})^{1.387}$$

$$9.81/1.62 = (6378/1738)^{1.387}$$

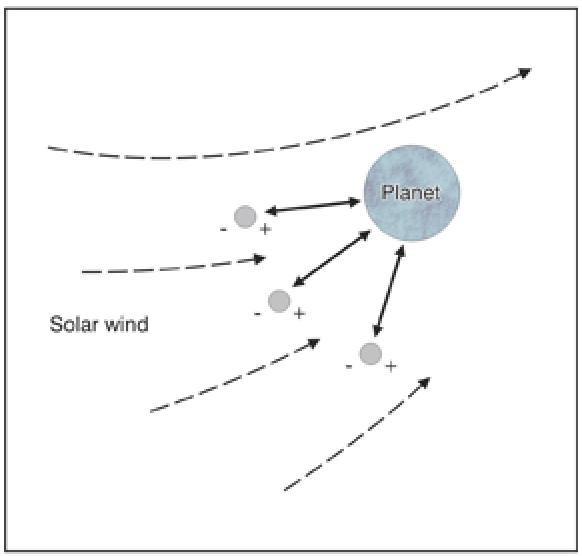
In this equation the surface gravity is related to the radius of the Earth and the moon and appears to be independent of a calculated mass. The solar wind or the differential rotation of the Sun is affecting everything in our solar system. The equation for gravity is incomplete. Both Newton and Kepler were brilliant, they took what information was available at the time and evolved a science – but it was only partially right. At the time they had no idea that it was not complete and only covering a portion of what is happening.

All Moons have a Dark Side

The solar wind makes a pretty convincing case for moving the planets, but what is moving the moons? This stumped us for a number of years, however we think we have found the answer. Every major moon in our solar system has a dark side. This is to say that all of the moons show only one face to the planet as they orbit – they are in locked orbits where they do not turn the opposite side to planet…ever.

For these locked moon orbits to exist for every moon throughout the solar system is again not a random occurrence or something that we should believe happens because of billions of years of past activity which we have no data to support. We think that all of the moons stay in locked orbits because they are mutually attracted to one side of the planet and also repelled from the other. This is similar to a magnetic force. We see the highly charged particles coming from the solar wind as imparting this magnetic/electric force. Figure 12 shows how we think this might be occurring.

Moon's Dark Sides



Here we guess that the solar wind imparts an electric/ magnetic charge to the planet and its moons so that they stay in locked orbits.

Figure 12: Hypothetical solar wind interaction with planet and moons

In this way, the solar wind provides the force and direction to move the planets around the Sun. It charges the planets and the moons in a way that they attract on another, creating what are typically referred to as surface gravitational forces.

The Rotation of Planets

Planets all orbit the Sun in the same direction and in the same plane near the Sun's equator (the ecliptic). We showed earlier that the chance of this being random is 1 in 30 Billion and have shown that the force responsible for moving the planets around their orbits of the Sun is the solar wind.

The planets all rotate around their axes as well as orbiting around the Sun. The current scientific explanation for this is, surprise…there isn't one. Theory says that there is no force that causes the planets to spin – just that this is the conservation of angular momentum and the planets had these spins a very long time ago, maybe 4 or 5 Billion years ago. As in all of the current scientific explanations of things associated with the equation for gravity, there are no observations to back it up, only conjecture that this happened way back in history – before humans existed, before records, before observations.

Since the solar wind controls planetary orbits, it would make sense that it would also influence how planets rotate around their axes. Most all planets rotate in the same way that they orbit (with the exceptions of Venus and Uranus which we will discuss further). On a quick logic based approach to thinking planetary rotations, it seems like they should follow some sort of pattern. Maybe those planets closer to the Sun would rotate faster as they have faster orbit speed, or maybe all planets have similar energy in their rotations so that the smaller planets would rotate faster. None of these things are the case. The bigger and more satellites (moons and small moons) a planet has, the faster it rotates.

Table 3: Planet Rotations about their axes related to radius and number of satellites

Planet	Rotation Period	Rotation speed at surface (km/h)	Radius (km)	Number of Satellites
Jupiter	9.925 hours	45,259	71,492	62
Saturn	10.626 hours	35,637	60,268	47
Neptune	16.11 hours	9,658	24,764	13
Uranus	17.24 hours	9,315	25,559	27
Earth	23.934 hours	1,674	6,378	1
Mars	24.623 hours	867	3,397	2
Pluto	6.387 days		1,151	3

		47		
Mercury	58.646 days	11	2,440	0
Venus	243.018 days	7	6,052	0

When you consider the solar wind as the motive force for the orbits, the rotation of the planets makes some sense. The solar wind hits both sides of a planet. The bigger the diameter of the planet, the greater net force - the difference between the force on one side of the planet and the other. This greater difference in force should impart greater rotational speed to the planet. The locked satellite orbits may also play a large role in spinning the planets faster. It should be noted that the two slowest rotating planets Venus and Mercury have no moons.

The two planets whose rotations about their axes do not follow their orbits are Venus and Neptune. Venus slowly rotates retrograde or in the opposite direction of its orbit. We do not know why this is the case – maybe that due to its location in the solar wind it gets imparted a slight backspin. It should also be noted that Venus does not have a magnetic field, which may be a big factor impacting its rotation.

The Parker spiral shape of the solar wind is shown in Figure 13 for the planets through Jupiter. The shape of the solar wind's magnetic field changes beyond about 10-20 astronomical units (AU) from the Sun. At this distance the magnetic field changes approximately 90 degrees and is nearly toroidal (pointed around the equator of the Sun) rather than poloidal (pointed from the North to the South pole, as in a bar magnet). Neptune at approximately 19 AU rotates with an axial tilt of 97.7 degrees which means that it orbits around the Sun like the other planets but it rotates on its side. There is no explanation for this other than an unobserved theory that this occurred because of some hypothetical collision at the beginning of the solar system. We think that this change in the direction of the solar wind is likely responsible for this unique rotation of Uranus.

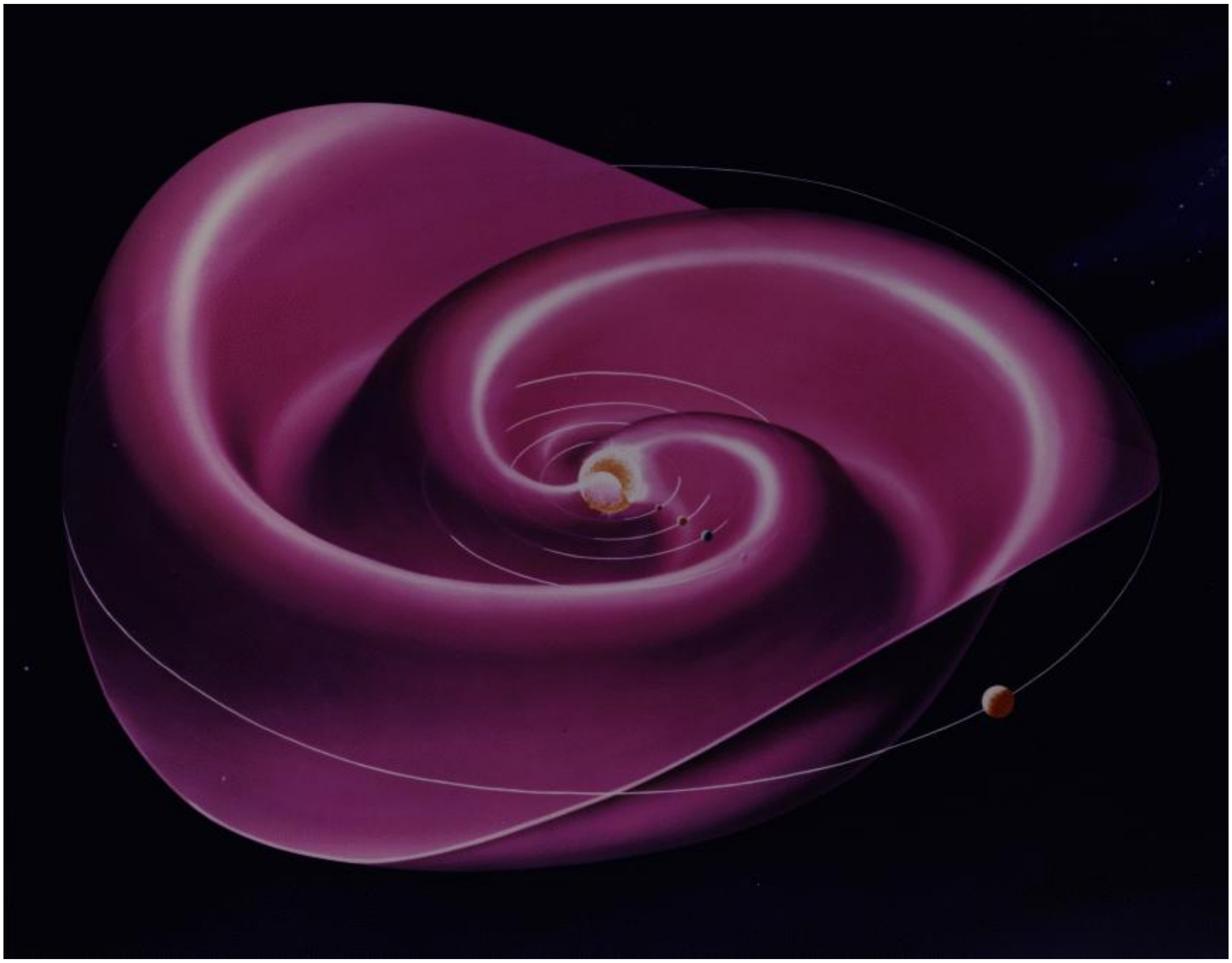


Figure 13: The Parker spiral shape of the solar wind at the near planets (Mercury to Jupiter)

Some Thoughts on Planet Densities

The way that the mass of planets is calculated assumes that the equation for gravity is correct, however it does not get tested anywhere, as we cannot weigh planets (see Gravity is Determined Empirically). Planet densities are then derived from the mass of a planet assuming that the equation for gravity is correct. As we look at planet densities and find logical problems, this further questions the equation for gravity.

What might we logically expect for density of the other planets based on what we know about Earth?

(1) We might expect the planets to all be about the same density. This would be if we had no information.

(2) We would expect that the bigger the planet is, the denser it would be. This comes from observations that the deeper we go into the Earth's surface, the greater the pressure and temperature - which create greater densities. For example, under high pressure and temperature graphite goes from being a soft substance to a diamond, the hardest known substance. This change to a diamond increases the density by more than 50%.

It would be logical that densities would increase as planets got bigger. The density of the planets as calculated through the equation for gravity does the exact opposite of logic. Earth has a calculated density of $5.52g/cm^3$. The largest planet Jupiter, which could fit about 1400 Earths inside it, would likely have a very high density, but its' density as calculated through the equation for gravity shows a density of only $1.33\ g/cm^3$. The next largest planet in our solar system, Saturn, has a calculated density of $0.70g/cm^3$ which is less dense than water. The other large planets also have low calculated densities as well - Uranus $1.21g/cm^3$ and Neptune $1.67g/cm^3$.

All of these planets have moons orbiting them and none of these moons has a density less than water. The whole idea of a planet being less dense than water does not make sense from a couple angles. If matter is attracted according current gravitational theory, then over time large bodies should become more dense as they attract others. Their calculated densities says the exact opposite is happening – as the planets get bigger they are becoming more light and airy, which is very counterintuitive and probably just wrong. The other thing is shape. If something has the density of water (or less in the case of Saturn) it should not have a circular shape. It would more likely have a shape like a teardrop.

Even the largest body in our solar system, the Sun, that could fit more than a million Earths inside has a calculated density of $1.4g/cm^3$ - just a little more than water. Hot enough to vaporize water or melt any of the planets, the Sun by all accounts has to be the most dense. These densities all come from the equation for gravity but do not seem to meet the test of logic. We are clearly seeing something more than gravity at work here.

Advance of the Perihelion

We have shown that the location of the planets and their velocities are not by chance but driven by the Sun. Einstein in his theory of General Relativity presented a different concept of gravity and its acceptance was based upon explaining two phenomena: first, predicting the advance of the perihelion of Mercury and second the deflection of light around a massive body.

Under Newtonian gravitational theory the advance of the perihelion was calculated to advance 531 arcseconds per earth century when the observed measurement was determined to be 574 arcseconds per century. Einstein felt that he had predicted accurately this value proving that his theory of gravity was correct and that Newton's was wrong. It is interesting that if you divide the 574 arcseconds by the

415 orbits that Mercury makes in century you obtain 1.38 arcseconds per orbit. It is likely that the advance of the perihelion is being caused by the solar wind and the Sun's differential rotation.

If the Sun is able to impart a force on to planet to control planet velocity, one would expect that it would react the same way on any phenomena entering its influence. There is no reason to suspect that a distant star light would not be subjected to the force related to the solar wind. One would expect the light to be bent. The concept that General Relativity is correct is based strongly upon predicting through a complicated space time continuum which predicts the advance of the perihelion and a shift in sunlight around the Sun. This complexity is not needed and masks what is actually happening. The light shift is being caused by the same force that is governing the motion of the planets, the solar wind.

In General Relativity Theory, in order to keep the universe from collapsing on itself Einstein needed a cosmological constant. This cosmological constant could be adjusted to give you any type of universe you desired, from collapsing, steady state, to expanding.

People like Alexander Friedmann and later George Lemaitre showed mathematically with an expanding universe the cosmological term could be zero. There was no scientific basis for the constant used by Einstein.

Whether the complex theory of General Relativity would have ever been developed if knowledge of the Sun being able to quantize the velocity and distance of the planets were known is a moot point. General Relativity cannot predict such events. General Relativity predicts that there will be a deflection in starlight as it nears the Sun and that the Perihelion of Mercury will advance by 574 arc sec in and earth century. Each orbit that Mercury goes around the Sun is altered by 1.38 arc sec per orbit which is in the same ratio as the planet are being quantized in velocity and position as by the solar wind and the differential rotation. What appears to happen as Mercury orbits around the Sun, it is constantly being bombarded by high speed particles which have a rotational component imparted from the solar wind. You could view this as the same force that is moving the planets and keeping them in their alignment is moving Mercury positionally.

General Relativity was given credit for showing that sunlight is deflected as it goes close to Sun. Experiments were done by Eddington which supposedly verified the theory, but when one looks at the deflection that was observed the deflections are not uniform and equal at similar distances from the Sun - spatially they vary. Dr. F. Schmeidler of Munich Observatory has published a paper titled "The Einstein Shift an Unsettled Problem" and a plot of the shifts for 92 stars for the 1922 eclipse shows shifts going in all directions, many of them going the wrong way by as large a deflection as those shifted in the predicted direction. Further examination of the 1919 and 1922 data originally interpreted as confirming relativity tended to favor a larger shift, the results depended very strongly on the manner for reducing

the measurement and the effect of omitting individual stars. In a paper that Marmet and Couture have written on "Relativistic Deflection of Light Near the Sun Using Radio Signals and Visible Light" comes to the conclusion after looking at the systematic errors are so great that the results on the deflection by the Sun proves nothing that would verify the results predicted by General Relativity.

The Theory of General Relativity has other issues, which have been questioned and it does have constants to describe the spatial conditions. The solar wind and the solar rotation have such a large effect upon the planets and everything that enters our solar system it is most likely accountable for the advance of the perihelion of Mercury and the deflection of sunlight as it passes near the sun. Due to the spatial effects of the solar wind, one might expect that the deflection of light would vary spatially since the solar wind varies spatially.

The recent experiments conducted by John Webb looking at light coming from distant quasars from both the northern and the southern hemisphere where he finds changes in the spectral lines showing a difference in the fine structure constant depending on your observation point is likely caused by the solar wind. It is hard to say which of constants appears to vary either charge or the speed of light as we think they both are.

It is obvious that if General Relativity is not accurate and the planets are being controlled by the Sun then the Big Bang Theory is also not accurate in describing the origin of our Universe. In the next sections we will show how the solar wind may affect the atom.

THE ATOM

As we have shown, the solar wind is governing the direction, velocity and position of the planets as they revolve around the Sun. At the atomic level there is a quantization effect, similar to the quantized order of the planets. It is our belief that these two phenomena are linked together. Since the solar wind dominates the motion of our planet we would expect it to impact all the matter on our planet.

It appears to us that the solar wind imparts quantization to the atomic scale, in a number of places, which we will show here. Quantization has been used to develop theories about the atom based on a number of experiments that were conducted in the 19th and early part of the 20th centuries. Before we show these experiments and get into the specific details; it might be better to look at a phenomenon that has eluded the scientific world, the natural log.

The natural log has been said to be a phenomena of nature. No explanation has ever been given to why matter exhibits properties that are to the natural log base. If the Sun is imposing a force to move the planets and position them it must affect the matter on Earth in some way. Let us look at the natural log.

Natural Log

Many things in nature behave as they are some way governed by the natural log. It has been a mystery in science and there is no explanation why experiments show these phenomena. As we have seen, the Sun and the solar wind control the planets speeds and locations, so it would reason that the solar wind would have an influence on all matter on our planet. We would expect there is some correlation between the two.

If we look at the way the planets are aligned by the power series, we see they are in a power series, x^{nth}.

The Sun and solar wind are generating the power series. We think that it would be logical that this influences all space within the solar system. So if we asked, what would x have to be to give e, the natural log? We could find the answer to this by using the Taylor series such that:

$$\sum_{n=0}^{n=\infty} 1/x^n \quad = e$$

$x= 1.58 = (1.387)^{1.387}$

We believe that the constant bombardment of the Earth by the solar wind imparts the natural log behavior to matter. This is one indication that what is taking place on both the solar scale and molecular scale are created by the same source, the Sun.

The natural log is not the only place we see the effect of the Sun's differential and the solar wind. We see this also in some of the fundamental data that we used to formulate early scientific perception of the atom.

Mobility of Ions

In the 1800's and early 1900's a great deal of research was done to explain the movement of charged matter. During this period science determined and refined the concept of charge. Experiments by a great number of researchers determined the mobility of ions which possessed both negative and positive charge. This was the beginning of the formulation of the modern day atomic theory. As more complex experiments were able to incorporate scientific observations, theories expanded. As conflicting data came in it was necessary to alter those theories to accommodate the new information and on a few occasions it was necessary to make major changes, as when it was necessary to give up the classical model for quantum mechanics. In order to make theories fit it was necessary to use constants, which provided agreement between a theory and what was observed during experimentation. These constants were attributed to being fundamental to nature and were used without explanation or reason why they worked. It could be said that these constants were inserted to bridge the gap from theory to the reality of observations.

Those constants that exist without a physical tie to the real world are a problem for the advancement of science. Those basic theories upon which other theories are built, propagate these constants throughout science. If data can be interpreted in a better way without these constants, many findings need to be reexamined. Pointing out the problem of the interaction of multiple unexplained constants, the famous mathematician Frederick Gauss said "give me four constants and I will give you an elephant. Give me five and I will raise his trunk." To get around the problems introduced with constants, we had to go back to many of the defining scientific experiments with the atom.

In the material presented we have shown that planets are driven by the Sun and the solar wind influences all matter on earth. It would be reasonable to expect that we should see evidence of this in some fundamental observations that led to the concept of the atomic world. J.J. Thomson and G.P. Thomson, in their book on the "Conduction of Electricity through Gases" (Thompson & Thompson, 1928 and 1933), show a great deal of the experimentation that was conducted and all the difficulty that were encountered in getting accurate measurements. In a paper published in 1932, to summarize some of the data compiled in this field, Norris E. Bradbury, in the Physical Review, vol.40 Issue 4, pp508-523, "The Absolute Values of the Mobility of Gaseous Ion in Pure Gases", showed that for air the mobility for the positive ion to be 1.60 cm/sec. per volt/cm and for the negative ion 2.21 cm/sec. per volt /cm.

The Ratio of the Mobilities of Negative to Positive Ions in Air

2.21/ 1.60 = 1.38

In the same paper he determines the Mobilities of positive and negative ions for Oxygen

$$2.18/ 1.58 = 1.38$$

Again we see the ratio that defines the energy jump in the solar wind and differential rotation of the Sun.

What else might we suspect in the mobilities of gases? Under certain circumstances we would see the power series as we have seen in the planetary effect on velocity and distance. In looking at mobilities of gases there appear to be multiple velocities for each gas and therefore multiple mobilities to be present. The experimental work is complicated and involves a lot of precision because small impurities can alter the results. Our objective here is to show that the driving force that creates the quantization in the atom is the Sun through the solar wind. Exactly how that is done will take more time to understand and development. From the mobility experiments we believe that a better understanding can be gained on how energy is really transferred by a charged particle in an electric field. It may help redefine what electricity is or is not. Our suspicion is that it is more than what we think it is.

Let us look at the oil drop experiment that has given us some important concepts in our current thinking.

Electron Experiments

In the next section we will describe a couple of experiments that were fundamental to the thinking of the atomic theory and the atom. This area needs an explanation also on the scientific thought process. In science, the concept is that experimental data is telling us something and any theory developed must incorporate the data. Experimental physics can be quite elaborate and technically involved. The information gathered is often complex and scientists try to describe what is being observed. The experiment is considered the proof and the theory is right if it describes the observed information. The two experiments that are described here are fundamental to theories we have today. The Millikan oil drop experiment and Franck Eisporn are two experiments taught to people learning the fundamentals of atomic physics.

These experiments were conducted before there were measurements of Sun and the solar wind and even before things like the differential rotation of the Sun and the possible effects of solar wind were known. In order to show that these experiments are indicating something other than what is currently interpreted we need to describe the experiments in some detail. In the case of Millikan, we have taken the data as he published from his tables on the experiments he conducted. In the case of Franck and Eisporn we took the data that was in the literature of their own experiments. These scientists were awarded the Nobel prize for their contribution to understanding the atom.

What has been done in this document is that the same data has been rearranged and it shows the same power series observed with the solar wind. It is interesting that some of the fundamental experiments show that the quantization of the atom is being influenced by the Sun. In the information presented on

these experiments we have presented the details of the experiments. Please look at the data and how it shows the same ratios.

Millikan's Oil Drop Experiment

In the description of the oil drop experiment we felt that some of the controversy that was part of this experiment should also be explained. It is not obviously relevant to how we have arranged the data. The fight that went along with this experiment went on between two great experimental physicists of that time. Millikan said that the charge on electron was discrete and the Ehrenhaft said that there were sub charges. Each one claimed that they could take the other's data and prove what they believed is fundamental. After a number of years, science decided they should go the Millikan way.

Our conclusion is somewhat different in that we are not sure whether it is telling us whether charge is discrete or is subatomic. It does tell us that the Sun has effect on what we call charge. The complete untangling of this will probably lead to the unified theory we seek. It is telling us there is more than gravity.

The Millikan oil drop experiment goes to the very fundamentals of the atomic theory, the charge on an electron. The value of charge on an electron has been determined from Avogadro's Number and the Faraday Constant. If N_o is the number of molecules in a gram molecule, then by definition the Faraday Constant is as follows:

$$eN_o = F$$

Knowing N_o and F, e the charge is obtained. The value obtained of e in this method is determined quite accurately. Many physicists objected to this as being only a statistical method for determining e and no one could be sure that sub-atomic charge exists. Millikan in a series of papers between 1908 and 1923 firmly established the concept that was presented by Stoney many years before, that there exists a discrete elementary charge. In Millikan's (Millikan, 1917) experiment an oil drop was allowed to fall freely between two plates. If the droplet was charged it would be accelerated when a potential was placed across the plates. The electric field was variable which made it possible to balance the droplet in the field of view for long periods of time. The charge on the droplet can be varied by a number of methods. In some cases the charge was changed from negative to positive with aid of x-rays. Millikan claimed that the charge on the oil drop is in multiples of one another. He made corrections to Stokes Law and assigned the number of electrons on the drop to be between 6 and 150. With these corrections Millikan was able to obtain a discrete charge.

Ehrenhaft (7) performed the same experiment interpreted the results somewhat differently. This resulted in a bitter argument between Millikan and Ehrenhaft which lasted for almost 15 years. In 1914

and 1915, four years after his original paper Ehrenhaft published (8) and two of his pupils , F. Zerner (9) and D. Konstaninowsky (10) published new evidence for the existence of a sub-electron. Ehrenhaft and Zerner took Millikan's data and showed sub-electrons do exist. Millikan and Fletcher in turn took Ehrenhaft's data and showed that sub-electrons do not exist. Ehrenhaft questioned Millikan's justification for his assumptions. The argument at the time was agreed by most of the physicists that Millikan was correct and Ehrenhaft was wrong.

Even though this idea of a discrete charge was not without controversy, Millikan stated based on his error calculation to be 1 part in 1500,"we may with certainty conclude that there are no difference of more this amount between the value of positive and negative electrons." He went on to say that "This is the best evidence I am aware of the exact neutrality of the ordinary molecule of gases. Such neutrality if it is exact would preclude the possibility of explaining gravitation as a result of electrostatic forces of any kind. The electromagnetic effect of moving charge might, however still be called upon for this purpose."

Even more recently the controversy continues. In the book "Betrayers of the Truth" (Broad & Wade, 1983), they point out that Millikan was not totally forthright in presenting all of his data and was selective in what was published. Holton has reevaluated many of Millikan’s original notebooks from his experiments and has pointed out that he left out material that might of made his interpretations of the data less convincing.

These experiments were complex and both Millikan and Ehrenhaft went to great length to try and make their data as accurate as possible and both had a preconceived idea of what they were measuring. Looking at the data in Millikan's book on the Electron, reproduced in Figure 14, he give the times of the oil drop falling freely with no electric field and with a field. In this experiment an oil drop was kept in the field for an hour and 40 minutes. During this time x-rays were used to reverse the sign of the charge on the drop. In each case the time for the drop to traverse a certain distance was recorded. As the drop possessed different charges the interval of time to travel the distance was altered. The time measurements that were recorded when the body was falling freely (no electric field present) were all the same. The time varied only when an electric field existed.

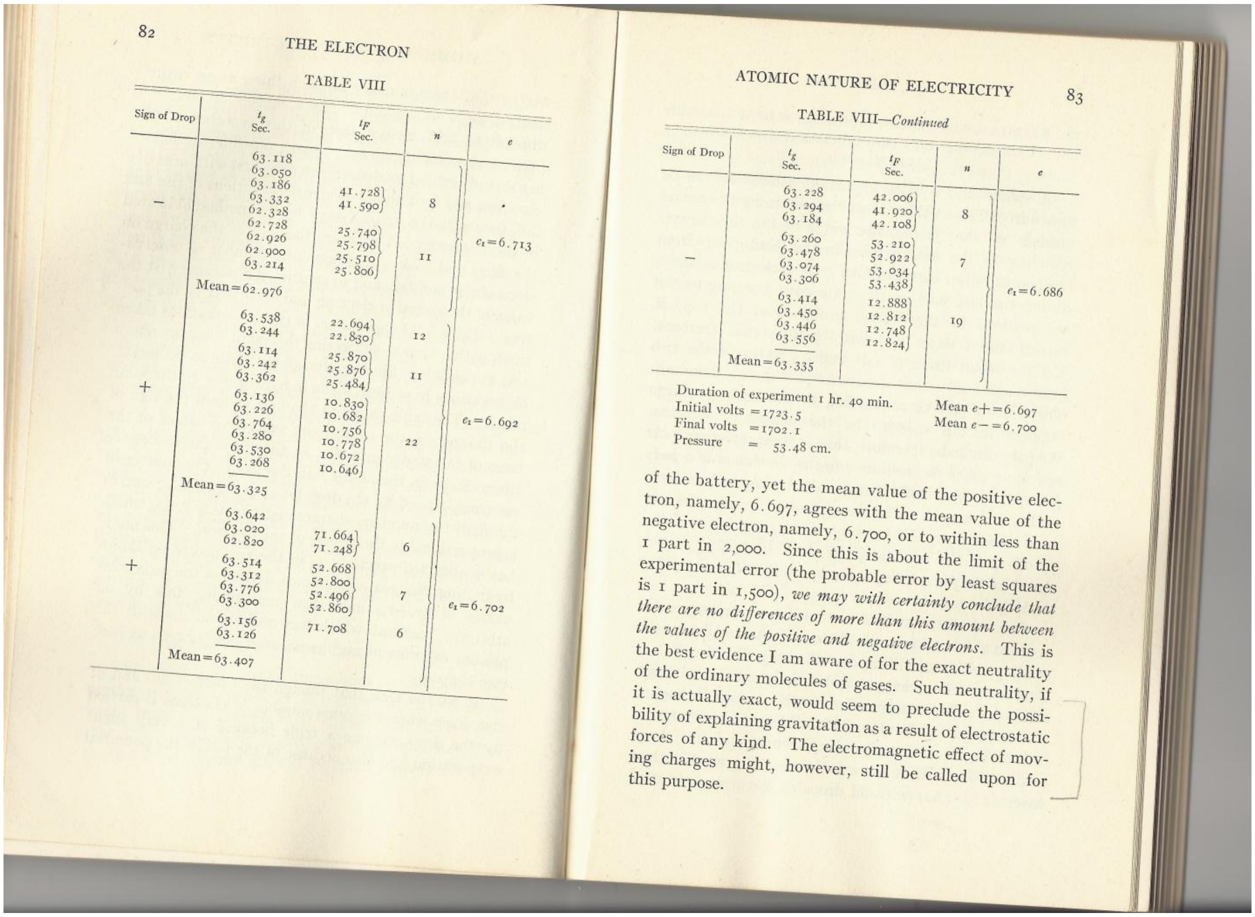


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TABLE VIII

Sign of Drop	t_g Sec.	t_F Sec.	n	e
−	63.118, 63.050, 63.186, 63.332, 62.328	41.728, 41.590	8	
	62.728, 62.926, 62.900, 63.214	25.740, 25.798, 25.510, 25.806	11	e_1=6.713
	Mean=62.976			
+	63.538, 63.244	22.694, 22.830	12	
	63.114, 63.242, 63.362	25.870, 25.876, 25.484	11	
	63.136, 63.226, 63.764, 63.280, 63.530, 63.268	10.830, 10.682, 10.756, 10.778, 10.672, 10.646	22	e_1=6.692
	Mean=63.325			
+	63.642, 63.020, 62.820	71.664, 71.248	6	
	63.514, 63.312, 63.776, 63.300	52.668, 52.800, 52.496, 52.860	7	e_1=6.702
	63.156, 63.126	71.708	6	
	Mean=63.407			

ATOMIC NATURE OF ELECTRICITY 83

TABLE VIII—*Continued*

Sign of Drop	t_g Sec.	t_F Sec.	n	e
−	63.228, 63.294, 63.184	42.006, 41.920, 42.108	8	
	63.260, 63.478, 63.074, 63.306	53.210, 52.922, 53.034, 53.438	7	e_1=6.686
	63.414, 63.450, 63.446, 63.556	12.888, 12.812, 12.748, 12.824	19	
	Mean=63.335			

Duration of experiment 1 hr. 40 min.
Initial volts =1723.5
Final volts =1702.1
Pressure = 53.48 cm.

Mean $e+$=6.697
Mean $e-$=6.700

of the battery, yet the mean value of the positive electron, namely, 6.697, agrees with the mean value of the negative electron, namely, 6.700, or to within less than 1 part in 2,000. Since this is about the limit of the experimental error (the probable error by least squares is 1 part in 1,500), *we may with certainty conclude that there are no differences of more than this amount between the values of the positive and negative electrons.* This is the best evidence I am aware of for the exact neutrality of the ordinary molecules of gases. Such neutrality, if it is actually exact, would seem to preclude the possibility of explaining gravitation as a result of electrostatic forces of any kind. The electromagnetic effect of moving charges might, however, still be called upon for this purpose.

Figure 14: Time in electric field from Millikan (Table VIII)

If we forget about whether the charge is positive or negative and just look at the time, assuming the distance is the same in all cases, we in effect have a velocity of the movement of oil drop between the plates.

The power series we have seen in the planetary system appear to be in these experiments. The times in the tables in Millikan's work are grouped together as he felt they represented similar number of electrons and he averaged them. If we do not make that assumption then a slight difference in time might be related to some other cause. We took a time that looks like it might represent the group, as shown below:

Time in seconds

10.7

12.7 12.7/10.7 = 1.18 $1.38^{1/2}$ = 1.17

22.6	41.8/22.6 = 1.85	1.38^{2} = 1.90
25.8	41.8/25.8 = 1.62	$1.38^{3/2}$ = 1.61
41.8	22.6/10.7 = 2.11	$1.38^{5/2}$ = 2.26
52,7	52.7/10.7 = 4.92	1.38^{5} = 4.99
71.6	71.6/ 10.7 = 6.69	1.38^{6} = 6.88

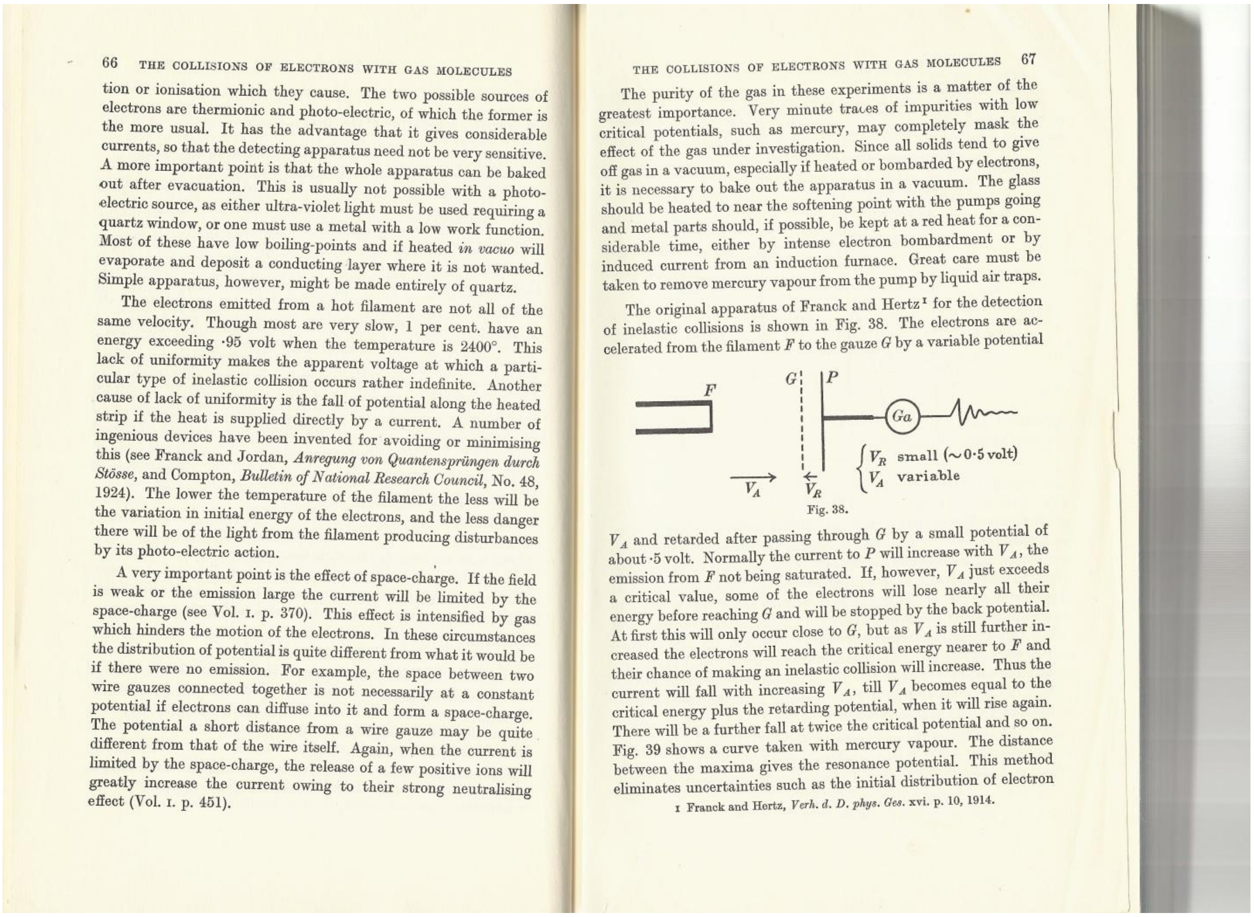
Slight changes in the times as they are grouped could result in showing a stronger or weaker correlation. The experiments that are fundamental to our basic theory may not be showing what Millikan surmised, that there is no effect of gravity on the atomic level. It is possible that both Ehrenhaft and Millikan did not measure charge on an electron or sub atomic particles, instead they were measuring how the Sun is affecting matter on earth. The data within the experimental realm appears to show the same power series that are propelling the planets and are governing their velocity.

We have looked at mobility, oil drop experiment and we will now look at the Frank Einsporn Experiment which is fundamental to quantum mechanics and the concept of energy states.

Franck -Hertz and Franck-Einsporn Experiments

The Franck-Hertz experiments and the more refined experiments of Franck and Einsporn are the experiments that led to science's understanding that there are energy states in matter. This work led to the fundamental concepts of quantum mechanics. In these experiments it was shown that at various discrete energy levels, energy appears to be absorbed and light is admitted at specific frequencies.

The Franck -Hertz experiment ,Verh. d. D. phys. Ges. xvi. P.10 , 1914 and in J.J. Thomson and G.P. Thomson, "Conduction of Electricity Through Gases, Vol. 2 p.67, 1933, showed a diagram of the original experiment shown in Figure 15.



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tion or ionisation which they cause. The two possible sources of electrons are thermionic and photo-electric, of which the former is the more usual. It has the advantage that it gives considerable currents, so that the detecting apparatus need not be very sensitive. A more important point is that the whole apparatus can be baked out after evacuation. This is usually not possible with a photo-electric source, as either ultra-violet light must be used requiring a quartz window, or one must use a metal with a low work function. Most of these have low boiling-points and if heated *in vacuo* will evaporate and deposit a conducting layer where it is not wanted. Simple apparatus, however, might be made entirely of quartz.

The electrons emitted from a hot filament are not all of the same velocity. Though most are very slow, 1 per cent. have an energy exceeding ·95 volt when the temperature is 2400°. This lack of uniformity makes the apparent voltage at which a particular type of inelastic collision occurs rather indefinite. Another cause of lack of uniformity is the fall of potential along the heated strip if the heat is supplied directly by a current. A number of ingenious devices have been invented for avoiding or minimising this (see Franck and Jordan, *Anregung von Quantensprüngen durch Stösse*, and Compton, *Bulletin of National Research Council*, No. 48, 1924). The lower the temperature of the filament the less will be the variation in initial energy of the electrons, and the less danger there will be of the light from the filament producing disturbances by its photo-electric action.

A very important point is the effect of space-charge. If the field is weak or the emission large the current will be limited by the space-charge (see Vol. I. p. 370). This effect is intensified by gas which hinders the motion of the electrons. In these circumstances the distribution of potential is quite different from what it would be if there were no emission. For example, the space between two wire gauzes connected together is not necessarily at a constant potential if electrons can diffuse into it and form a space-charge. The potential a short distance from a wire gauze may be quite different from that of the wire itself. Again, when the current is limited by the space-charge, the release of a few positive ions will greatly increase the current owing to their strong neutralising effect (Vol. I. p. 451).

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The purity of the gas in these experiments is a matter of the greatest importance. Very minute traces of impurities with low critical potentials, such as mercury, may completely mask the effect of the gas under investigation. Since all solids tend to give off gas in a vacuum, especially if heated or bombarded by electrons, it is necessary to bake out the apparatus in a vacuum. The glass should be heated to near the softening point with the pumps going and metal parts should, if possible, be kept at a red heat for a considerable time, either by intense electron bombardment or by induced current from an induction furnace. Great care must be taken to remove mercury vapour from the pump by liquid air traps.

The original apparatus of Franck and Hertz[1] for the detection of inelastic collisions is shown in Fig. 38. The electrons are accelerated from the filament F to the gauze G by a variable potential

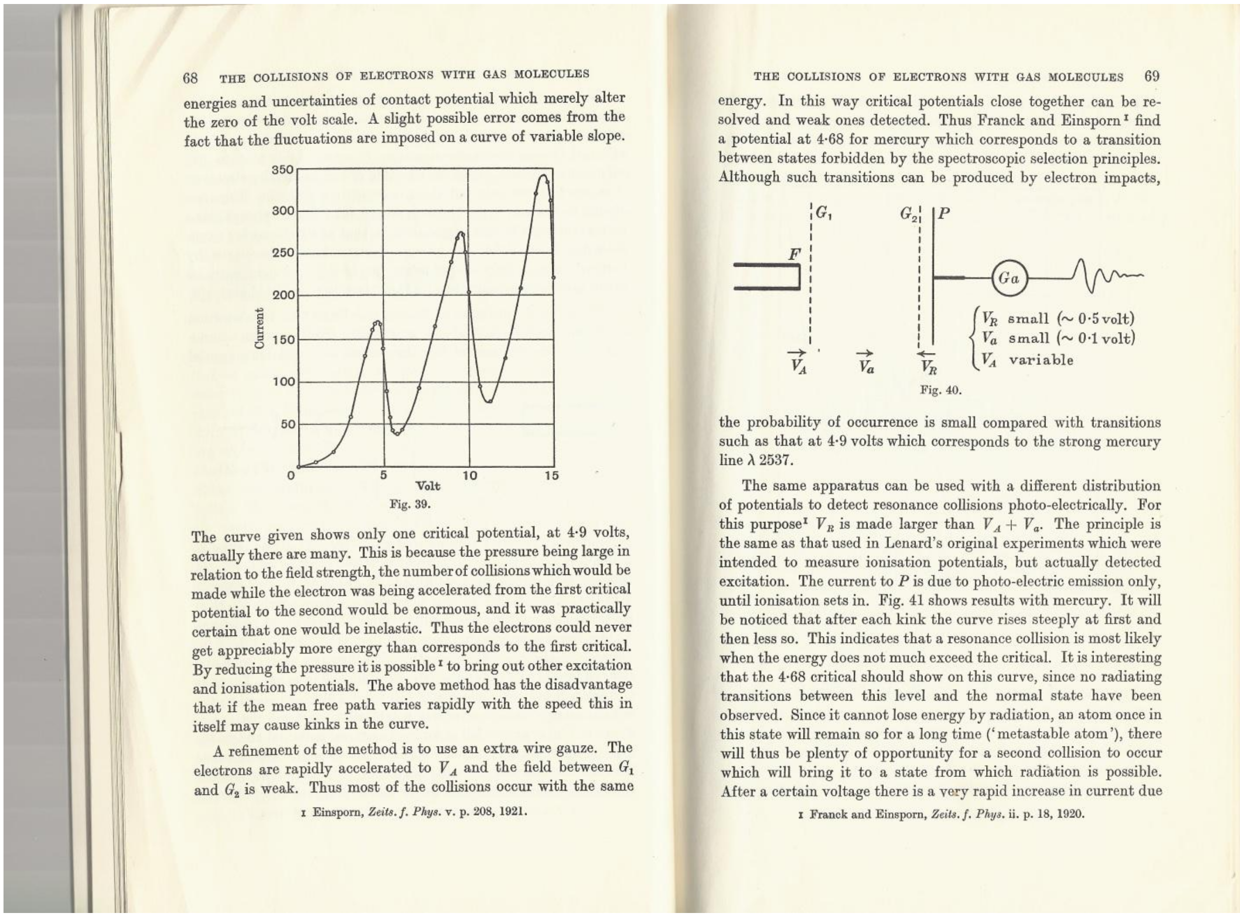
Fig. 38.

V_A and retarded after passing through G by a small potential of about ·5 volt. Normally the current to P will increase with V_A, the emission from F not being saturated. If, however, V_A just exceeds a critical value, some of the electrons will lose nearly all their energy before reaching G and will be stopped by the back potential. At first this will only occur close to G, but as V_A is still further increased the electrons will reach the critical energy nearer to F and their chance of making an inelastic collision will increase. Thus the current will fall with increasing V_A, till V_A becomes equal to the critical energy plus the retarding potential, when it will rise again. There will be a further fall at twice the critical potential and so on. Fig. 39 shows a curve taken with mercury vapour. The distance between the maxima gives the resonance potential. This method eliminates uncertainties such as the initial distribution of electron

1 Franck and Hertz, *Verh. d. D. phys. Ges.* xvi. p. 10, 1914.

Figure 15: Franck-Hertz experiment

It is stated that F is the filament, which electron are accelerated to gauze G by a variable potential, Va and retarded after passing through G by a small potential of about 0.5 volts. Normally the current to P will increase with Va, the emission from F not being saturated. If however, Va just exceeds a critical value some of the electrons will lose nearly all their energy before reaching G and will be stopped by the back potential. At first this will occur close to G, but as Va is still further increased the electrons will reach the critical energy nearer to F and the chance of making an inelastic collision will increase. Thus the current will fall with increasing Va, till Va becomes equal to critical energy plus the retarding potential, when it will rise again. There will be a further fall at twice the critical potential and so on. We have reproduced the figure for mercury vapor in Figure 16, which shows how the voltage changes with increased current.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energies and uncertainties of contact potential which merely alter the zero of the volt scale. A slight possible error comes from the fact that the fluctuations are imposed on a curve of variable slope.

Fig. 39.

The curve given shows only one critical potential, at 4·9 volts, actually there are many. This is because the pressure being large in relation to the field strength, the number of collisions which would be made while the electron was being accelerated from the first critical potential to the second would be enormous, and it was practically certain that one would be inelastic. Thus the electrons could never get appreciably more energy than corresponds to the first critical. By reducing the pressure it is possible[1] to bring out other excitation and ionisation potentials. The above method has the disadvantage that if the mean free path varies rapidly with the speed this in itself may cause kinks in the curve.

A refinement of the method is to use an extra wire gauze. The electrons are rapidly accelerated to V_A and the field between G_1 and G_2 is weak. Thus most of the collisions occur with the same

1 Einsporn, *Zeits. f. Phys.* v. p. 208, 1921.

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energy. In this way critical potentials close together can be resolved and weak ones detected. Thus Franck and Einsporn[1] find a potential at 4·68 for mercury which corresponds to a transition between states forbidden by the spectroscopic selection principles. Although such transitions can be produced by electron impacts,

Fig. 40.

the probability of occurrence is small compared with transitions such as that at 4·9 volts which corresponds to the strong mercury line λ 2537.

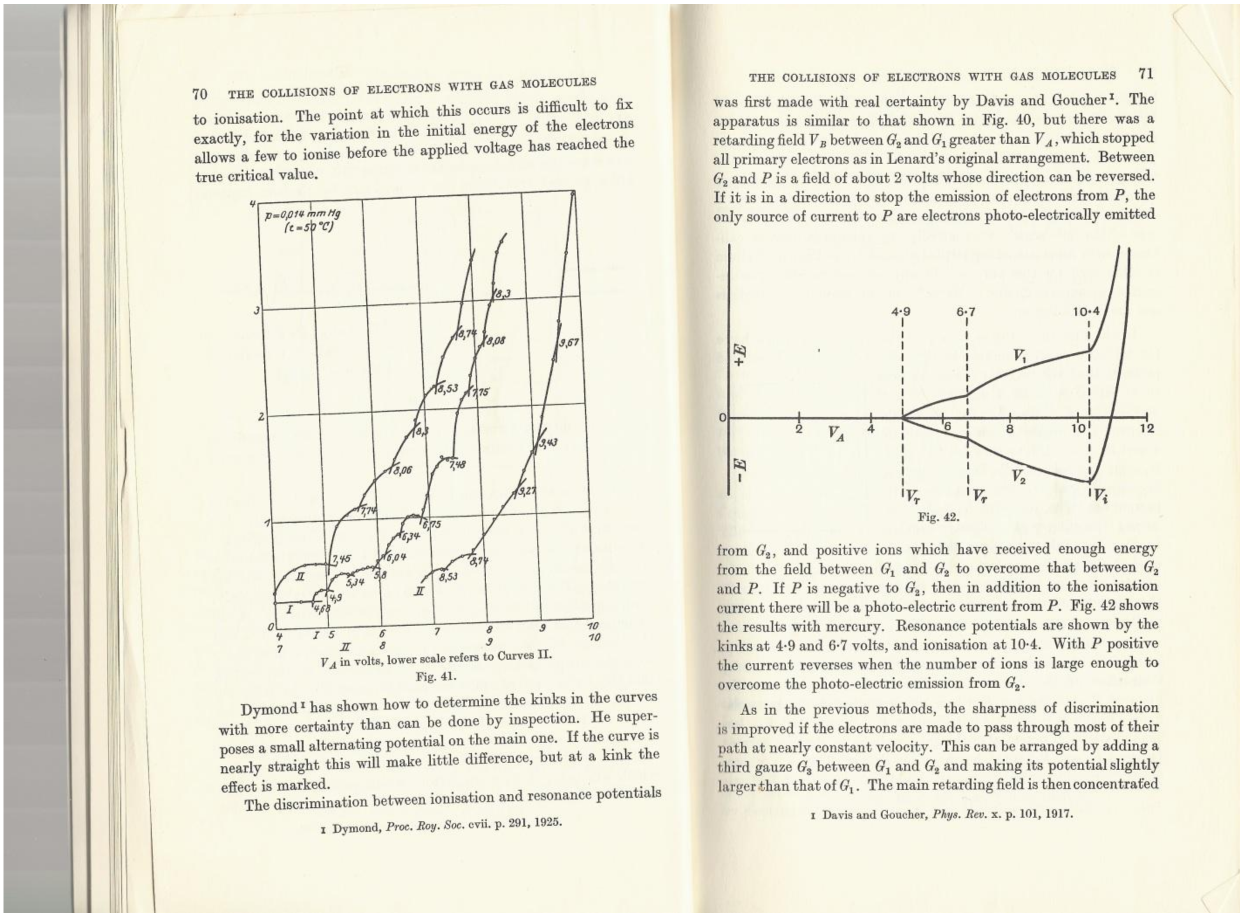
The same apparatus can be used with a different distribution of potentials to detect resonance collisions photo-electrically. For this purpose[1] V_R is made larger than $V_A + V_a$. The principle is the same as that used in Lenard's original experiments which were intended to measure ionisation potentials, but actually detected excitation. The current to P is due to photo-electric emission only, until ionisation sets in. Fig. 41 shows results with mercury. It will be noticed that after each kink the curve rises steeply at first and then less so. This indicates that a resonance collision is most likely when the energy does not much exceed the critical. It is interesting that the 4·68 critical should show on this curve, since no radiating transitions between this level and the normal state have been observed. Since it cannot lose energy by radiation, an atom once in this state will remain so for a long time ('metastable atom'), there will thus be plenty of opportunity for a second collision to occur which will bring it to a state from which radiation is possible. After a certain voltage there is a very rapid increase in current due

1 Franck and Einsporn, *Zeits. f. Phys.* ii. p. 18, 1920.

Figure 16: Voltage peaks from Einsporn and apparatus diagram from Franck and Einsporn

The distance between maxima give the resonance potential. The curve shows there is only one critical potential at 4.9 volts, actually there are many. As stated : This is because the pressure is large in relation to the field strength, the number of collisions which would be made while the electron was being accelerated from the first critical potential to the second would be enormous, and it was practically certain that one would be inelastic. Thus the electron could never get appreciably more energy than corresponds to the first critical potential. By reducing the pressure it is possible to bring out other excitation and ionization potentials.

A refinement of the existing experiment was made by Franck and Einsporn, published in 1920, Zeits. F. Phys. ii p18 and described by the Thomsons on p69 and 70. with illustrations of their data apparatus shown also in Figure 16.



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to ionisation. The point at which this occurs is difficult to fix exactly, for the variation in the initial energy of the electrons allows a few to ionise before the applied voltage has reached the true critical value.

V_A in volts, lower scale refers to Curves II.

Fig. 41.

Dymond[1] has shown how to determine the kinks in the curves with more certainty than can be done by inspection. He superposes a small alternating potential on the main one. If the curve is nearly straight this will make little difference, but at a kink the effect is marked.

The discrimination between ionisation and resonance potentials

1 Dymond, *Proc. Roy. Soc.* cvii. p. 291, 1925.

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was first made with real certainty by Davis and Goucher[1]. The apparatus is similar to that shown in Fig. 40, but there was a retarding field V_B between G_2 and G_1 greater than V_A, which stopped all primary electrons as in Lenard's original arrangement. Between G_2 and P is a field of about 2 volts whose direction can be reversed. If it is in a direction to stop the emission of electrons from P, the only source of current to P are electrons photo-electrically emitted

Fig. 42.

from G_2, and positive ions which have received enough energy from the field between G_1 and G_2 to overcome that between G_2 and P. If P is negative to G_2, then in addition to the ionisation current there will be a photo-electric current from P. Fig. 42 shows the results with mercury. Resonance potentials are shown by the kinks at 4·9 and 6·7 volts, and ionisation at 10·4. With P positive the current reverses when the number of ions is large enough to overcome the photo-electric emission from G_2.

As in the previous methods, the sharpness of discrimination is improved if the electrons are made to pass through most of their path at nearly constant velocity. This can be arranged by adding a third gauze G_3 between G_1 and G_2 and making its potential slightly larger than that of G_1. The main retarding field is then concentrated

1 Davis and Goucher, *Phys. Rev.* x. p. 101, 1917.

Figure 17: Potentials from Franck-Einsporn experiment

As stated from the text, The electrons are rapidly accelerated to Va and the field between G1 and G2 is weak. Thus most of the collisions occur with the same energy. In this way critical potential close together can be resolved and weak ones detected. Thus Franck and Einsporn find a potential of 4.68 for mercury which corresponds to a transition between states forbidden by spectroscopic selection principles. Although such transition can be produced by electron impacts the probability of occurrence is small compared with transition as that as at 4.9 which correspond to the strong mercury line which is at 2437 Angstroms.

The potentials obtained from their experiment are shown in Figure 17. It is also stated that the exact point is difficult to affix exactly, for the variation in the initial energy of the electrons allow a few to ionize before the applied voltage has reached the critical value.

Potentials from Franck Einsporn Experiment

We have grouped these potential in powers of 1.38 to the n/2 power the same as we observe in the velocity of the planets. Let's look at the potentials:

and if we correlate n=1 raised to 1/2 power be 1.174

Measured		Calculated	Measured
4.9	(1.174)	= 5.8	5.8
5.8	(1.174)	= 6.80	6.75
6.34	(1.174)	=7.44	7.48
7.48	(1.174)	=8.78	8.74
8.3	(1.174)	=9.74	9.67

if we correlate n=2 raised to 2/2 power is 1.38

Measured		Calculated	Measured
4.68	(1.38)	= 6.45	6.34
4.9	(1.38)	= 6.76	6.78
5.8	(1.38)	= 8.00	8.08
6.04	(1.38)	=8.33	8.3
6.34	(1.38)	=8.74	8.74
6.75	(1.38)	=9.31	9.27

The real question is what did Franck, Hertz, and Einsporn measure. It was described by Thomsons on what had occurred. Since it was their experiments and their interpretation of the data that led to a number of concepts that are fundamental to science's current view of the atom. With the discoveries we have made we believe the data from the experiment is telling us something different.

Definitely, something is happening to this energy and there is a quantization effect. Why should the same power series be prevalent that correlate with the solar differential rotation, the solar wind and the velocity of the planets? This experiment may tell us that a unified field theory may be within reach. It appears that the Sun is effecting quantization of the atomic scale on Earth.

The energy states that are so fundamental to quantum mechanics may be affected by the solar wind. Only recently have data about the solar wind and the Sun's rotation become available from satellites measurements. Some way the electric field experiments were interpreted as to how many charges were on Millikan's oil drop and what caused quantization of the atom masked this connection to the Sun.

The Franck - Eisporn experiment is one of the key experimental in physics that showed there was a quantum effect to matter. From the analysis of the data obtained from this experiment it could be seen that the voltages were quantized. By grouping the data in a slightly different way, one can see the same power series we see in the solar system and in the natural log. The Sun through the solar wind is causing the phenomena we observe on Earth on both the atomic and planetary scales.

Conclusions

It is the Sun and the properties of the solar wind that are truly controlling what goes on in our solar system. The Sun via the solar wind puts the planets in a quantized order in both their position and velocity.

This quantization that is occurring on the planetary scale shows up in the natural log and some of our basic experiments that led to quantum mechanics. The same properties that govern the solar system also govern the atomic scale.

The solar wind is the most powerful force in our solar system, literally moving the Earth on which we stand. If humankind could understand and harness even a small proportion its force, space travel would be much more attainable. If we can understand how the atom interacts with the solar wind we may find a better way to produce and control energy.

There is more to gravity than thought. The 400 year old equation for gravity is not the driving force in the universe. Many, sometimes complex, theories that have assumed that the equation for gravity is universal, need to be rethought. New and better theories can replace these old ones. Reexamining

scientific observations in a new light, we may be able to find the real physical mechanisms can be found that account for gravity.

This work is beginning to show the fundamental structure of a universal approach to uniting the physics of the solar system and that of the atom. This effort was no easy task to find the relationship between the micro and macro scales of a part of the universe. Science must continue as in the past, never saying it has the only solution which all knowledge must fit within, but to change as more information is developed. We think there are many more exciting discoveries to be made.

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