

The Kinetic Universe

A View From Outside of the Box

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Abstract

This paper describes a simple Kinetic Universe. The venture starts with revisiting and expanding upon existing kinetic theories of gas pressure, heat and temperature. New territory is covered with the introduction of kinetic models for light, electric charge, gravity and the structure of atoms. Kinetic models rely on kinetic energy and avoid the use of ghostly fields and massless mediators. Much maligned Aether is revived, redefined and its density is calculated. This paper presents an unexpected view of the Kinetic Universe from outside of the box. Then again you may think the author has lost his marbles.

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Introduction

The High Priests of the Twentieth Century have built an impressive Ivory Tower and populated it with strange elementary particles sporting bizarre names. To provide interaction between the inhabitants, fields were borrowed from the past and new massless mediators were introduced. To keep you and me out of the tower, tall barriers of self serving complications were erected. The complexity of this Standard Model can only be described as Obscene. Rumors have it that the commotion heard around the Tower these days is caused by some burly guy named Higgs Boson.

Troubles started hundred years earlier with the introduction and acceptance of Supernatural Fields with unlimited energy. Unsuspecting students are indoctrinated early in life with Field Theory and become conditioned to accept fields for real. The student learns about gravity and gravitational fields. The student is mesmerized with electrostatic experiments. The student learns about the similarities between the Bohr atom and the solar system. Electric Fields, Gravitational Fields and Strong Force Fields become ingrained, never to be questioned. The student has no incentive to consider possible alternative ideas.

By design or by chance Quantum Theory, Relativity Theories and Standard Models became very complex; their comprehension is reserved for the gifted few with vivid imagination.

On a clear day it became obvious that Field Theories do not reflect reality; they are the products of wishful thinking from two hundred years ago. Field Theory can't be explained; without it other modern theories fail; they all rely on the Field Theory magic.

In reality our Universe is a Kinetic Universe. The Moon orbits the Earth, the Earth and other Planets orbit the Sun and the Sun with 600 billion other stars orbit the center of the Milky Way Galaxy. Our Galaxy also moves in some yet unknown ways in the local cluster of Galaxies. This Kinetic Universe is complex mechanical machinery. Impact craters of asteroids on the Moon and here on Earth provide proof of speed and mass and collisions all around.

The Kinetic Universe is kinetic all the way to the bone. To accept the concept of a Kinetic Universe the reader must realize that force and pressure is applied only with collisions of particles having mass. Collisions can't pull. Collisions can only push. In the Kinetic Universe there aren't any fields. In the Kinetic Universe the universal gravitational pull doesn't exist. In the Kinetic Universe a positive charge

doesn't attract a negative charge. In fact in the Kinetic Universe there is no electric charge. In the Kinetic Universe atoms are not held together by strange attracting strong forces. In the Kinetic Universe force is created with collisions of particles having mass.

What provides the force to hold us together if there are no fields to pull, you ask? Let me call the reader's attention to the newly discovered mysterious Dark Matter. This Dark Matter is accelerating the expansion of the Universe. This Dark Matter must be a gas with pressure that is expanding into the surrounding empty space. In a gas, pressure is developed by collisions of particles.

Please imagine a sphere of immense dimensions, with a radius of 15 to 45 billion light-years. This sphere is filled with super-gas Aether at the impressive pressure of about one Terapascal. This high pressure is the result of collisions of the high speed particles of Aether. This giant ball is self contained; the outer layer of Aether is its own shell.

According to Plato, God used Aether to *delineate* the Universe. His student Aristotle stated that Aether is spreading into spaces not occupied by the elements.

In the Kinetic Universe everything is kinetic. We know that gas pressure is a kinetic event. We know that heat expansion is a kinetic event. We know that heat is kinetic energy of elementary particles. You will be surprised to discover that the electrical charge is a kinetic event. The electron is interacting with Aether to create a pressure gradient in Aether. We have been fooled. If you really think of it, what makes an electric charge? The electric charge needs an electric field around it to communicate its existence, but fields do not exist.

You are invited on this adventure. Please, leave home your devotion to fields and massless mediators; you will find none of them in the Kinetic Universe.

Outline

This paper is not a mystery novel. The reader will not be kept in suspense with unexpected twists and turns on a long winding road for a surprise ending. The purpose of this paper is to convey information and to present a Kinetic Universe. The author doesn't claim to know it all or any of it, but hopes to involve the reader in exploring new trails. It is time to abandon the religion of fields and forces acting at a distance. It is time to embrace reality. The reader may have better ideas and solutions looking from a different perspective and is encouraged to pick up a pen and paper and publish them for our benefit. Let's move forward.

The presentation is short and to the point with very little math involved. Your time is valued and appreciated.

Kinetic theories for certain physical events were proposed and gained wide acceptance. We expand on known kinetic concepts and introduce others. The reader must realize and accept that in the Kinetic Universe force and pressure is created with collisions of elementary particles that have mass. Collisions can't pull, collisions can only push. Here is a short outline what you will find in this paper.

Space and Time: This chapter is here to establish that space is infinite and time is endless.

Aether in Our Universe: For the Kinetic Universe we revive and redefine Aether as a super-gas with mass and with large amounts of kinetic energy. Aether provides the infrastructure for our existence.

Kinetic Theory of Gas Pressure: This chapter revisits a well known theory. Our main goal is to find the ratio of molecular velocity to speed of sound in gases. The result will be used in the next chapter to calculate the density of Aether.

Density of Aether: In the Kinetic Universe everything has mass. We calculate the density of Aether based on the speed of light and the pressure of Aether.

Real Numbers: Educated guesses are made about the relative sizes of the basic elements of the Kinetic Universe: Aethons, Electrons and Nucleons.

Heat and Temperature: The kinetic theory of heat and temperature has also been around for long time. In gases it is part of the kinetic theory of pressure. Heat is more difficult to visualize in solids. The difficulty is in equating atoms in motion with the sensation of heat. Heat is the kinetic energy of elementary particles. Temperature is the density of this kinetic energy. There is no "heat". We expand on

the kinetic theory of heat and temperature with the help of a table, listing the specific heat of elements.

The Kinetic Gas is described in more details and the Thermal Processes chapter uses kinetic energy in place of heat for the major processes: Isochoric, Isobaric, Isothermal and Adiabatic.

The Kinetic Electron: Repulsion between electrons is caused by a pressure gradient in Aether. The pressure gradient is the result of pressure polarization by the interaction between the Electron and Aether. There is no electric charge. In Appendix C you will find a short recap of the Electric Charge as defined by the Standard Model.

Gravity: A new kinetic model of Gravity is proposed without fields. Similarly to Electron repulsion, Gravity is also caused by a pressure gradient created in Aether.

The Atom: The Kinetic Atom is held together by the pressure of Aether. A table of elements in Appendix A provides visual presentation of all isotopes. A second table in Appendix B shows possible configuration of Nucleons in Atoms.

The Nature of Light: Light is a pressure wave in Aether, similar to Sound being a pressure wave in a gas or in a liquid or in a solid. Aether is not transparent to light; Aether is the transport medium of light. This chapter explores the complex nature of light and the way we see light.

Frames of Reality: Aether is the transport medium of light, therefore Aether is the local frame. Frames can't overlap. Information coming from other frames is translated and converted at the boundary of our frame.

Summary: Our Universe is a Kinetic Universe built with three basic elementary particles and large amounts of kinetic energy. Every elementary particle has mass. Three basic elementary particles with abundant energy created hundred different elements. These elements combined into an infinite number of structures from simple water to the very complex human brain. It took time, but the Universe has plenty of time.

Space and Time

Once upon a time there was nothing, supposedly. Then, according to Hawking, Ellis and Penrose in papers published in 1968 and 1970, a singularity appeared in nothing. Space and time began in this singularity and now we are here in this space that was created inside this singularity that appeared in nothing. Prior to the singularity nothing existed; not space, not time, not matter, not energy – nothing.

1. Steven W. Hawking, George F.R. Ellis, "The Cosmic Black-Body Radiation and the Existence of Singularities in our Universe," *Astrophysical Journal*, 152, (1968) pp. 25-36.
2. Steven W. Hawking, Roger Penrose, "The Singularities of Gravitational Collapse and Cosmology," *Proceedings of the Royal Society of London*, series A, 314 (1970) pp. 529-548.

What is nothing? Can a singularity appear in nothing or did it appear in space containing nothing?

Space and Time was defined by many and it would take pages to present the basic ideas that range from a Flat Earth to a Multiverse. I am sure you have your favorite ideas on these subjects and I have mine. At this point I would argue that prior to the singularity nothing did exist, nothing being limitless empty space. The existence of never ending time is arguable. Our time could be just that, our time.

Space

I prefer the definition by the Encyclopedia Britannica: "Space is the boundless three-dimensional extent in which objects and events have relative position and direction," This definition of space is based on the ideas of Newton and Kant and others. Extent means not substance and not relations. The choice of Euclidean geometry is for its simplicity.

Simple logic dictates that if space is limited to any size by some sort of a fence or barrier, there must be some more space on the other side of that fence. Space is boundless.

I agree with Plato and Aristotle that the space outside of our Galaxy is empty and our Galaxy is expanding into this empty space. Mostly empty boundless three-dimensional extent is a very acceptable definition of space.

Time

Newton defined the essence of time in his Principia: “Absolute, true and mathematical time, of itself and from its own nature flows equably without relation to anything external...” Newton and Kant defined time in general without tying it to a beginning, but Newton and Kant didn’t know about a beginning.

Using the same logical argument as above, if there was a beginning of time, what was going on before that beginning? If time was standing still, how did we get to the beginning? How could vacuum fluctuate and create the singularity proposed in the Big-Bang event? On the other hand, if space was absolutely empty before the beginning, does it matter if time was standing still or if there was a passage of time? While we know that our Universe is spreading into an existing empty space, we can’t make a similar statement about time. Your ideas about time are just as correct as, or better than mine.

Aether in Our Universe

According to Plato, God used Aether to *delineate* the Universe. This is a simple, fundamental statement. Our Universe is filled with Aether and space outside this Universe is empty. I am sure Plato had a much smaller Universe in mind. Aristotle further defined that space not occupied by one of the four elements is filled with Aether because Nature doesn't like empty spaces. The implications of these statements are that our Universe is bound by and filled with Aether, Aether flows around objects to fill spaces not occupied by objects, and Aether expands into empty space surrounding our Universe. Aether is an energetic super-gas causing the expansion of the Universe.

What is Aether?

Aether in the Kinetic Universe is a monatomic super-gas consisting of tiny balls of matter under very high pressure, around one Terapascal. Aethons, the individual particles of Aether could be less than one hundredth of the size of Electrons. Aethons are neutral but have mass. Aethons move at an average speed of $1.5c$ as we shall justify that speed in the next chapters. Aethons' kinetic energy is the source of the rather large pressure.

Aether is not some useless, esoteric substance put here for our entertainment. Aether makes our existence possible. Aether is the main player in our Universe; it has purpose. Aether's kinetic energy makes our Universe a Kinetic Universe.

Aether does everything we take for granted:

- * Aether colonizes empty space to provide infrastructure for our existence.
- * Aether delineates the Universe. Aether is within, empty Space is outside.
- * Aether's kinetic energy is the source of all energies: nuclear, chemical, kinetic and potential.
- * Aether's pressure holds atoms together without gluons or strong forces.
- * Aether's pressure holds molecules together – it is the binding force between atoms.
- * Aether's pressure provides tensile strength for crystal structures.
- * Aether is the transport medium for all radiated energy including light.
- * Aether is the cause of the electric charge.

- * Aether is the cause of gravity.
- * Aether's density is 20 milligrams per cubic meter.
- * Aether constitutes more than 99.9999% of the mass of our Universe.
- * Aether is the dark matter scientists have been looking for.

The concept of Aether is supported by:

- * Plato and Aristotle and others.
- * A close examination of the structure of the atom.
- * A new model of the electron.
- * The missing dark matter.
- * The accelerating expansion of the Universe.

Aether is not transparent to light, Aether is the transport medium of light.

Kinetic Theory of Gas Pressure

According to the kinetic theory of gas pressure there is correlation between gas pressure, gas density, velocity of molecules or atoms and the speed of sound in a gas. Temperature also plays a role but for our purpose we will limit our work to ambient temperature. It turns out that heat and temperature are also kinetic issues and we shall visit them in a chapter dedicated to heat and temperature.

The objective of this chapter is to calculate the ratio of molecular velocity to speed of sound for a number of gases. We will use this information in the next chapter to calculate the density of Aether. Density of gases and the speed of sound in gases are measured values. Molecular velocity is calculated.

Kinetic Energy, Pressure, Density and Sound Propagation in Gases

Let us take a look how pressure is developed in a gas. Molecules and atoms in a gas participate in random movements and collisions. When gas molecules and atoms collide with a wall, they bounce off like balls and transfer momentum to the wall in the process. One atom or one molecule may not do much, but there are millions of collisions per second contributing to the overall effect of pressure on the wall.

Collisions of gas atoms and molecules with atoms of the wall are very complex. At atomic scale the wall is not smooth. Collisions are not necessarily head on. The molecules and atoms may be spinning. The rebound angle of most atoms and molecules will be different from the incident angle. Atoms of the wall may not be stationary due to thermal vibrations. The collision of gas molecules and atoms with atoms in the wall may occur at varying differential speeds. Still these complications average out and the system is in equilibrium.

Next time you are speeding down the road in the hot Mojave Desert, think of all the tiny nitrogen molecules in your car's tires bouncing around, colliding, creating pressure to hold up your car.

For our discussion of pressure vs. molecular velocity, consider a single point on a vertical wall perpendicular to the x axis as shown on Figure 1. In a time period a large number of molecules will bump into this particular point on the wall from random directions with varying velocity.

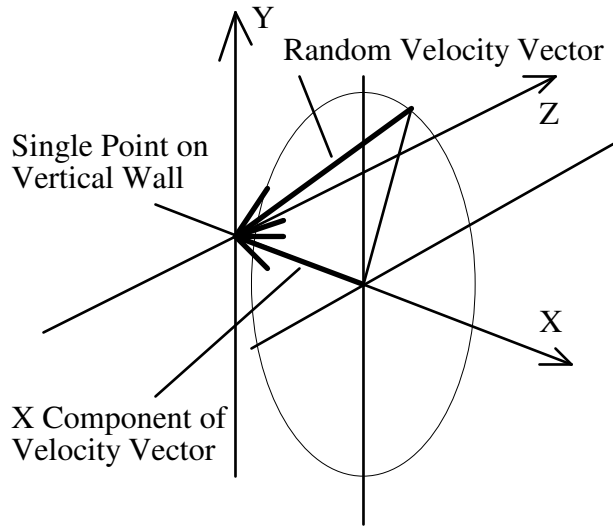


Figure 1, Velocity Vector of Molecule

Each molecule has a different effect on the vertical wall because of the angle of incidence varies. For the generation of pressure on the wall only the X component of the velocity is effective from one side of the wall. The velocity of molecules or atoms may vary by some amount and for this discussion let us average it to v ; $m \times v$ is a linear function. We can find the average effective velocity of molecules or atoms against the vertical wall by dividing the integral of the velocity vectors' x component $v \times \cos \alpha$ with the integral of the number of velocity vectors:

$$v_x = \frac{\int_0^{90^\circ} v \times \cos \alpha \times \sin \alpha \times 2\pi \times d\alpha}{\int_0^{90^\circ} \sin \alpha \times 2\pi \times d\alpha} = \frac{v \times 2\pi \times \left| \frac{1}{2} \sin^2 \alpha \right|_0^{90^\circ}}{2\pi \times \left| -\cos \alpha \right|_0^{90^\circ}} = \frac{1}{2} v$$

The effective x component of the velocity is one half of the average random velocity of molecules or atoms in a gas. It is easy to see that v_x in any direction is one half of the nominal molecular velocity. Random has no directional preference.

Consider a volume of gas in a cubical container of L^3 . A molecule or atom impacts and departs one specific side of the container every

$$t = 2L/v_x \quad s$$

And it transfers a momentum $p = 2 \times m \times v_x \quad kg \times m / s$

This momentum transfer can happen different ways. Let us stipulate that the temperature of the container walls and the gas are the same.

If the wall of the container is solid and has a very large mass, the equation above works quite well. The incoming gas atom will bounce back at the same speed and the momentum transferred to the wall is as shown above. But there are no solid walls. Walls are made from atoms and molecules. The inside of a tire is not solid.

If the incoming gas atom hits an atom of similar mass in the wall that is capable to move, the gas atom will transfer its kinetic energy to the atom in the wall and come to a standstill. Lucky for us the atom in the wall can't go very far, it can only vibrate. The atom in the wall then returns all the energy to the gas atom and the momentum transfer equation shown above is satisfied.

In the real world the gas atoms and wall atoms don't collide head-on, they don't have the same velocity and they don't have the same mass. The process becomes very complex but it averages out nicely. In a stable system the net energy transfer between gas and container wall is zero. The average incoming momentum transfer equals the average outgoing momentum transfer and the equation shown above is satisfied.

The force created on the wall with this momentum transfer is:

$$\text{Force} \quad F = \frac{n \times p}{t} = \frac{n \times 2 \times m \times v_x}{2L/v_x} = \frac{n \times m \times v_x^2}{L}$$

Extend this force to area L^2

$$\text{Pressure} \quad P = \frac{F}{L^2} = \frac{N \times m \times v_x^2}{L^3}$$

N is the number of molecules of mass m in volume L^3

$$\frac{N \times m}{L^3} = \text{density}$$

$$v_x = \frac{v}{2}$$

$$\text{Pressure} \quad P = \frac{\text{density} \times v^2}{4} = \frac{1}{2} \times \frac{\text{density} \times v^2}{2}$$

This result is in accordance with the Virial Theorem.

Ambient air pressure is $P = 101300$ *Pascal = Newton / m²*

Resolve for v $v = \sqrt{\frac{405200}{\text{density}}}$ *m / s*

Molecular Velocity for Air

Ambient air density is $\text{density} = 1.20$ *kg / m³*

Average Velocity of Air Molecules $v = 580$ *m / s*

In ambient air the average molecular velocity is 69% higher than the 343 *m/s* speed of sound. For simplicity let's stipulate that the time spent in elastic collisions to be less than 1% of the total time and is ignored.

Molecular Velocity for Other Gases

Let us repeat the same calculation for a variety of gases listed in Table 1 below. Density of gases and speed of sound in gases are measured values widely available. Thermal velocity values are calculated with the formula developed above.

Gas Type Gas	Density kg / m ³	Molecular Velocity v	Speed of Sound s	Ratio v / s
Molecular gases				
Hydrogen	0.084	2196	1319	1.66
Nitrogen	1.166	590	353	1.67
Air	1.204	580	343	1.69
Oxygen	1.332	552	330	1.67
Monatomic gases				
Helium	0.166	1562	972	1.61
Neon	0.839	695	435	1.60
Argon	1.662	494	323	1.53
Krypton	3.749	328	220	1.49
Xenon	5.894	262	169	1.55

Table 1, Thermal Velocity / Speed of Sound in Gases

The ratio of average molecular velocity to speed of sound is about 1.67 for molecular gases of Hydrogen, Nitrogen, Air and Oxygen.

The ratio of average atomic velocity to speed of sound is between 1.49 to 1.61 for monatomic gases of Helium, Neon, Argon, Krypton and Xenon.

Please note that the velocity of gas molecules and atoms is not restricted by the sound barrier.

Density of Aether

In our Kinetic Universe every elementary particle has mass. Nothing is massless and only nothing is massless. Aether is a super-gas made up from tiny particles we call Aethons. Aethons are three or four orders of magnitude smaller than Nucleons; still Aether has mass and in this chapter we shall calculate the density of Aether.

Light Waves Traveling in Aether

Let me make a leap of faith and consider that Aether is the medium to propagate light and other energies, similar to air being the medium to propagate sound. According to the kinetic theory of gas pressure there is correlation between pressure, density, velocity of molecules or atoms and speed of sound in a gas. This subject was examined in the previous chapter and we have determined the ratio of molecular speed vs. speed of sound in gases. Similarly there is correlation between Aether pressure, density of Aether, velocity of Aethons and speed of light in Aether. Aether is a super-gas under pressure.

To repeat the reasoning: Empty space is the ultimate insulator to light and other energies. Only simple elementary particles can exist in empty space. Aethons are simple elementary particles. Aether is confined in a giant ball of the Universe, it is under high pressure and it is capable to propagate pressure waves.

Aether is not transparent to light. Aether is the transport medium of light. Aether propagates pressure waves.

Considerations

There are large size differences between Nucleons and Aethons. The diameter of a Nucleon could be 1000 times the diameter of an Aethon. The volume and mass of a Nucleon would be 1 billion times the volume and mass of an Aethon. The pressure of ambient air is 101 kPa. Some high-pressure tires may have pressure of 1 MPa. Considering the tensile strength of carbon nanotubes and other structures, the estimated pressure of Aether is 1000 Gigapascal. The speed of sound in ambient air is 340 m/sec; the speed of light is 3×10^8 m/sec. There are similarities but the scaling factors are in the order of a million to a billion.

Continuing with the leap of faith, we suppose that the individual Aethons have an average velocity of 1.5 times the speed of light or 4.5×10^8 m/sec. This is based on our experience with atomic gases in the previous chapter. Please don't worry about breaking the speed of light barrier. In gases the atoms and molecules also break the sound barrier with ease.

From previous chapter:
$$P = \frac{\text{density} \times v^2}{4}$$

We find density:
$$\text{density} = \frac{4 \times P}{v^2}$$

Assume:
$$P = 10^{12} \quad \text{Pascal}$$

$$v = 4.5 \times 10^8 \quad \text{m/s}$$

Density of Aether

$$\text{density} = \frac{4 \times 10^{12}}{20.25 \times 10^{16}} \approx 2 \times 10^{-5} \quad \text{Kg/m}^3$$

The estimated density of Aether is 20 milligrams per cubic meter. This number would also be the density of the Universe as the density of visible matter in the Universe is very close to zero. The density of ambient air on the surface of our Earth is about 600,000 times that of Aether.

These are first-cut numbers. Extensive modeling is required to refine or rework them.

Energy Consideration

The Universe is a massive ball of Aether containing a very large amount of kinetic energy. At the surface of this giant Aether ball individual Aethons are departing into the great empty space with the speed of $v = 1.5c$. Aethons moving slower than $1.5c$ or moving at an angle will soon be caught and accelerated by other Aethons. The moving stream of Aethons can't be slowed down by gravity. At the edge of the Universe there is no gravity of any sort

It should be noted here that the pressure and the speed of light may be smaller at the boundary of the Universe.

The kinetic energy of a departing Aethon is

$$E = \frac{m \times v^2}{2} = \frac{m \times (1.5 \times c)^2}{2} \approx m \times c^2$$

This is interesting. $E = m \times c^2$ I have seen this equation somewhere before.

I suspect that energy is created in nuclear processes in a similar way. Matter is ejected with speed of $1.5c$ due to Aether pressure and some time later the ejected matter gives up its kinetic energy of $E = m \times c^2$. Matter is not converted into energy!

The Aether ball of the Universe isn't getting smaller. The internal pressure expands the Aether ball faster than the shrinking caused by the departures. This expansion of Aether reduces its density and the pressure. Could it be that the tensile strength of wood and bones was higher a billion years ago? Think of the giant trees and the giant dinosaurs.

Related Data

Numbers are presented below about the mass of Aether in the Solar System and about the mass of Aether in the Milky Way Galaxy. In both cases ellipsoid of 100 to 1 ratio of diameter to thickness is used. This shape is similar to the shape of the visible mass of the Milky Way Galaxy.

Mass of the Solar System

The estimated mass of the Sun is $1.989E+30$ kg. The mass of the Solar System is $1.992E+30$ kg. Table 2 below calculates the mass of Aether ellipsoids of various radii similar to the orbiting radii of the planets.

Please note that at the radius of 8.917 AU the mass of Aether ellipsoid equals the mass of the Sun. At the radius of Neptune's orbit of 30 AU the mass of Aether ellipsoid is 38 times the mass of the Sun.

Mass of an Aether ellipsoid, radius 50 AU is 176 times the mass of the Sun.

Mass of an Aether ellipsoid, radius 1,000 AU is $1.41E+06$ times the mass of the Sun

Planet	Orbiting Radius AU	Volume of Ellipsoid Ratio	Mass of Aether in Ellipsoid kg	Mass of Aether in Ellipsoid to Mass of Sun Ratio
Earth	1	1	2.81E+27	1.41E-03
Mars	1.524	3.537	9.92E+27	4.99E-03
Jupiter	5.203	1.41E+02	3.95E+29	1.99E-01
	8.917	7.09E+02	1.99E+30	1.00
Saturn	9.555	8.72E+02	2.45E+30	1.23
Uranus	1.92E+01	7.07E+03	1.98E+31	9.99
Neptune	3.01E+01	2.73E+04	7.66E+31	3.85E+01
Kuiper Belt	5.00E+01	1.25E+01	3.51E+32	1.76E+02
Ort Cloud	1.00E+03	1.00E+09	2.81E+36	1.41E+06

Table 2, Mass of Aether Ellipsoids

Miscellaneous Data

Item	Symbol	Value	Units
Light-year	ly	9.461E+15	m
Light-year	ly	6.324E+04	AU
Mass of Sun	M	1.989E+30	kg
Density of Aether	m	2.000E-05	kg/m ³
Density of Aether	mly ³	1.694E+43	kg/ly ³
Mass of Milky Way Galaxy	MMW	1.000E+12	M
Volume of Ellipsoid *	VMW	5.236E+12	ly ³
Mass of Aether Ellipsoid *		4.458E+13	MMW

* 50.000 ly radius, 1:100

Table 3, Data for Milky Way Galaxy

Mass of the Milky Way Galaxy

Mass of Aether of an ellipsoid, radius 50,000 ly, 1:100 is 4.46E+13 times the visible mass of the Milky Way Galaxy. That is a lot of mass.

Reality Check

The numbers listed below are to estimate plausibility. This Universe already knows everything about this Universe. The size and composition of every particle has been decided long time ago at the beginning of this Universe. We are grasping.

1 mole of C12 = 12 grams = $6.02214179 \times 10^{23}$ atoms = $7.226570148 \times 10^{24}$ Nucleons
 12 grams / $7.226570148 \times 10^{24}$ Nucleons = $1.6605387 \times 10^{-24}$ g / Nucleon

There are 10^{22} to 10^{23} Atoms in a cubic cm of most solids

Highest number is Diamond 1.77×10^{23} Atoms / $\text{cm}^3 \rightarrow 2.124 \times 10^{24}$ Nucleons / cm^3

Linear packing density for Diamond $\sim 7 \times 10^7$ Atoms / cm \rightarrow 1 Atom / 0.13 nm

Suppose Aethon to Nucleon numerical ratio in Diamond is $\sim 100:1$

Resulting in 2×10^{26} Aethons / cm^3

Aether is $20 \text{ mg} / \text{m}^3 = 2 \times 10^{-8} \text{ g} / \text{cm}^3$

Mass of Aethon: $2 \times 10^{-8} / 2 \times 10^{26} = 10^{-34}$ grams

Mass ratio of Nucleon to Aethon = $1.66 \times 10^{-24} / 10^{-34} = 1.66 \times 10^{10} = 16,600,000,000$

Mass ratio of Nucleon to Electron = 1835

Mass ratio of Electron to Aethon = $9 \times 10^6 = 9,000,000$

Suppose similar matter density for Nucleons, Electrons and Aethons:

Diameter ratio of Nucleon to Electron = 12.24

Diameter ratio of Electron to Aethon ~ 208

Diameter ratio of Nucleon to Aethon = 2545

In Table Form:

	Aethon	Electron	Nucleon	Units
Diameter	5.9×10^{-17}	1.3×10^{-14}	1.5×10^{-13}	cm
Diameter Ratio		208	2545	Aethon
			12.24	Electron
Mass	10^{-34}	9×10^{-28}	1.66×10^{-24}	gram
Mass Ratio		9×10^6	1.66×10^{10}	Aethon
			1835	Electron

Table 4, Size and Mass of Particles

Average velocity of Aethons: $v = 4.5 \times 10^8$ m/s

Time to travel 1nm = 2.2×10^{-18} sec = 2.2 attosec

Momentum exchange

Aethon colliding head-on with Electron or Nucleon transfers Momentum = $2 \times m \times v$

Velocity gain by Electron = $2 \times m \times v / m_e = 9 \times 10^8 / 9 \times 10^6 = 100$ m/s

Velocity gain by Nucleon = $2 \times m \times v / m_n = 9 \times 10^8 / 1.66 \times 10^{10} = 5.42$ cm/s

Velocity gain by Carbon Atom ~ 0.45 cm/s

Note

The numbers presented above are for 2×10^{26} Aethons / $\text{cm}^3 = 2 \times 10^{-8}$ g/ cm^3

Your results may vary.

Note: Observing the sizes of the three particles listed above, one could predict the existence of a fourth particle between the sizes of Aethons and Electrons.

Heat and Temperature

Heat and Temperature are biological concepts for living creatures. Our senses tell us if an object is hot or cold. Our senses warn us of the dangers of getting burned by hot objects or freezing in the cold of the night. A cold drink on a hot summer day is appreciated. The sensation of heat on a cold day makes us feel warm and fuzzy.

In reality Heat and Temperature are kinetic issues and in this chapter we shall examine them.

Heat is a measurable quantity of kinetic energy of elementary particles that can be transferred from one object to another. Temperature is the intensity of average kinetic energy of elementary particles in an object. Heat is transferred by radiation or conduction from hotter objects to colder objects until their temperatures become equal. This heat energy transfer is not reversible. You may replace the word *heat* with *kinetic energy of elementary particles*.

The living skin has millions of sensors that are sensitive to energy emission from objects. Objects with higher energy density radiate energy at higher rate than objects with smaller energy density. The brain translates energy levels received from objects into temperatures of these objects.

Humans set up reference points for temperature. The most widely used reference points are the phase change points of water. The melting point of ice is assigned 0 degree Celsius and the boiling point of water is assigned 100 degree Celsius. The scale between 0 and 100 supposed to be linear as indicated by the differential expansion of mercury in a glass container.

At higher temperatures radiation intensity of objects are measured and compared to known values.

The idea that heat is matter in motion dates back hundreds of years. Tyndall, Thompson, Maxwell and others were pioneers in this field. This idea is strange to us because we sense heat and we sense cold. We are thinking of kilograms of matter and volumes of air and we do not see Atoms and Molecules and Aethons in motion in them, but they are in motion.

In gases the kinetic energy of atoms and molecules results in pressure. Molecules and atoms collide with each other and container walls and bounce off after elastic collisions. Higher temperature at constant volume means higher molecular speed that result in higher pressure. The relationship between pressure, density and kinetic energy of gases was discussed in detail in an earlier chapter.

The pressure in this relationship is:

$$P = \frac{\text{density} \times v^2}{4}$$

v is the average velocity of gas molecules or atoms

v^2 is proportional to the absolute temperature

Ideal gas law includes the temperature of the gas:

$$P = \frac{n \times R \times T}{V}$$

P is the absolute pressure of the gas

n is the amount of gas

R is the ideal gas constant.

T is the absolute temperature

V is the volume of gas

The collision between gas molecules or atoms and the container walls is rather complex, as it was described earlier. If the container wall is *cooler* than the gas, some of the kinetic energy of the gas atoms will be transferred to atoms in the container wall. As the kinetic energy of gas atoms decreases, atoms in the container wall will vibrate more vigorously. This process continues until the rate of energy emission of the container wall becomes equal to the rate of energy emission of the gas. This energy transfer is a statistical process and it is similar between solids, liquids and gases.

In liquids the intensity of motion is not enough to free the atoms and molecules from the effects of gravity, though it is sufficient to free them from the constraints of being a solid.

In solids the situation is more complicated. Atoms and molecules are locked in place except for small vibrations. Energy input increases the amplitude and the frequency of vibrations of atoms and molecules. In solids and liquids this increased activity results in size expansion. Humans have used this expansion to indicate temperature. In a thermometer we are observing the expansion of mercury in a glass container to determine temperature. In bimetal sensors and actuators we utilize the differential thermal expansion of two metals to determine temperature. At very low temperatures the vibrations of atoms are greatly reduced. Electrons of an electric current don't have to run the gauntlet of intensely vibrating atoms and molecules, resulting in superconductivity in some materials.

Measuring Temperature

Measuring temperature of an object is measuring kinetic energy density of the object and it can only be measured indirectly. Kinetic energy density of an object is the average kinetic energy intensity of elementary particles in the object.

For objects on hand at moderate temperature we can use thermometers. The object passes some of the kinetic energy of its elementary particles to the thermometer where the particles of mercury or some other substance will use this energy to vibrate more vigorously and expand to indicate the temperature of the mercury and indirectly the temperature of the object.

For objects at a distance and for objects with elevated temperatures we measure the rate of energy radiation and compare it to known or calculated values to estimate the temperature of these objects.

Molar Heat Capacity

A convenient way to look at specific heat of elements is the Molar Heat Capacity that is favored by chemists and physicists. It is expressed in Joules per Mole per degree Kelvin. This is the amount of energy needed to elevate the temperature of one Mole substance by one degree Kelvin. Three groups of elements are listed in Table 5: Atomic gases, Molecular gases and Solids / Mercury.

I thank the many scientists for their efforts to measure and compile the data used here. Most of this data was obtained from Wikipedia and other sources. Plato, Aristotle, Newton and others did not have access to this valuable source of knowledge we are fortunate to have.

It is interesting to note that the Molar Heat Capacity is similar for most elements in the same group despite the big differences in their masses. One notable exception is Carbon. Carbon structures are very unique, very tight, especially Diamond. Beryllium and Boron are other exceptions to lesser degree. Molar Heat Capacity doesn't vary much between the groups either.

Please note that according to the data, more energy is needed to heat 1 gram of Hydrogen than 196 grams of Gold or 200 grams of Mercury. Hydrogen is used to transport heat in some high performance industrial cooling systems for good reason.

From the numbers in Table 5 it is reasonable to conclude that Nucleons do not absorb *heat*. Nucleons don't heat up. There is no such thing as heat. Heat is a substitute concept for kinetic energy of Atoms, Nucleons and Aethons. Temperature

is the intensity of the kinetic energy of Atoms, and Molecules. This is a Kinetic Universe.

Type of Element Element	1 Mole Grams	Molar Heat Capacity Joule/K	Number of Nucleons $\times 10^{23}$ per Mole
Noble Gases			
Helium	4.003	20.800	24.106634
Neon	20.179	20.786	121.520790
Argon	39.948	20.786	240.572520
Krypton	83.798	20.786	504.643430
Xenon	131.293	20.786	790.665080
Molecular Gases			
Hydrogen ₂	2.016	28.836	12.140638
Nitrogen ₂	28.014	29.124	168.704280
Oxygen ₂	31.998	29.378	192.696492
Solids & Mercury			
Lithium	6.940	24.860	41.793664
Beryllium	9.012	16.400	54.271541
Boron	10.810	11.087	65.099352
Carbon ₁₂	12.000		72.265704
Diamond	12.011	6.155	72.331947
Graphite	12.011	8.517	72.331947
Sodium	22.989	28.230	138.443010
Magnesium	24.305	24.869	146.368190
Aluminium	26.981	24.200	162.479582
Calcium	40.078	25.929	241.349716
Iron	55.845	25.100	336.298590
Copper	63.546	24.400	382.674012
Silver	107.868	25.350	649.581096
Gold	196.166	25.418	1181.311652
Mercury	200.590	27.983	1207.981400
Lead	207.200	26.650	1247.758400

Table 5, Molar Heat Capacity of Elements

Avogadro's Number: 1 Mole contains $6.0221417930 \times 10^{23}$ atoms

Electrical Current and Heat

Electrical current generating heat in a wire is a kinetic event. As Electrons move through the wire they bump into atoms and molecules and change their direction of movement. The collisions transfer kinetic energy from Electrons to molecules or atoms they bump into. The offending Electrons will bump into other molecules or atoms of the wire to change direction again similar to the action in a pinball machine. Overall forward motion of electrons is powered by the electrical potential applied to the wire. Molecules and atoms of the wire gain kinetic energy from the Electrons. We already know that kinetic energy of atoms and molecules is heat. There is no friction at the molecular level, only collisions.

Friction between objects generates heat in similar manner: Atoms and molecules collide and convert kinetic energy of objects into kinetic energy of atoms and molecules of these objects. This is a Kinetic Universe.

Chemical Events

Chemical reactions are kinetic events. This subject deserves its own publication. For now, let me make a short illustration. Suppose we mix small amounts of oxygen and methane gas in a container at low temperature in a safe environment. Nothing happens. The molecules have low velocities and reaction doesn't occur.

By adding kinetic energy – heat – to the mixture, the molecular velocities of the gases increase and sooner or later some molecules or atoms will reach the critical velocity where recombination of molecules is triggered. The event of joining of two oxygen atoms and a carbon atom is rather violent, driven by the pressure of Aether and the result is more kinetic energy. To find the exact mechanism of this reaction shall keep me busy for the next couple of years. But we already know that kinetic energy is heat.

There is another subject why oxygen atoms have higher affinity for carbon atoms and hydrogen atoms than hydrogen atoms have for carbon atoms. It has to do with shapes and hardness of Atoms. We will touch on this subject in a later chapter: The Atom.

The Kinetic Gas

No gas molecule or atom is an island. Gas atoms and molecules are surrounded by other gas atoms and molecules or by the walls of containers. Gas molecules and atoms collide with the wall to create pressure. In steady state conditions, atoms and molecules of a gas have the same energy level as the atoms of the container. In everyday parlance we would say: all components are at the same temperature. The variation in molecular speed is mostly caused by the random collisions with atoms in the wall.

The kinetic energy of an atom or a molecule is $m \times v^2 / 2$. It doesn't matter if it is a small Neon atom, a larger Krypton atom, a large Oxygen molecule or a giant Carbon Dioxide molecule; their kinetic energies are equal in a steady state system. Small atoms move fast, larger atoms move slower. It seems that at sonic speeds a molecule behaves like an atom, the bonds are strong enough.

Type of Element Element	1 Mole Grams	Density g / L 0 C ^o , 1 atm	Density divided by Moles
Noble Gases			
Helium	4.003	0.1786	0.04462
Neon	20.179	0.9002	0.04469
Argon	39.948	1.784	0.04466
Krypton	83.798	3.749	0.04474
Xenon	131.293	5.894	0.04489
Molecular Gases – Gas Molecules count as Atoms.			
Hydrogen ₂	2.016	0.08988	0.04458
Methane CH ₄	16.040	0.716	0.04464
Nitrogen ₂	28.014	1.251	0.04466
Ethane C ₂ H ₆	30.070	1.3562	0.04510
Oxygen ₂	31.998	1.429	0.04466
CO ₂	44.010	1.977	0.04492

Table 6, Atom density per Volume

Avogadro's Number: 1 Mole contains $6.0221417930 \times 10^{23}$ atoms

Avogadro's Number \times 0.04466 = 2.689×10^{22} atoms or molecules per Liter

Table 6 is to show that any gas or combination of gases contain the same number of atoms and molecules per volume at a given temperature and pressure. At C° and 1 atm this number is 2.689×10^{22} atoms or molecules per Liter. Since atoms and molecules have the same amount of kinetic energy $m \times v^2 / 2$, the same number of atoms of any size will maintain a given pressure at a given temperature.

Detailed research will determine if there are small variations introduced by the complexities of molecules. Data available at this time is not indicative one way or other.

Thermal Processes

This chapter is here to verify that the kinetic theory of gas pressure is applicable to thermal processes. The author doesn't pretend to be a student of Thermodynamics; still we are fearlessly forging ahead with the presentation. To find exact solutions are deferred to the experts.

In an earlier chapter we have developed an equation to calculate the pressure of gas atoms and gas molecules on a container wall:

$$\text{Pressure} \quad P = \frac{\text{density} \times v^2}{4}$$

$$\text{We can re-write this equation as follows} \quad P = \frac{1}{2} \times \frac{\text{density} \times v^2}{2}$$

$$\text{Kinetic Energy Density of molecules} \quad K = \frac{\text{density} \times v^2}{2}$$

The movement of atoms and molecules in the gas is random. Only half of the kinetic energy of the atoms and molecules of the gas contribute to the development of pressure on the walls of the container. This is in agreement with the *Virial Theorem*. Energy is preserved but only half of the random internal kinetic energy can be observed from the outside world. Pressure is energy density as observed at the container wall.

As stated earlier temperature and heat are biological concepts. Heat is kinetic energy of atoms and molecules. In this chapter we shall examine four basic thermal processes by replacing temperature and heat with kinetic energy of atoms and molecules. They are Isochoric, Isobaric, Isothermal and Adiabatic processes.

To simplify things the processes discussed shall be considered reversible and ideal using ideal gases where the size of molecules is negligible compared to the distance between the molecules. The real world is less kind to us.

Terms used:

P	pressure (energy density)
K	kinetic energy density of gas
E	other energy
v	molecular velocity
<i>density</i>	density
<i>Mass</i>	total mass = <i>density</i> x volume
V	volume
X	expansion ratio = V_1 / V_0
X	compression ratio = V_0 / V_1
W	work done = $\int P \times dV$
T	absolute temperature

Isochoric Process

In an Isochoric Process the volume of gas is constant implying constant density.

Kinetic energy (heat) is injected into a quantity of gas located in a rigid container through the container walls by heating the container. Kinetic energy (heat) could also be injected into the gas by a heating element located within the container or by internal chemical reaction. The difficulty with these two alternative methods is heat escaping through cooler container walls.

In the Isochoric Process the volume of the gas doesn't change, the density of the gas doesn't change; there is no work performed by the gas. The injected kinetic energy (heat) is stored in the gas in the form of kinetic energy of molecules and atoms by increasing their nominal molecular velocity from v_0 to v_1 .

Basic equation for Pressure
$$P = \frac{1}{2} \times \frac{\text{density} \times v^2}{2}$$

Kinetic energy density of molecules
$$K = \frac{\text{density} \times v^2}{2}$$

The injected energy density
$$E_{SP} = K_1 - K_0 = \frac{\text{density}}{2} \times (v_1^2 - v_0^2)$$

Resulting molecular velocity $v_1^2 = v_0^2 + \frac{2 \times E_{SP}}{\text{density}}$

Initial pressure was $P_0 = \frac{1}{2} \times \frac{\text{density} \times v_0^2}{2}$

Final pressure $P_1 = \frac{1}{2} \times \frac{\text{density} \times v_1^2}{2}$

Final pressure in ratio form $P_1 = P_0 \times \frac{v_1^2}{v_0^2} = P_0 \times \left(1 + \frac{E_{SP}}{K_0} \right)$

Only half of the injected energy is observed as additional pressure; the $\frac{1}{2}$ multiplier is located in the P_0 term. This is in agreement with the *Virial Theorem*.

Please note that the absolute “temperature” is proportional to v^2 .

Equations for pressure, temperature, molecular velocity and specific energies:

$$\frac{P_1}{P_0} = \frac{T_1}{T_0} = \frac{v_1^2}{v_0^2} = 1 + \frac{E_{SP}}{K_0} = 1 + \frac{E_{SP}}{2 \times P_0}$$

$$P_1 = P_0 + \frac{E_{SP}}{2}$$

Isobaric Process

In an Isobaric Process the Pressure of the gas is constant.

Kinetic energy (heat) is injected into a quantity of gas located in an expandable container through the container walls by ‘heating’ the container while the pressure of the gas is kept constant. The introduced kinetic energy (heat) increases the molecular velocity of the gas. To keep the pressure unchanged, the density of the gas is reduced by increasing the volume of the container while the total mass of this gas stays constant.

Basic equation $P = \frac{\text{density} \times v^2}{4}$

Kinetic energy density $K = \frac{\text{density} \times v^2}{2}$

Total mass of gas $Mass = V_0 \times \text{density}_0 = V_1 \times \text{density}_1$

Initial kinetic energy density $K_0 = \frac{\text{density}_0 \times v_0^2}{2}$

Kinetic energy density of expanded gas $K_1 = \frac{\text{density}_0 \times v_1^2}{2}$

Energy needed to expand gas $E_{SP} = K_1 - K_0 = \text{density}_0 \times \frac{v_1^2 - v_0^2}{2}$

Define expansion ratio $X = \frac{V_1}{V_0} = \frac{\text{density}_0}{\text{density}_1} = \frac{v_1^2}{v_0^2}$

Using expansion ratio $E_{SP} = \frac{\text{density}_0 \times v_0^2}{2} \times (X - 1)$

Energy needed to expand gas $E_{SP} = K_0 \times (X - 1)$

Pressure is constant $P = \frac{\text{density}_0 \times v_0^2}{4} = \frac{\text{density}_1 \times v_1^2}{4}$

The gas also performs work on the environment that is part of the injected kinetic energy:

$$W = P \times \Delta \text{volume} = P \times (X - 1) \times V_0$$

Work per initial density $W = P \times V_0 \times (X - 1)$

The total kinetic energy inserted into the gas is $E + W$

$$W_{Total} = (K_0 + P) \times V_0 \times (X - 1)$$

Isothermal Process

In an Isothermal Process the molecular velocity of gas (temperature) is constant.

Utilizing a piston, mechanical energy is injected into a quantity of gas located in an otherwise rigid cylinder while the molecular velocity (temperature) of the gas is kept constant, implying that the cylinder is also a large kinetic energy (heat) reservoir and the compression happens at a slow rate.

Basic equation
$$P = \frac{\text{density} \times v^2}{4}$$

The density of the gas changes but the total mass of the gas involved stays same.

With v constant
$$v^2 = \frac{4 \times P_1}{\text{density}_1} = \frac{4 \times P_0}{\text{density}_0}$$

$$P_1 = P_0 \times \frac{\text{density}_1}{\text{density}_0} = P_0 \times \frac{V_0}{V_1}$$

Define compression ratio
$$X = \frac{\text{density}_1}{\text{density}_0} = \frac{V_0}{V_1}$$

The mechanical energy introduced into the gas is:

$$W = \int_{V_0}^{V_1} P \times dV \quad V_1 = \frac{V_0}{X}$$

$$W = P_0 \times V_0 \times \int_{V_0}^{V_1} \frac{dV}{V} = P_0 \times V_0 \times \ln \frac{V_1}{V_0}$$

$$W = P_0 \times V_0 \times \ln X$$

All of the injected mechanical energy is stored outside of the gas in the container walls as kinetic energy of molecules and atoms (heat). The density of the gas has increased from density_0 to density_1 but the total energy of the gas did not change. The gas and its energy have been confined to a smaller volume.

Adiabatic Process:

Utilizing a piston, mechanical energy (compression) is injected into a quantity of gas located in an otherwise rigid cylinder while molecular kinetic energy (heat) of the gas is prevented from escaping through the walls of the cylinder. It may be difficult to realize this experiment, but we shouldn't encounter problems doing it on paper.

This process is similar to the Isothermal Process with the additional complexity of the injected mechanical energy retained in the gas. In the isothermal process the energy spent on compression is expelled as kinetic energy of atoms (heat). Here, in the adiabatic process the compression energy is retained by the molecules and atoms of the gas as kinetic energy (heat). The additional kinetic energy of molecules and atoms increases the pressure; in turn the piston has to work harder to compress the gas.

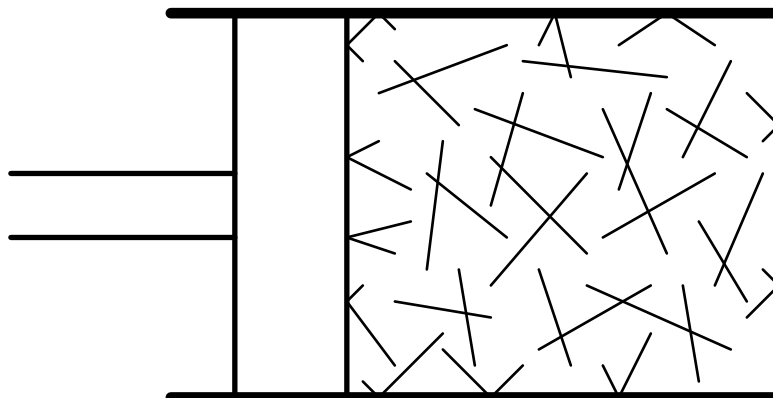


Figure 2, Gas trapped in cylinder

Let's get serious about this kinetic gas model. Gas consists of a number of molecules or atoms moving randomly colliding with each other and the container wall. Gas is not a uniform milky substance or some other expandable homogeneous matter. The walls of the cylinder and the piston are also made from individual atoms. These atoms are more restricted in their movements but still they bounce around and collide with their neighbors.

Please take note of Figure 2. The cylinder contains an amount of gas and a piston holding the gas in place. The short lines are there to imitate the random movements of gas molecules in three-dimensional space. Suppose, the setup is in equilibrium;

the net energy exchange between gas and container is zero. You could say in common parlance that the temperatures of gas and container are equal.

Initial conditions are: Volume V , Pressure P , molecular velocity v .

The gas molecules and atoms may hit the piston or any of the walls at random angles from 0 degree to 90 degrees. The average effective velocity of the molecules hitting the piston or any walls is one half of the molecular velocity v . In an earlier chapter we have developed that the molecules colliding with the piston develop a pressure:

$$P = \frac{\text{density} \times v^2}{4} = \frac{1}{2} \times \frac{\text{density} \times v^2}{2}$$

The pressure on the walls (specific energy) is one half of the specific kinetic energy of the moving molecules and atoms.

Suppose we apply force to the piston to reduce the volume of the cylinder. The piston moves at a constant speed. To simplify things, suppose that the piston is made of smooth, solid matter.

Two major changes take place at the piston-gas interface: The moving piston meets the next group of molecules a little sooner than before; the bombardment of the piston by molecules is more frequent. Smaller volume means an increase in the density of the gas. The equation above shows that if there are no other effects, the pressure increases linearly with the density of the gas. But this is thermodynamics; things are never simple.

When a molecule collides and bounces off the moving piston it gains additional velocity. This energy packet propagates toward the far end of the cylinder. Molecules collide with other molecules and the directional velocity gain at the piston soon becomes random velocity gain by all. We already know that molecular velocity represents heat. Let's examine two theoretical situations to see what may happen to this additional molecular velocity or heat.

In the first case the piston moves rather slowly and the walls of the cylinder can absorb the extra energy. By the time the energy packet would be echoed back to the piston, the extra molecular velocity is absorbed by the walls. There is no change to the initial molecular velocity; there is no change in temperature. This is the Isothermal Process discussed in the previous section.

The second case is more complicated and rather theoretical. The piston moves fast and magically the cylinder walls do not absorb heat. The molecules retain their velocity gains and that means increased temperature. This molecular velocity gain

further increases the pressure of the gas; the piston has to work increasingly harder to move further in.

It is important that we distinguish between $density_x$ and the *mass* of the original $density_0$. The piston's mechanical work is absorbed by the total mass in $density_0$ but the pressure is a function of $density_x$.

In a small amount of time the piston travels and displaces an amount of volume. The pressure increases because the density increases and because the compression work increases the molecular velocity.

The pressure is
$$P_x = \frac{density_x \times v_x^2}{4}$$

The density
$$density_x = density_0 \times \frac{V_0}{V_x}$$

Work performed
$$dW_x = P_x \times dV$$

Increased Kinetic Energy
$$K_{x+1} = K_x + dW_x$$

Where $density_0$ represents $mass_0$
$$K_x = \frac{density_0 \times v_x^2}{2}$$

The new Pressure
$$P_{x+1} = \frac{K_{x+1}}{2} \times \frac{V_0}{V_{x+1}}$$

The problem with Adiabatic Process is the loop in the process. Compression is work performed, work becomes kinetic energy of the molecules, and half of the additional kinetic energy is reflected as higher pressure that in turn increases the amount of work needed to further compress the gas.

I confess that I wasn't the mathematical genius of the crowd. I must have missed some of the pertinent lectures. As a reasonably savvy engineer, I resort to numerical solutions to solve complex problems. I know how to find my way out of a paper bag, though help is always appreciated.

Definitions: Kinetic Energy Density is for the initial $density_0$ of the gas. Energy Density or Pressure is an attribute regardless of the amount of gas.

Here are the numbers used in this numerical solution:

Initial Volume = 1

Initial Mass = 1

Initial Density = 1

Initial Pressure = 1

Initial Kinetic Energy Density = 2

Compression Ratio = 1 to 10

Granularity = 101 Steps: First step = 1/200, 99 Steps @ 1/100, Last Step = 1/200

Excel numbers with 10 decimal places

The Calculations are presented in Appendix E.

The incremental work of one step is added to the accumulated Kinetic Energy of the original density of gas. Kinetic Energy Density is calculated for the new $volume_{x+1}$ and divided by two for the new value of Pressure. Keep in mind the *Virial Theorem*. This new pressure is used for the next iteration.

The results for 10 to 1 Adiabatic Compression are as follows:

Final Pressure = 30.6353

Final molecular velocity, $v^2 = 3.06$ times the original value

Absolute Temperature is proportional to the square of molecular velocity v^2

Final Kinetic Energy of the original quantity of gas is 6.127, about 3.06 times the original value of 2 but contained in one tenth of the original volume.

Final Kinetic Energy Density = 61.27 or about 30 times the original value.

We should mention that $30.64 = 10^{1.478} \sim 10^{1.5}$
 Familiar values found in literature are $10^{7/5} = 22.5$ and $10^{5/3} = 44.6$

These calculations have ignored the effects of accelerating the gas or the speed of sound in the gas. For example consider a compressor with a 4" stroke running at 6000 rpm. That is a crank radius of 5 cm and a speed of 100 rps; the piston moves at 31 m/sec in the middle of the stroke. While that is only one tenth the speed of sound the secondary effects may not be negligible

Summary

Thermodynamics could be renamed Gas Kinetics.

The Kinetic Electron

In the Kinetic Universe there are no fields. The electron must be able to inform the world with physical means without spending any energy that it is an Electron. We need a new model for the Electron.

Let us explore one possible way of creating an Electron that doesn't rely on an electric charge and doesn't require an interacting electric field. I am sure you can find better solutions once you free your mind from the shackles of fields.

The Electron without Charge

Suppose that our Universe is filled with Aether at one Terapascal pressure and this pressure is uniform and identical in all directions. This pressure is created by Aethons moving at an average velocity of 1.5 c in random directions as described in an earlier chapter. For this experiment let us locate an electron size sphere in the middle of a vacuumed container. The mass of the electron sized sphere is 9×10^6 times the mass of Aethons. Aethons will collide with this small sphere from every direction, striking the surface at any angle between 0+ and 90 degrees and bounce off after an elastic collision. The sphere should not introduce any disturbance to the surrounding Aether; collisions are symmetrical and should average out.

Let us turn the small sphere into a magical small sphere. Suppose that every Aethon striking the sphere will rebound at a slightly sharper angle than the incident angle. The result is polarization of Aether pressure without changing its density or energy. The pressure in the radial direction from the sphere is slightly higher. This extra pressure propagates away from the small sphere at the speed of light and diminishes with the square of the distance, creating a pressure gradient. The polarization must be regenerated constantly to maintain it. The creation of this polarization doesn't require any energy.

Let us introduce a second magical sphere into the container. Both spheres would want to keep away from the elevated energy levels and energy gradients created around the other sphere. How could we create this radial polarization in Aether?

In an earlier chapter we stated that an Aethon colliding head-on with an Electron or a Nucleon transfers a momentum = $2 \times m \times v$.

$$\text{Velocity gain by the Electron} = 2 \times v \times m / m_e = 100 \text{ m/s.}$$

$$\text{Velocity gain by the Nucleon} = 2 \times v \times m / m_n = 5.42 \text{ cm/s.}$$

Aethons are tiny compared to Electrons, but their velocity is $1.5c$. For every head-on collision the Electron gains 100 m/s. Millions of collisions per second transfer non-negligible amount of kinetic energy. The kinetic energy received by the Electron from one Aethon is returned to other Aethons. The returned kinetic energy is polarized in the radial direction from the Electron. Surface properties of both the Electron and the Aethon play a role and can only be speculated upon. Simulation will help. Nucleons gain only 5.42 cm/s per collision. Because of the larger size of Nucleons the momentum transfers from many collisions average out faster.

Polarization of Aether

This polarization spreads out from the Electron at the speed of light and diminishes with the square of the distance. It is regenerated constantly at the surface of the Electron. There is no loss of energy and there is no expenditure of energy. Electrons are passive particles. Electrons don't have an electric charge and they don't generate electric fields. There are no electric fields. There are no fields. Electrons polarize the kinetic energy of Aether around them.

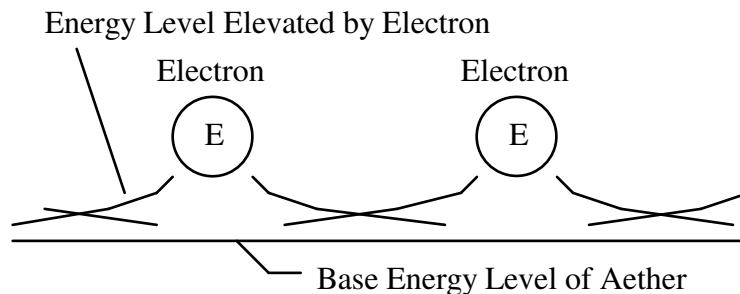


Figure 3, Energy Levels around Electrons

An Electron thus informs the Universe that it is an electron by polarizing the random movements of Aethons in the surrounding Aether. This polarization results in higher pressure in the radial direction around every electron and this pressure gradient is maintained without the use of any energy. Each electron tries to occupy an area with the lowest energy level; they keep away from the elevated energy levels around other electrons; they repulse each other.

Let's turn our attention to the subject of charge polarity. The only so-called charged particle is the Electron. Positrons do not exist. We can create an Electron Hole by removing a single electron from an evenly distributed group of electrons.

At the site of the Electron Hole the energy level of Aether is not polarized. The electron hole is not repulsing neighboring electrons, but the neighboring electrons are still repulsed from the opposite sides creating the illusion that the positive Electron Hole is attracting negative Electrons. The idea of electron holes has been used to explain the action in P-layers of semiconductors. An electron hole could be mistaken for a positron.

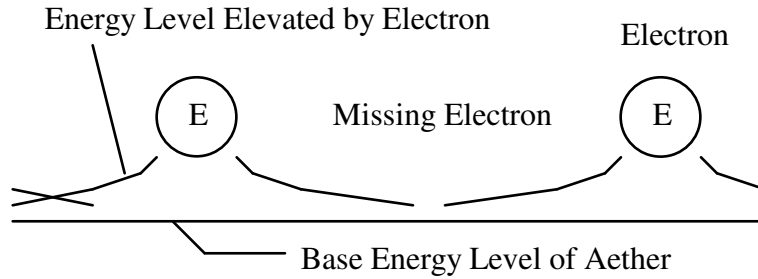


Figure 4, Missing Electron is an Electron Hole.

Collisions between Aethons and Nucleons do not create Aether polarization similar to that caused by Electrons. The reasons could be size differences, surface property or matter hardness of Nucleons. There is a kinetic solution out there for you to discover.

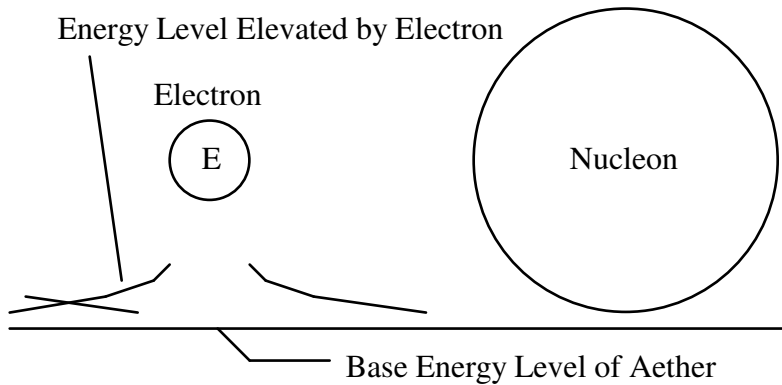


Figure 5, Nucleon behaves like a missing Electron

Nucleons do not repulse each other; they only want to occupy space with the lowest energy level. The result of this polarizing mechanism is that electrons want to disperse and keep the Universe in an even *neutral* state, and nucleons are pushed together to form massive bodies. Conventional calculation shows that electrical

forces are 10^{38} times larger than gravitational forces. In the Kinetic Universe electrons do not create gravitational forces.

The repulsive nature of forces makes it difficult to concentrate large numbers of electrons at any single point. It is impossible to create electric forces to rival gravitational forces. It would be impossible to suck all the free electrons out of the solar system and pump them into the Sun. If you could achieve this feat, the electrons wouldn't stay very long.

There is nothing electrical about the Electron or the electric charge. The electric charge is a manifestation of Aether polarization and pressure gradient caused by collisions of Aethons and Electrons. The electric charge is a kinetic event.

How can we use tiny electrons to transmit large amounts of power, you ask? How can we do it with polarization of Aether? For the answers we have to consider the numbers involved. The estimated pressure or energy content of Aether is about 1000 Gigapascal; small polarization can create large forces. The number of electrons in a Coulomb (Ampere-second) is also very large; about 6.2415×10^{18} . While it is difficult to assemble a charge of 1 coulomb on a small sphere, current flow isn't a concentration of electrons; it's a flow of evenly distributed electrons in a quasi neutral wire. To find the number of excess electrons in a section of wire, multiply the capacitance of the wire section with the potential applied to it. It is very small.

What is electrical discharge and lightning? Electric spark is the sudden equalization of electron densities between objects. Violent collisions create photons that we see as spark or lightning. And what are these photons? They are waves of energy carried by Aether that our eyes can see and our instruments can detect.

We come to the question: what is neutral? Neutral is the average density of electrons in the vicinity and it may vary with location. In metals there are large numbers of free electrons, the potential maybe higher. Some metals are more neutral than others due to variation of electron densities. This density differential allows us to make batteries; it also causes corrosion.

Note

The review of Magnetism is under construction and it will be presented in a future publication. Be assured that Magnetism is also a kinetic event powered by the energy of Aether.

Gravity

Untold numbers of hours were spent by many to solve the riddle of gravity. We know the cause of gravity is mass, we know the symptom of gravity is attractive force. We are looking for the mechanism; how is it done? We already know that in the Kinetic Universe force is created by collisions. We know that collisions can only push.

In previous chapters we have described Aether and calculated its density. Aether is a super-gas with tremendous amount of kinetic energy. Tiny balls of matter bouncing around at the speed of $1.5 c$, colliding with each other and with everything else in their way. In the previous chapter a kinetic model of the electron was also proposed. The repulsive forces between Electrons were attributed to Aether polarization that creates a pressure or energy gradient in Aether. Gravity is also attributed to Aether polarization.

Nucleons are giants masses compared to Electrons. The velocity gained by a nucleon from a collision with an Aethon is very small, only $1/1800$ of the velocity gained by the electron from a similar collision with an Aethon. The surface of the nucleon is 150 times the surface of the electron, the momentum gained from many Aethons average out faster. In addition atoms have four to 200 times the mass of nucleons. Collisions between Aethons and Nucleons still have to be investigated and better understood. Smaller attractive forces between Nucleons are caused by Aether polarization though the process is not fully understood at this time and needs further investigation.

The Casimir Effect is a case of gravitation caused by Aether polarization. Two parallel plates at very small distance between them develop an attracting force. This force is small and almost negligible compared to the estimated Aether pressure of 1000 Gigapascal.

Aether doesn't create gravity. Aether is everywhere. The density of Aether is the same inside and outside of Galaxies. Only the polarization varies. Dragged Aether contributes to the kinetic mass of Galaxies and other smaller masses.

Electrons don't create gravity, but may contribute to the kinetic mass of associated atoms, molecules and objects. Nucleons may seem to attract electrons similarly to electron holes, but the elevated energy levels around electrons repulse nucleons. Gravitational mass may not be equal to kinetic mass of matter, though the difference is less than 0.1%.

Nucleons may have been evenly distributed in the early Universe, but that was an inherently unstable situation. The smallest disturbance in the energy level in Aether would start the process of clumping two nucleons. Nucleons don't repulse each other. As more nucleons join the crowd, the local energy level becomes more polarized attracting still more nucleons. Once the gravitational pressure is high enough, barriers are broken down and nucleons are joined into atoms. Atoms may be guarded by electrons to prevent merging with other atoms.

If the Universe did not expand, ultimately all nucleons in the Universe could end up in one big nucleon heap. It would be driven by the pressure or energy in the surrounding Aether with help from electrons and not by some magical gravitational pull from the masses. The big crunch will never happen because the Aether of the Universe is expanding at a higher rate than the clumping process occurs. As the Aether of the Universe expands, the pressure will diminish and slowly this Universe will fall apart and dissipate into the great empty space.

Black Holes

In the Kinetic Universe black holes are not possible. The pressure or energy contained in Aether is limited. The center of a galaxy may contain a very large pile of matter, but the directional energy level of Aether can't fall below zero and that would not be enough to create a black hole.

At 50% polarization the speed of light would be greatly reduced in one direction but it would not be able to prevent the escape of light. The strength of gravity can't be large enough to prevent matter from escaping a large mass. Spiral galaxies with their center bars are proof that matter is ejected from the large central mass to form the spiral arms of these galaxies. This must be the way heavy atoms of old stars are recycled into new hydrogen and other smaller atoms. Event horizons and black holes may make good material for science fiction books and suspense movies, but they don't exist.

Other

As a public service, we are presenting values of gravitational forces in our Solar system and in our Milky Way Galaxy.

Gravitational Acceleration $g = G \times \frac{M}{r^2}$

Location in Solar System	m/s ²
On surface of Earth	9.81
On surface of Moon	1.623
On surface of Sun	2.7370E+02
At 1 AU from Sun (Earth orbit)	5.9242E-03
At 50 AU from Sun (Kuiper Belt)	2.3697E-06
At 1000 AU from Sun	5.9242E-09
At 10000 AU from Sun (Ort Cloud)	5.9242E-11
Location in Milky Way Galaxy	
At 27000 ly from center of MWG	1.2191E-09
At 50000 ly from center of MWG	3.5550E-10

Table 7, Gravitational Acceleration

At 10000 AU from our Sun, the Sun's gravity is weaker than the gravity of the Milky Way Galaxy's center. The Ort Cloud would be sucked away by the Milky Way Galaxy.

At 1000 AU from Sun, the Sun's gravity is six times stronger than the gravity of the Milky Way Galaxy's center.

Gravitational Force $F = G \times \frac{m \times M}{r^2}$

Location	Newton
1 kg mass on surface of Earth	9.81
Earth pulled by Sun	3.5392E+22
Sun pulled by center of MWG	2.4237E+21
Earth pulled by center of MWG	7.4245E+15

Table 8, Gravitational Forces

The Atom

The notion that matter is made up from atoms dates back to the Greeks. The word Atom is of Greek origin. Most of their work was philosophical as the technology was not available to do the necessary research. Not much happened for a long time. Alchemists of the middle ages were busy trying to make gold from anything and everything. Maybe they were just hustling the Kings. In time light chased away the darkness and we know much more about the elements listed in the periodic table.

Interlocking theories about negative electrons and positive protons gave birth to the Bohr Atom. Protons and Neutrons are in the center surrounded by an orbiting Electron Cloud. The new problem was to hold together the multitude of positively charged protons in the center of the atom, giving rise to the strong force. The strong force was a strange force and it was soon replaced with gluons. Some problems were never touched upon. If positively charged protons repulse each other in the center of the atom why would negatively charged electrons tolerate each other in orbit around the center of the atom? Their charges are just as large but opposite polarity.

If atoms were held together by the mysterious strong force or by gluons or some other attracting force invented by man, any number of nucleons could form stable atoms. Reality shows otherwise.

In the Kinetic Universe the Nucleons of atoms are held together by the constant bombardment of Aethons from the outside, there is no Aether between the Nucleons. Atoms are more selective in their configuration as spurs and appendages would easily break off.

In the Kinetic Universe there is no electric charge and there are no electric force fields. Nucleons don't repulse each other and they don't attract electrons. In the Kinetic Universe there is no strong force and there are no gluons.

The Elements

It would take a lifetime of hard work to learn the intricacies of the Elements. I do have great appreciation for the effort of thousands of scientists of the past 3-400 years creating the wealth of data about the Elements. Thank you very much. The available data has given me a better understanding of the possible structure of the atom in the Kinetic Universe.

Appendix A contains 10 pages of charts of Element Number vs. Element Mass. This chart lists all stable isotopes occurring in nature. Synthesized isotopes aren't listed as they only exist for a short time in the laboratory. As stated earlier, in our Kinetic Universe there is no electric charge. Protons and Neutrons are the same and we call them Nucleons. Electrons do not orbit atoms; they may be stationary on the surface of atoms. An electron inside the atom would have no effect on the outside world; it couldn't communicate its existence to the world. The number of electrons could be equal to the number of nucleons on the surface of the atom.

Element Number	Isotopes of Elements in %							
	1	2	3	4	5	6	7	8
Symbol	H	He	Li	Be	B	C	N	O
Name	Hydrogen	Helium	Lithium	Beryllium	Boron	Carbon	Nitrogen	Oxygen
Mass								
1	99.985							
2	0.015							
3	trace	0.0001						
4		99.9999						
5								
6			7.5					
7			92.5	trace				
8				trace				
9				100				
10				trace	19.9			
11					80.1			
12						98.9		
13						1.1		
14						trace	99.634	
15							0.366	
16								99.760
17								0.039
18								0.201
Element Number	1	2	3	4	5	6	7	8
Symbol	H	He	Li	Be	B	C	N	O

Table 9, Sample Data from Appendix A-1

The Helium Atom

A symmetrical Helium atom has four nucleons and two or four electrons. Electrons are located near the dimples at the intersection of three nucleons. The Helium atom is a very stable structure. There is no Aether inside Atoms.

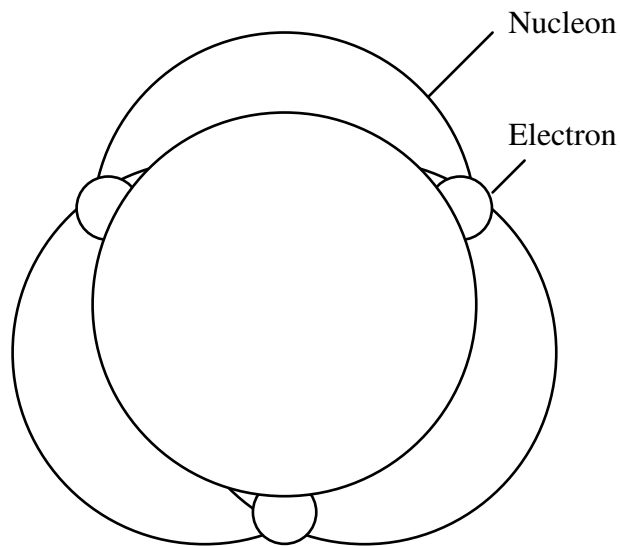


Figure 6, Helium Atom with 4 Nucleons and 4 Electrons

The Carbon Atom

The Carbon atom has two variations; one with twelve nucleons, the other with 13 nucleons. Both atoms have twelve nucleons on the outside surface. The ¹³C Isotope has a center nucleon. The overall shape of the two versions of Carbon atom is identical except for a small difference in size.

Please note on Figure 7 the offset double ring of 5 nucleons each in six different directions. This structure is symmetrical. The 12 nucleons are held together by the pressure of Aether. This Carbon atom is very stable and is difficult to enter by other nucleons or exit. Nucleons must have soft, pliable bodies and they are deformed into wedge shaped segments by the pressure of Aether. The ¹²C atom has no center Nucleon and the empty space between nucleons is reduced to the bare minimum. The ¹³C Carbon atom has a center and the outer nucleons are deformed into truncated wedge shaped segments.

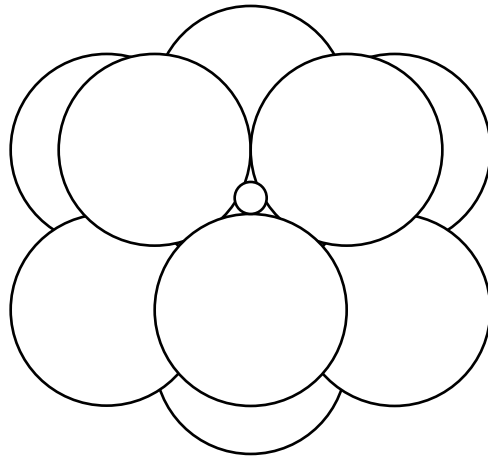


Figure 7, Carbon Atom with 12 Nucleons
 Nucleons are shown not compressed
 Only one Electron is shown

It is suggested that electrons are located on the surface near the dimples at the intersection of three nucleons. The difficulty is that there are 20 dimples for 12 nucleons ($D=2N-4$). There is work to do.

Carbon burning joins two C_{12} atoms to form Magnesium and other elements. Carbon burning happens only in massive stars at high energies or pressures.

The Elements Chart

Element Mass 1 through 35 only a single Element Number is supported, except some traces.

There are no stable isotopes listed with Element Mass 5, 71 and 211 to 220.

There is a long list of Element Masses not very popular, similar to Carbon13: 2, 3, 8, 13, 15, 17, 18, 21, 23, 33, 36, 38, 42, 43 and 61.

At the high end, only traces can be found with Element Mass 210, 221-230, 233, 236 and 237.

Many elements have isotopes with various Element Masses. As the size of atoms increase, the possibilities also increase. Still there are very few stable isotopes for each Element Mass.

A special case is Mass 40; Argon 18 and Calcium 20, two very dissimilar elements with the same mass.

Gold and Mercury

Another interesting case is Gold and Mercury. Gold is a very stable single isotope noble metal. The outer layer of the Gold atom has 122 nucleons with 75 nucleons inside this outer layer.

Mercury is a low melting point metal with a large number of isotopes. The outer layer of the Mercury atom has 124 nucleons. Inside this outer layer there may be 80, 78, 77, 76, 75, 74 or 72 nucleons.

The major difference seems to be two more nucleons on the surface of the Mercury atom.

The Atom

We propose the following configuration for the atom, except for Hydrogen: The number of nucleons located in the outer layer of an atom is unique for each element. This number ranges from twice the element number for the very lightest atoms to 1.5 times the element number for lead and other heavy atoms. The leftover nucleons are inside this outer layer, preventing the collapse of the outer layer.

The shape of an atom can be a perfect sphere like the Carbon atom or an ellipsoid of some kind. The shape of the atom and its overall rigidity determines its affinity to join other atoms to form molecules. Sharp corners or appendages are not allowed. Nucleons have soft, pliable bodies and the pressure of Aether reduces the volume of the sphere or ellipsoid to the smallest possible size.

In the Kinetic Universe nucleons are tiny gumballs of real matter. The kinetic energy of Aether holds these nucleons together to form atoms. In Appendix B you may find our attempt to calculate the number of nucleons in the outer shells of atoms and the number of nucleons inside these shells. The main purpose of this exercise is to involve your curiosity. The numbers are preliminary, your results may vary. A sample Table from Appendix B-1 is shown below.

The number of electrons associated with an atom is not known at this time. Possible role of electrons is to keep atoms from merging.

Element	Isotopes of Elements in %							
Number	1	2	3	4	5	6	7	8
Symbol	H	He	Li	Be	B	C	N	O
Name	Hydrogen		Lithium		Boron		Nitrogen	
		Helium		Beryllium		Carbon		Oxygen
Nucleons								
Outer		4	6	8	10	12	14	16
Inner								
Nucleons		0.0001		trace				
0		99.9999	7.5	trace	19.9	98.9	99.634	99.760
1			92.5	100	80.1	1.1	0.366	0.039
2				trace		trace		0.201
3								
Element	1	2	3	4	5	6	7	8
Number	1	2	3	4	5	6	7	8
Symbol	H	He	Li	Be	B	C	N	O

Table 10, Sample Data from Appendix B-1

The Nature of Light

After centuries of investigation by many the exact nature of light has not been determined. According to particle theory, light consists of tiny corpuscles moving with the speed of light relative to the source. Maxwell's equations supported wave theory but it needed a suitable medium to propagate light. No transport medium was found by the ill-defined Michelson-Morley experiments. In 1905 light was declared an Electromagnetic Energy that propagates in vacuum at the universal speed of c . Quantum Theory is more cautious. According to Quantum Theory light can be a wave function or light can be particles or both or neither, depending on the situation on hand. Quantum Theory requires only that light be quantized into photons.

According to prevailing theories and popular understanding, light is a line of photons that can travel for billions of years, unimpeded at the constant speed of c in vacuum. In literature, light is represented by a thin black line on white paper. That is a nice mathematical model for a theoretical world.

A detailed study of light receptors of the human eye should yield clues to the nature of light and the nature of light polarization. Humans also have fine color vision. The effort to undertake such study is beyond the resources of this author.

In the Kinetic Universe light is a pressure wave function in Aether propagating at the speed of c relative to the local Aether. Energy waves carried by real particles with mass should satisfy the wave-particle duality of light. The speed of propagation c depends on the energy density of Aether. The mechanism is similar to sound waves traveling in gases. It is a statistical process. There are other similarities between sound and electromagnetic energy. High frequency sound waves are more directional than low frequency sound waves. Low frequency radio waves can bend around the horizon while high frequency TV signals require line of sight.

The spectrum of visible light was determined long before our ancestors have left the water to live on dry land. Water is reasonably transparent to visible light. It was an evolutionary development.

Light rays are very pervasive in our Universe. We find them everywhere. Every point in this Universe is a crossroad for millions of light rays.

Consider the simplest of cameras that we have experimented with in our younger years: a darkened room or a black box with a pinhole in one wall and a display screen opposite the pinhole. The outside scenery is projected through the pinhole onto the display, rotated 180 degrees. Every ray of light from the outside travels

through this pinhole and intersects the path of every other ray of light moving through this pinhole. The pinhole is a very busy intersection.

To increase the complexity, imagine standing in your yard with a large number of people observing the trees. Every part of every tree sends light rays in every direction and every person sees light rays arriving from every direction. You can see how every point in your yard is a pinhole. A single ray of light from a flower to your eye crosses an infinite number of pinholes. In every pinhole that single ray of light crosses path with an infinite number of light rays from every other direction. Still we can observe a clear picture of the flowers and trees without interferences or collisions with other photons.

Humans and most animals can't see a single ray of light originating from a single point. The lens of the eye collects a large number of light rays from every point in our view. There is a light cone with thousands of light rays arriving to our eyes from every point in our view. The lens collects these rays in the light cone and directs them to a single receptor in the eye. In addition there is this thing called resolution. We see light rays arriving from many atoms as originating from a single point.

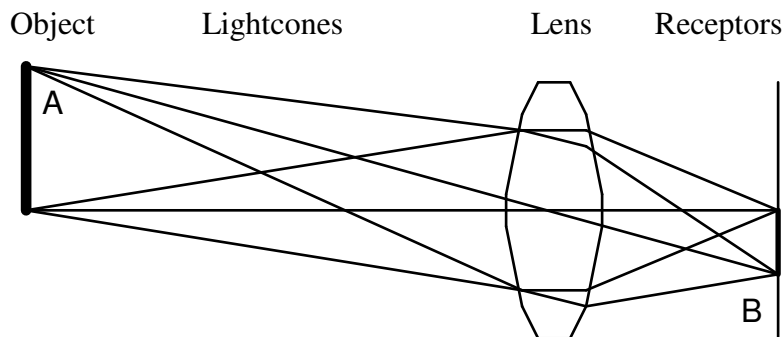


Figure 8, Receptors collect photons from light cones with a lens

An atom or a group of atoms on the surface of an object at ambient temperature will reflect an incoming photon in random direction. Thermal vibration of the atoms makes the reflection very random. This process is repeated continuously. A single light ray from point A on the object to point B in the eye contains a series of random photons. The many light rays in the light cone combine to present a solid dot in the eye. One could speculate that the size of the lens in the eye is the result of evolutionary process. In the dark of the evening we still get enough light rays to combine into a solid dot in the eye to recognize objects. In bright daylight the pupil

contracts to reduce the size of the light cone to limit the number of light rays entering the eye because each light ray contains many more photons.

Long distance light travel in the Universe has its own difficulties. There are large numbers of powerful light and other energy sources all around. We have to consider all the pinholes a single ray of light has to traverse in a billion years.

It is true that with increased distance light from a single point disperses to a larger area and becomes “weaker”, but with increased distance objects become smaller and because of resolution we receive light rays from more points to the same receptor. Within limits brightness stays the same at the expense of resolution

Rays of light do not slow down and do not get tired in their long distance travel because the energy of the local Aether keeps them young and perky.

Chances are that photons do not travel alone; they organize themselves into Solitons. Solitons are theorized in fiber optic communications. Solitons can travel long distances without distortion or attenuation. Solitons seem to self organize and rejuvenate. The energy most likely comes from Aether. This is another subject of interest that is beyond the resources of this author.

In this segment we tried to show that light as we see it is much more complex than that thin black line on white paper.

Frames of Reality

Relativity tutorials set out with defining an imaginary stationary frame where light proceeds unimpeded with the speed of c . This light can be observed from other moving frames and the speed of light will still be c . To make things work properly the length of measuring rods and the speed of clocks are adjusted according to rules. Apparent changes soon become real changes. To sell the story, the smoke and mirrors are augmented with fancy diagrams and judicious double talk, but troubles loom on the horizon. The discovery of dark matter will soon put a dent into the theory of empty space inside this Universe. If light travels in not so empty space occupied by dark matter, the rules of relativity may have to be reworked.

Encapsulating Aether is the Local Frame. Frames Can't Overlap

In the Kinetic Universe every object is immersed in Aether, in a sea of Aethons. Aether is part of every atom and every molecule. Aether holds together atoms, molecules and crystal structures. Aether is part of every object. This encapsulating Aether is the local frame. Frames can't overlap and frames don't overlap. Light and all other forms of energy are propagated by this Aether with the speed of light that is determined by the local pressure or energy density of Aether. Objects moving with the same speed in the same direction may be part of the same frame. Objects moving with different speeds or in different directions have their own frames. An observer can make direct measurements only in his own frame. Information arriving from other moving frames is converted, translated at the boundary of the two frames. This boundary depends on the physical size and shape of the objects and may not be well defined. There are transitional regions between the frames.

Please remember, Aether is not transparent to light, Aether is the transport medium of light.

Aether *delineates* the Universe. Without Aether interplanetary space would be identical to empty space outside of this Universe, dark empty space where light can't proceed. Aether is the transport medium of light.

Train vs. Embankment Mind Experiment

We could examine the famous Train vs. Embankment mind experiment often exemplified by the relativity crowd. Lightning strikes both ends of a speeding train simultaneously. On the embankment light travels in Aether tied to the embankment. The man standing halfway on the tracks will see the two lightning strikes at the same time. Inside the train light travels in Aether moving with the train. The man standing in the middle of the train will also see the two lightning strikes at the same time. The two observations happen simultaneously. The process is same for sound traveling in air inside the train and in air outside the train on the embankment. Only mathematicians can talk about light traveling inside the train in a frame tied to the railroad embankment. It can't happen in the real world. Frames can't overlap and frames don't overlap.

Michelson-Morley Experiment

The Michelson-Morley experiments to prove the existence of a rigid stationary Aether were conducted within basements and indoor laboratories. The Michelson-Morley experiments proved that Aether encapsulating the experiment was the local frame of the experiment. You can't measure differential speed in Aether if this Aether is moving with your measuring apparatus. The Michelson-Morley experiment was a wasted effort due to incorrect definition of Aether and light. What were they thinking?

Fizeau has modified the Michelson-Morley apparatus by inserting a water pipe into the light path and proved that the speed of light is relative to the transporting medium.

Stellar Aberration

Stellar Aberration provides us the means to calculate the orbital speed of Earth around the Sun because the direction of movement of Earth relative to distant stars changes with the seasons. The observed positions of distant stars change with the seasons due to Stellar Aberration.

In a paper "Stellar Aberration and the Unjustified Denial of Ether," author Carel van der Togt uses dragged Aether and interstellar vacuum. His dragged Aether and

vacuum can be substituted with Aether encapsulating Earth and Interstellar Aether moving with the Milky Way Galaxy.

Carel van der Togt

[http: //gsjournal.net/Science-Journals/Essays/View/1176](http://gsjournal.net/Science-Journals/Essays/View/1176)

The math is the same and it will not be repeated here. Carel van der Togt is correct; there is no relativity of any kind involved in Stellar Aberration or in anything else.

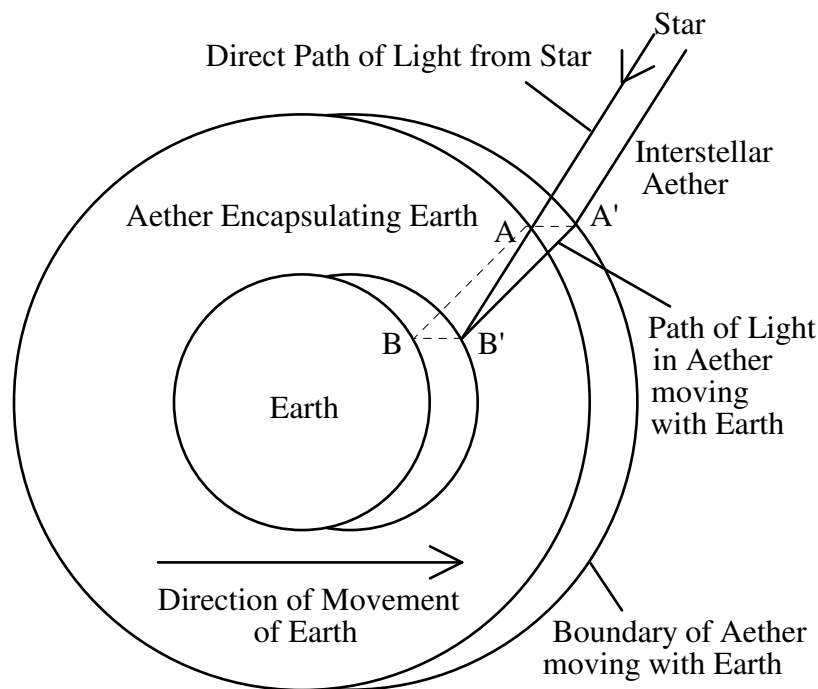


Figure 9, Direct and Apparent Paths of Light from Distant Star

We can't measure the orbital speed of the Sun in our Galaxy with the help of stellar aberration because one revolution of the Solar system takes several hundred thousand years. We can't make direct measurements of objects and their velocities in other frames. By the time information arrives into our frame, the information has been converted and referenced to our frame.

Summary

This is my Kinetic Universe. I am a privileged guy; I was born and I was gifted with conscience. Once I realized existence, I had to accept the idea of an infinite space and never ending time. Simple logic also made me realize that most of the information I've learned in my younger years are not applicable to this Kinetic Universe. It turns out that this kinetic design is simple but genius. Three basic elementary particles with abundant energy can create hundred different elements. These elements are able to combine into an infinite number of structures from a simple helium atom to the very complex human brain.

How did it begin? It really doesn't matter but if you find the answer, please, let me know, I am eager to learn. At this time all I know, I am here and I am not lost.

Our Universe will survive this human race. No matter what we do, no matter what we think, no matter what we theorize, we can't change this Universe. We can't make any difference in the outcome. We are searching for the truth, but mainly we are just trying to impress each other with original ideas and clever thinking.

The best I can hope for is that you've read this paper with an open mind. It would be great if you found some of the information useful. It would be fantastic if you'd see the possibilities a new dawn can bring.

If I ruined your day, I apologize.

Appendix A

Appendix A is a table of elements, listing all stable isotopes occurring in nature on 10 pages. Synthesized isotopes aren't listed as they only exist for a short time in the laboratory. The order of listing is by Element Number and Element Mass.

Appendix A-1

Element	Isotopes of Elements in %									
Number	1	2	3	4	5	6	7	8	9	10
Symbol	H	He	Li	Be	B	C	N	O	F	Ne
Name	Hydrogen		Lithium		Boron		Nitrogen		Flourine	
		Helium		Beryllium		Carbon		Oxygen		Neon
Mass										
1	99.985									
2	0.015									
3	trace	0.0001								
4		99.9999								
5										
6			7.5							
7			92.5	trace						
8				trace						
9					100					
10				trace	19.9					
11					80.1					
12						98.9				
13						1.1				
14						trace	99.634			
15							0.366			
16								99.760		
17								0.039		
18								0.201	trace	
19									100	
20										90.48
21										0.27
22										9.25
Element										
Number	1	2	3	4	5	6	7	8	9	10
Symbol	H	He	Li	Be	B	C	N	O	F	Ne

Table A-1, Elements 1-10

Appendix A-2

Element	Isotopes of Elements in %									
Number	11	12	13	14	15	16	17	18	19	20
Symbol	Na	Mg	Al	Si	P	S	Cl	Ar	K	Ca
Name	Sodium		Aluminium		Phosphorus		Chlorine		Potassium	
		Magnesium		Silicon		Sulfur		Argon		Calcium
Mass										
22	trace									
23	100									
24		78.99								
25		10.00								
26		11.01	trace							
27			100							
28				92.23						
29				4.67						
30				3.10						
31					100					
32				trace		95.02				
33						0.75				
34						4.21				
35							75.77			
36						0.02	trace	0.34		
37							24.23			
38								0.06		
39								trace	93.26	
40								99.60	0.01	96.941
41									6.73	trace
42										0.647
43										0.135
44										2.086
45										
46										0.007
47										
48										0.187
Element										
Number	11	12	13	14	15	16	17	18	19	20
Symbol	Na	Mg	Al	Si	P	S	Cl	Ar	K	Ca

Table A-2, Elements 10-20

Appendix A-3

Element	Isotopes of Elements in %									
Number	21	22	23	24	25	26	27	28	29	30
Symbol	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn
Name	Scandium	Titanium	Vanadium	Chromium	Manganese	Iron	Cobalt	Nickel	Copper	Zinc
Mass										
45	100									
46		8.0								
47		7.3								
48		73.8								
49		5.5								
50		5.4	0.25	4.345						
51			99.75							
52				83.789						
53				9.501	trace					
54				2.365		5.80				
55					100					
56						91.72				
57						2.20				
58						0.28		68.077		
59							100	trace		
60								26.223		
61								1.140		
62								3.364		
63									69.15	
64								0.926		48.6
65									30.85	
66										27.9
67										4.1
68										18.8
69										0.6
Element										
Number	21	22	23	24	25	26	27	28	29	30
Symbol	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn

Table A-3, Elements 20-30

Appendix A-4

Element	Isotopes of Elements in %									
Number	31	32	33	34	35	36	37	38	39	40
Symbol	Ga	Ge	As	Se	Br	Kr	Rb	Sr	Y	Zr
Name	Gallium		Arsenic		Bromine		Rubidium		Yttrium	
		Germanium		Selenium		Krypton		Strontium		Zirconium
Mass										
67	60.11									
68										
69	39.89									
70		21.23								
71										
72		27.66								
73		7.73								
74		35.94		0.87						
75			100							
76		7.44		9.36						
77				7.63						
78				23.78		0.35				
79				trace	50.69					
80				49.61		2.25				
81					49.31	trace				
82				8.73		11.60				
83						11.50				
84						57.00		0.56		
85							72.168			
86						17.30		9.86		
87							27.832	7.00		
88								82.58		
89									100	
90								trace		51.45
91										11.22
92										17.15
93										trace
94										17.38
95										
96										2.80
Element										
Number	31	32	33	34	35	36	37	38	39	40
Symbol	Ga	Ge	As	Se	Br	Kr	Rb	Sr	Y	Zr

Table A-4, Elements 31-40

Appendix A-5

Element	Isotopes of Elements in %									
Number	41	42	43	44	45	46	47	48	49	50
Symbol	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	Tn	Sn
Name	Niobium		Technetium		Rhodium		Silver		Indium	
		Molybdenum		Ruthenium		Palladium		Cadmium		Tin
Mass										
92		14.64								
93	100									
94		9.25								
95		15.92								
96		16.68		5.52						
97		9.55								
98		24.13		1.88						
99			trace	12.70						
100		9.63	100	12.60						
101				17.00						
102				31.60		1.02				
103					100					
104				18.70		11.14				
105						22.33				
106						27.33		1.25		
107						trace	51.839			
108						26.46		0.89		
109							48.161			
110						11.72		12.49		
111								12.80		
112								24.13		0.97
113								12.22	4.3	
114								28.73		0.66
115									95.7	0.34
116								7.49		14.54
117										7.68
118										24.22
119										8.59
120										32.58
121										
122										4.63
123										
124										5.79
125										
126										trace
Element										
Number	41	42	43	44	45	46	47	48	49	50
Symbol	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	Tn	Sn

Table A-5, Elements 41-50

Appendix A-6

Element	Isotopes of Elements in %									
Number	51	52	53	54	55	56	57	58	59	60
Symbol	Sb	Te	I	Xe	Cs	Ba	La	Ce	Pr	Nd
Name	Antimony		Iodine		Caesium		Lanthanium		Praseodymium	
		Tellurium		Xenon		Barium		Cerium	Neodymium	
Mass										
120		0.09								
121	57.36									
122		2.55								
123	42.64	0.89								
124		4.74		0.10						
125		7.07								
126		18.84		0.09						
127			100							
128		31.74		1.91						
129			trace	26.40						
130		34.08		4.07		0.11				
131				21.20						
132				26.90		0.10				
133					100					
134				10.40		2.42				
135					trace	6.59				
136				8.86		7.85		0.19		
137					trace	11.23				
138						71.70	0.09	0.25		
139							99.91			
140								88.45		
141									100	
142								11.11		27.2
143										12.2
144										23.8
145										8.3
146										17.2
147										
148										5.7
149										
150										5.6
Element										
Number	51	52	53	54	55	56	57	58	59	60
Symbol	Sb	Te	I	Xe	Cs	Ba	La	Ce	Pr	Nd

Table A-6, Elements 51-60

Appendix A-7

Element	Isotopes of Elements in %									
Number	61	62	63	64	65	66	67	68	69	70
Symbol	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb
Name	Promethium	Europium		Terbium	Holmium			Thulium	Ytterbium	
		Samarium	Gadolinium	Dysprosium	Erbium					
Mass										
144		3.07								
145										
146										
147	trace	14.99								
148		11.24								
149		13.82								
150		7.38								
151			47.8							
152		26.75		0.20						
153			52.2							
154		22.75		2.18						
155				14.80						
156				20.47		0.06				
157				15.65						
158				24.82		0.10				
159					100					
160				21.86		2.34				
161						18.91				
162						25.51		0.14		
163						24.90				
164						28.18		1.60		
165							100			
166								33.50		
167								22.87		
168								26.98		0.13
169									100	
170								14.91		3.04
171										14.28
172										21.83
173										16.13
174										31.83
175										
176										12.76
Element										
Number	61	62	63	64	65	66	67	68	69	70
Symbol	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb

Table A-7, Elements 61-70

Appendix A-8

Element	Isotopes of Elements in %									
Number	71	72	73	74	75	76	77	78	79	80
Symbol	Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg
Name	Lutetium		Tantalum		Rhenium		Indium		Gold	
		Hafnium		Tungsten		Osmium		Platinum		Mercury
Mass										
174		0.162								
175	97.41									
176	2.59	5.206								
177		18.606								
178		27.297								
179		13.629								
180		35.100	0.012	0.12						
181			99.988							
182				26.50						
183				14.31						
184				30.64		0.02				
185					37.4					
186				28.43		1.59				
187					62.6	1.96				
188						13.24				
189						16.15				
190						26.26		0.014		
191							37.3			
192						40.78		0.782		
193							62.7			
194								32.967		
195								33.832		
196								25.242		0.15
197									100	
198								7.163		9.97
199										16.87
200										23.10
201										13.18
202										29.86
203										
204										6.87
Element										
Number	71	72	73	74	75	76	77	78	79	80
Symbol	Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg

Table A-8, Elements 71-80

Appendix A-9

Element	Isotopes of Elements in %									
Number	81	82	83	84	85	86	87	88	89	90
Symbol	Tl	Pb	Bi	Po	At	Rn	Fr	Ra	Ac	Th
Name	Thallium		Bismuth	Polonium		Radon	Francium		Actinium	
Mass		Lead						Radium		Thorium
203	29.524									
204		1.4								
205	70.476									
206		24.1								
207		22.1								
208		52.4								
209			100							
210		trace		trace						
211										
212										
213										
214										
215										
216										
217										
218										
219										
220										
221							trace			
222						trace				
223							trace	trace		
224								trace		
225									trace	
226								trace		
227									trace	
228								trace		trace
229										trace
230										trace
231										trace
232										100
233										
234										trace
Element										
Number	81	82	83	84	85	86	87	88	89	90
Symbol	Tl	Pb	Bi	Po	At	Rn	Fr	Ra	Ac	Th

Table A-9, Elements 81-90

Appendix A-10

Element	Isotopes of Elements in %									
Number	91	92	93	94	95	96	97	98	99	100
Symbol	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm
Name	Protactinium		Neptunium							
		Uranium		Plutonium						
Mass										
231	100									
232										
233	trace									
234	trace	0.0005								
235		0.7204								
236		trace								
237			trace							
238		99.2741								
239			trace	100						
240				trace						
241										
242				trace						
243										
244				trace						
Element										
Number	91	92	93	94	95	96	97	98	99	100
Symbol	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm

Table A-10, Elements 91-94

Appendix B

The nucleons in the outer shells of atoms are visible to the Universe and determine the type of element. Nucleons inside these outer shells fill up the space and prevent the collapse of the outer shell. Some shells are perfect with an appropriate number of inner nucleons like Cobalt, Arsenic, Yttrium and many others. For other elements the shells are less perfect and more pliable, resulting in various isotopes for that element. To find the number of nucleons in the outer shell and inside this shell for each element is a challenging puzzle.

Appendix B is an example of possible solutions. The purpose of this exercise is to involve your curiosity. The numbers are preliminary, your results may vary.

Appendix B-1

Element	Isotopes of Elements in %									
Number	1	2	3	4	5	6	7	8	9	10
Symbol	H	He	Li	Be	B	C	N	O	F	Ne
Name	Hydrogen		Lithium		Boron		Nitrogen		Flourine	
		Helium		Beryllium		Carbon		Oxygen		Neon
Nucleons										
Outer		4	6	8	10	12	14	16	18	19
Inner										
		0.0001		trace						
0		99.9999	7.5	trace	19.9	98.9	99.634	99.760	trace	
1			92.5	100	80.1	1.1	0.366	0.039	100	90.48
2						trace		0.201		0.27
3										9.25
4										
Element										
Number	1	2	3	4	5	6	7	8	9	10
Symbol	H	He	Li	Be	B	C	N	O	F	Ne

Table B-1, Elements 1-10

Lithium⁷ may have all 7 Nucleons in the outer shell. That would result in some differences between the chemical properties of the two isotopes.

Appendix B-2

Element	Isotopes of Elements in %									
Number	11	12	13	14	15	16	17	18	19	20
Symbol	Na	Mg	Al	Si	P	S	Cl	Ar	K	Ca
Name	Sodium		Aluminium		Phosphorus		Chlorine		Potassium	
		Magnesium		Silicon		Sulfur		Argon		Calcium
Nucleons										
Outer	21	22	23	24	27	28	31	34	35	36
Inner										
1	trace									
2	100	78.99						0.34		
3		10.00	trace							
4		11.01	100	92.23	100	95.02	75.77	0.06	93.26	96.941
5				4.67		0.75	trace	trace	0.01	trace
6				3.10		4.21	24.23	99.60	6.73	0.647
7										0.135
8				trace		0.02				2.086
9										
10										0.007
11										
12										0.187
Element										
Number	11	12	13	14	15	16	17	18	19	20
Symbol	Na	Mg	Al	Si	P	S	Cl	Ar	K	Ca

Table B-2, Elements 10-20

Appendix B-3

Element	Isotopes of Elements in %									
Number	21	22	23	24	25	26	27	28	29	30
Symbol	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn
Name	Scandium		Vanadium		Manganese		Cobalt		Copper	
		Titanium		Chromium		Iron		Nickel		Zinc
Nucleons										
Outer										
Inner	37	40	43	44	45	46	47	48	51	52
6		8.0		4.345						
7		7.3	0.25							
8	100	73.8	99.75	83.789	trace	5.80				
9		5.5		9.501						
10		5.4		2.365	100	91.72		68.077		
11						2.20		trace		
12						0.28	100	26.223	69.15	48.6
13								1.140		
14								3.364	30.85	27.9
15										4.1
16								0.926		18.8
17										0.6
Element										
Number	21	22	23	24	25	26	27	28	29	30
Symbol	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn

Table B-3, Elements 20-30

Appendix B-4

Element	Isotopes of Elements in %									
Number	31	32	33	34	35	36	37	38	39	40
Symbol	Ga	Ge	As	Se	Br	Kr	Rb	Sr	Y	Zr
Name	Gallium		Arsenic		Bromine		Rubidium		Yttrium	
		Germanium		Selenium		Krypton		Strontium		Zirconium
Nucleons										
Outer	55	56	57	60	61	62	63	64	65	68
Inner										
12	60.11									
13										
14	39.89	21.23		0.87						
15										
16		27.66		9.36		0.35				
17		7.73		7.63						
18		35.94	100	23.78	50.69	2.25				
19				trace		trace				
20		7.44		49.61	49.31	11.60		0.56		
21						11.50				
22				8.73		57.00	72.168	9.86		51.45
23								7.00		11.22
24						17.30	27.832	82.58	100	17.15
25										trace
26								trace		17.38
27										
28										2.80
Element										
Number	31	32	33	34	35	36	37	38	39	40
Symbol	Ga	Ge	As	Se	Br	Kr	Rb	Sr	Y	Zr

Table B-4, Elements 31-40

Appendix B-5

Element	Isotopes of Elements in %									
Number	41	42	43	44	45	46	47	48	49	50
Symbol	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	Tn	Sn
Name	Niobium		Technetium		Rhodium		Silver		Indium	
		Molybdenum		Ruthenium		Palladium		Cadmium		Tin
Nucleons										
Outer	69	70	72	74	75	76	77	78	79	82
Inner										
22		14.64		5.52						
23										
24	100	9.25		1.88						
25		15.92		12.70						
26		16.68		12.60		1.02				
27		9.55	trace	17.00						
28		24.13	100	31.60	100	11.14		1.25		
29						22.33				
30		9.63		18.70		27.33	51.839	0.89		0.97
31						trace				
32						26.46	48.161	12.49		0.66
33								12.80		0.34
34						11.72		24.13	4.3	14.54
35								12.22		7.68
36								28.73	95.7	24.22
37										8.59
38								7.49		32.58
39										
40										4.63
41										
42										5.79
43										
44										trace
Element										
Number	41	42	43	44	45	46	47	48	49	50
Symbol	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	Tn	Sn

Table B-5, Elements 41-50

Appendix A-6

Element	Isotopes of Elements in %									
Number	51	52	53	54	55	56	57	58	59	60
Symbol	Sb	Te	I	Xe	Cs	Ba	La	Ce	Pr	Nd
Name	Antimony		Iodine		Caesium		Lanthanium		Praseodymium	
		Tellurium		Xenon		Barium		Cerium	Neodymium	
Nucleons										
Outer	83	86	87	88	89	90	91	92	93	94
Inner										
34		0.09								
35										
36		2.55		0.10						
37		0.89								
38	57.36	4.74		0.09						
39		7.07								
40	42.64	18.84	100	1.91		0.11				
41				26.40						
42		31.74	trace	4.07		0.10				
43				21.20						
44		34.08		26.90	100	2.42		0.19		
45						6.59				
46				10.40	trace	7.85		0.25		
47						11.23	0.09			
48				8.86	trace	71.70	99.91	88.45	100	27.2
49										12.2
50								11.11		23.8
51										8.3
52										17.2
53										
54										5.7
55										
56										5.6
Element										
Number	51	52	53	54	55	56	57	58	59	60
Symbol	Sb	Te	I	Xe	Cs	Ba	La	Ce	Pr	Nd

Table B-6, Elements 51-60

Appendix B-7

Element	Isotopes of Elements in %									
Number	61	62	63	64	65	66	67	68	69	70
Symbol	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb
Name	Promethium	Europium		Terbium		Holmium		Thulium		
		Samarium		Gadolinium		Dysprosium		Erbium	Ytterbium	
Nucleons										
Outer	97	98	99	100	101	102	103	106	107	108
Inner										
46		3.07								
47										
48										
49		14.99								
50	trace	11.24								
51		13.82								
52		7.38	47.8	0.20						
53										
54		26.75	52.2	2.18		0.06				
55				14.80						
56		22.75		20.47		0.10		0.14		
57				15.65						
58				24.82	100	2.34		1.60		
59						18.91				
60				21.86		25.51		33.50		0.13
61						24.90		22.87		
62						28.18	100	26.98	100	3.04
63										14.28
64								14.91		21.83
65										16.13
66										31.83
67										
68										12.76
Element										
Number	61	62	63	64	65	66	67	68	69	70
Symbol	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb

Table B-7, Elements 61-70

Appendix B-8

Element	Isotopes of Elements in %									
Number	71	72	73	74	75	76	77	78	79	80
Symbol	Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg
Name	Lutetium		Tantulum		Rhenium		Indium		Gold	
		Hafnium		Tungsten		Osmium		Platinum		Mercury
Nucleons										
Outer	111	112	113	116	117	118	119	120	121	124
Inner										
62		0.162								
63										
64	97.41	5.206		0.12						
65	2.59	18.606								
66		27.297		26.50		0.02				
67		13.629	0.012	14.31						
68		35.100	99.988	30.64	37.4	1.59				
69						1.96				
70				28.43	62.6	13.24		0.014		
71						16.15				
72						26.26	37.3	0.782		0.15
73										
74						40.78	62.7	32.967		9.97
75								33.832		16.87
76								25.242	100	23.10
77										13.18
78								7.163		29.86
79										
80										6.87
Element										
Number	71	72	73	74	75	76	77	78	79	80
Symbol	Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg

Table B-8, Elements 71-80

Appendix B-9

Element	Isotopes of Elements in %									
Number	81	82	83	84	85	86	87	88	89	90
Symbol	Tl	Pb	Bi	Po	At	Rn	Fr	Ra	Ac	Th
Name	Thallium		Bismuth	Polonium		Radon	Francium		Actinium	
Nucleons	Lead		Polonium		Radon	Radium		Thorium		
Outer	125	126	127	128	130	132	133	134	135	136
Inner										
78	29.524	1.4								
79										
80	70.476	24.1								
81		22.1								
82		52.4	100	trace						
83										
84		trace								
85										
86										
87										
88							trace			
89								trace		
90						trace	trace	trace	trace	
91										
92								trace	trace	trace
93										trace
94								trace		trace
95										trace
96										100
97										
98										trace
Element										
Number	81	82	83	84	85	86	87	88	89	90
Symbol	Tl	Pb	Bi	Po	At	Rn	Fr	Ra	Ac	Th

Table B-9, Elements 81-90

Appendix B-10

Element	Isotopes of Elements in %									
Number	91	92	93	94	95	96	97	98	99	100
Symbol	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm
Name	Protactinium		Neptunium							
		Uranium		Plutonium						
Nucleons										
Outer	137	138	139	141						
Inner										
94	100									
95										
96	trace	0.0005								
97	trace	0.7204								
98		trace	trace	100						
99				trace						
100		99.2741	trace							
101				trace						
102										
103				trace						
Element										
Number	91	92	93	94	95	96	97	98	99	100
Symbol	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm

Table B-10, Elements 91-94

Appendix C

The Electric Charge

The mentioning of electric charge conjures up images of lighting bolts and thunder. Lightning strikes can scorch trees and start fires. Dozens of people are killed every year by charges accumulated in the sky. Benjamin Franklin experienced the electric charge with his kite. In Biblical times static electricity collected from desert winds protected the Golden Cow from intruders. In science fiction movies giant Van de Graf generators are used to create monsters. You can build your own static electricity generator to make your hair stand up. It is a favorite experiment in high school.

The theory of the electric charge is well developed and generally accepted. The problem is with Gravity. However I have realized that I must understand the real nature of the electric charge in the context of a kinetic universe before I can understand gravity. I must understand the true nature of attraction and repulsion by the electric charge without the use of electric fields. I know fields do not exist, but I also know that two Electrons repulse each other.

According to the Standard Model...

According to the Standard Model, The electric charge is a fundamental conserved property of certain subatomic particles that determines their electromagnetic interactions. Electrically charged particles are influenced by and create electromagnetic fields. The elementary unit of charge is carried by a single Proton and the equivalent negative charge is carried by a single Electron.

I say, the gods were very diligent or very lucky creating perfect symmetry of negative and positive charges in very dissimilar subatomic particles. In addition they created an equal number of positive and negative charges to make the Universe electrically neutral.

The Standard Model tells the student that the electric charge is defined once and for all by its interaction with the electromagnetic field and the student does not need to worry about it any more. The electromagnetic field is also defined by its interaction with the electric charge. The definition of the electric charge by the Standard Model describes the interaction of two unknown entities but fails to

describe either one of them independently. This is circular reasoning; similar to $B=A-2$ because we already know that $A=B+2$. Let's move on to the next problem.

The Standard Model declares: The elementary unit of charge $e+$ is carried by a single proton and the equivalent negative charge $e-$ is carried by a single electron. In the Standard Model we also find that there are up-quarks with $(2/3)e+$ charge and there are down-quarks with $(1/3)e-$ charge. Two up quarks and a down quark add up to a charge of $1e+$ for a proton. One up quark and two down quarks combine to a charge of zero for a neutron. If quarks have $(2/3)e-$, $(1/3)e-$, $(1/3)e+$ and $(2/3)e+$ charges, maybe $(1/3)e+$ should be the elementary charge.

Confining protons in an atom requires gluons or the strong force. Confining $(2/3)e+$ charges within the proton must require super gluons or super strong force; the distances are much smaller. Positioning three distinct charges in a proton or in a neutron would form a tripole, though that may be possible.

Particle	Symbol	Charge	Mass	Mass per Unit Charge
Electron	$e-$	$e-$	511 keV	511 keV
Positron	$e+$	$e+$	511 keV	511 keV
Up quark	u	$(2/3)e+$	~ 3000 keV	4500 keV
Up antiquark	\bar{u}	$(2/3)e-$	~ 3000 keV	4500 keV
Down quark	d	$(1/3)e-$	~ 6000 keV	18000 keV
Down antiquark	\bar{d}	$(1/3)e+$	~ 6000 keV	18000 keV

Table C-1, Charge and Mass from the Standard Model

The charge-to-mass ratios of various subatomic particles are very dissimilar. Charge and mass numbers are listed in Table C-1. If we could cut an electron into three pieces with a very sharp knife, we could use two of the pieces for an up-antiquark and use one piece for a down-quark. The newly created up-antiquark and down-quark wouldn't have nearly enough mass to be a real up antiquark and down quark. That may mean that the electric charge is not an inherent property of the matter of the electron or the quark. Maybe the charge is somehow painted on or mixed in like colored plaster or confined inside like a cherry seed? Would any of these solutions work? Could we fabricate these elementary charged particles in mass to fill up the Galaxies? Or we could just toss the problem over the wall to the production department.

Appendix D

Notes on Prevailing Theories

There are hundreds of books and tutorials available for Field Theory, Relativity Theories, Quantum Theory and Standard Models, and the reader will not be annoyed with another rehash of them in this paper. The reader may want to skip this section altogether since we only want to present a few questions and doubts.

An interesting footnote was seen on a Dark Matter tutorial page: “In Popular Culture dark matter is usually attributed extraordinary physical or magical properties.” Hmm, this is very interesting! Visible Matter has also been attributed extraordinary magical properties of Field Forces by scientists for over a century. Empty Space has also been attributed extraordinary magical properties by scientists for a century. Empty Space is able to combine with Time to form Space-Time and this combination is able to stretch and curve and expand faster than the speed of light under the magical spell of a mass. Magic is everywhere.

Field Theory

Field Theory proposes that masses interact with other masses and electric charges interact with other electric charges at a distance with the help of force fields. A mass creates a gravitational field and is influenced by gravitational fields created by other masses. An electric charge creates an electromagnetic field and is influenced by electromagnetic fields created by other charges. The friends of the atom invented the most bizarre field to save the atom from being blown apart. It is the Nuclear Force or Strong Force Field that holds the Protons of the atom together. Recently this Strong Force Field was quietly replaced with newly minted Gluon mediators. The Weak Force Field is less known.

According to the Astronomical Standard Model, Protons and Electrons acquired their fields shortly after the Big-Bang event.

What is a field? A magician would declare that a field is a transparent, massless, tasteless, odorless, invisible non-substance that is created in empty space by a distant mass or a distant electric charge. You can't see it, you can't touch it, but this field has magical powers of pulling other real objects or pushing and pulling other electric charges. It's magic, but magicians do it with trickery. Extensive research to

discover what substance is used to create a field by a mass or a charge in supposedly empty space was fruitless. Fields don't exist in the Kinetic Universe.

The Standard Model

Maybe Field Theory was getting stale and it couldn't explain the strange results coming out of new and more powerful particle accelerators and colliders. Instead of investigating the cause of the strange results, a new set of particles and interactions were invented. Quantum mechanics combined with Field Theory blossomed into the new Standard Model. Evolving complexities justified larger amounts of research monies that provided additional opportunities to increase the complexities. By the early 1970's the Standard Model was refined and polished to be the new standard of particle physics.

The Standard Model is defined as Quantum Field Theory consistent with quantum mechanics and special relativity. Protons and Neutrons are constructed from inseparable, confined Quarks with interesting names. Mediators are introduced to provide for force and momentum transfer with the help of fields. One major feature of the Standard Model is symmetry. Each particle has its anti-particle. Each electric charge has its electric anti-charge.

The Standard Model has too many particles, too many mediators, too many field forces and it is too complex to be useful for this project. The building blocks of our Kinetic Universe are simple. Symmetry around zero for real objects is not a useful concept. We may be conditioned to accept positive and negative charges; how do you visualize negative mass? The Standard Model is not applicable to the Kinetic Universe.

Relativity Theory

Aether or Aether not, was the question since the time of the Greek Giants. Scientists of the Nineteenth Century could not determine if light was a wave function in Aether per Maxwell's equations or if light consisted of tiny corpuscles moving through empty space. Discovery of light polarization sided with Maxwell's equations. The negative results of the Michelson-Morley experiments to detect solid Aether were unexpected and disappointing.

In 1905 light was declared a magical energy function propagating through empty space with the speed of light that is a Universal Constant. To make things work in

all moving frames the Lorentz transform equations were assembled into a Special Theory of Relativity. Nothing could travel faster than light and light always traveled with velocity c . Clocks and measuring rods were adjusted with the help of transform equations. Very soon the apparent length changes of objects became real length changes. The believers did not understand that speeding objects did not change; only our view of them may have changed. Aether was tossed onto the trash heap.

Fifteen years later the General Theory of Relativity combined empty space with time and used mass to curve the resulting Space-Time to cause gravity. Smoke and mirrors were utilized to describe this curved Space-Time since there are no perceivable relationships between mass, space and time. An undefined Aether was quietly resurrected. Now you see it, now you don't.

This is a good spot to end the discussion about Relativity since nothing meaningful can result from continuing it. A better definition of Aether and light would have made the subject of Relativity rather simple. In any case Relativity in its present form is not applicable to the Kinetic Universe.

In the Beginning...

Once upon a time there was nothing, supposedly. Then, according to Hawking, Ellis and Penrose in papers published in 1968 and 1970, a singularity appeared in this nothing. Space and time began in this singularity and now we are here in this space that was created inside this singularity that appeared in nothing. Prior to the singularity nothing existed; not space, not time, not matter, not energy – nothing. Can a singularity appear in nothing or did it appear in space containing nothing? This singularity was the size of an atom at 10^{94} g/cm³ density and at 10^{99} K° temperature.

3. Steven W. Hawking, George F.R. Ellis, "The Cosmic Black-Body Radiation and the Existence of Singularities in our Universe," *Astrophysical Journal*, 152, (1968) pp. 25-36.
4. Steven W. Hawking, Roger Penrose, "The Singularities of Gravitational Collapse and Cosmology," *Proceedings of the Royal Society of London*, series A, 314 (1970) pp. 529-548.

According to...

According to the Astronomical Standard Model it all started 13.5 billion years ago. There was no time and there was no space. There was no matter and there was no energy. There was nothing. Then vacuum fluctuated and a singularity appeared. It was the size of an atom at 10^{94} g/cm³ density and at 10^{99} K° temperature. The tiny ball expanded and cooled and expanded some more. Out of the chaos Protons emerged and acquired the four major force fields: gravitational fields, strong force fields, weak force fields and electric force fields. The ball cooled some more, expanded some more. Matter prevailed over anti-matter and forces prevailed over anti-forces. Protons captured electrons to form atoms. Atoms formed clouds. Clouds formed stars. Stars formed galaxies and black holes. Here we are 13.5 billion years later trying to figure out what happened and how it happened. Oh, did I mention the magical period of Inflation?

Well now! We know that nothing could have happened that way. We know that temperature is an indication of the kinetic energy of particles. There isn't enough room in the size of an atom for all that mass to speed around to represent that immense amount of energy. We also know that visible matter is a tiny part of the total mass of this Universe. Aether is the main player. It would be rather difficult to squeeze all that Aether matter into the size of an atom. We also know that there are no fields. Gravitational fields, strong force fields, weak force fields and electric force fields do not exist. We also know that electrons do not orbit protons; without the pull of electric fields they couldn't stay in orbit.

There are other problems with this scenario. According to the presently accepted Model the visible region of the Universe is estimated to have a radius of 46 billion light years. At the age of 13.5 billion years this would violate the rules of relativity, but there is a back door solution to this dilemma. According to the rules of curved space-time, Space can expand faster than the speed of light under the magical spell of mass. This is quite a stretch, literally. What is the speed of light in this expanding space and how could we measure it?

Lately there is talk of dark matter accelerating the expansion of the Universe. If one part of the Universe contains dark matter than all parts of the Universe must contain dark matter since everything came from that singularity. Dark matter must have mass and dark matter has energy to accelerate the expansion. This dark matter must be stretching with space faster than the speed of light. In any case we couldn't see anything from 46 billion light years away; that must be an inferred number.

Here on Earth we see light from the boundary of the Universe as it was sent our way maybe 6-12 billion years ago. That same boundary could be at 46 billion light years away today, but that is not what we see. We have no idea how the boundary of our Universe looks today. It may be colliding with another Universe of the Multiverse but we will have to wait another 30-40 billion years to find out about it. Information travels at light speed.

What Now?

In light of the Dark Matter, the Astronomical Standard Model and Relativity Theories should be revised. If dark matter is everywhere there is a possibility that dark matter is needed to propagate light and other energies. If dark matter is all around us, can you prove that light can travel in empty space? Can you prove that the speed of light is not referenced to this dark matter?

Gravity

Gravity is the mother of all natural phenomena. Gravity rules the Universe. Gravity will pull us back into the Big Crunch in a few billion years. Gravity is the result of curved space-time. The list goes on. Scientists have proposed many theories to solve the riddle of Gravity, none very satisfying. We know there are attractive forces between masses. Many years ago Newton presented his Theory of Universal Gravitation. The equations are known, but the theories lack working details. Attractive force at a distance defies simple explanation. The introduction of bogus Gravitons didn't help.

I have news for you. Gravity does not rule the Universe. Gravity may hold together our Earth, Gravity may hold together the Solar system and Gravity may hold together the few hundred billion stars in our Milky Way Galaxy, but Gravity does not hold together the Universe. Our Universe is ever expanding and falling apart at the fringes due to the recently hypothesized dark matter or dark energy. It is official now: Dark mass or dark energy is stronger than Gravity and it is ripping us apart. Dark Matter rules the Universe. We can relax. There won't be a big crunch. We won't be crushed; we will just fade into the void. Now we have to discover what this mysterious dark matter is.

Black Holes

The concept of Black Holes was made possible by the limitless equations in the General Theory of Relativity. Similar numbers can be obtained using Newton's equations. This section is to highlight the absurd numbers contemplated by the idea of black holes.

According to definition the gravitational pull of a Black Hole will not let light or anything else escape. For this section suppose light has mass and behaves like mass.

Consider a small mass m traveling from infinity towards the Sun, and the Sun's mass is concentrated at its center. The small mass m accelerates towards the Sun and at the critical radius will travel with velocity $v = c$.

$$\text{Gravitational Energy} \quad E = \frac{G \times M \times m}{R} = \frac{m \times c^2}{2} \quad m \ll \ll M$$

$$\text{Critical Radius} \quad R_C = \frac{2 \times G \times M}{c^2} = \frac{M}{6.75 \times 10^{26}}$$

From the energy equation above, gravitational energy from infinity to radius R_C equals the gravitational energy from radius R_C to radius $R_C / 2$.

$$E = \frac{G \times M \times m}{R} = \frac{G \times M \times m}{R/2} - \frac{G \times M \times m}{R}$$

Light ray originating at radius R_C will escape to infinity.

Light ray originating at radius $R_C / 2$ will travel to radius R_C and fall back.

In this case $R_C = R_E = \text{Event Horizon}$

To create a black hole, the radius of mass M must be smaller than the critical radius. General solution for the radius of the Event Horizon of mass M of radius R_M

$$\text{The radius of event horizon} \quad R_E = \frac{R_C \times R_M}{R_C - R_M} \quad \text{where} \quad 0 < R_M < R_C$$

$$\text{Critical Radius} \quad R_C = \frac{M}{6.75 \times 10^{26}}$$

Specific numbers for a concentrated black hole Sun:

Critical Radius:
$$R_C = \frac{2 \times 10^{30}}{6.75 \times 10^{26}} = 3 \times 10^3 \text{ m}$$

If radius of mass M is
$$R_M = \frac{R_C}{2} = 1.5 \times 10^3 \text{ m}$$

The event horizon is
$$R_E = R_C = 3 \times 10^3 \text{ m}$$

The value of g at $R_E = R_C = 3 \times 10^3 \text{ m}$ for a concentrated Sun with mass M and radius of $R_M = 1.5 \times 10^3 \text{ m}$

$$g = \frac{G \times M}{R_C^2} = \frac{6.67 \times 10^{-11} \times 2 \times 10^{30}}{9 \times 10^9} = 1.5 \times 10^{10} \text{ m/s}^2$$

The density of Sun with radius of $R_M = 1.5 \times 10^3$ is

$$\text{density} = \frac{M}{4.189 \times R_M^3} = \frac{2 \times 10^{30}}{4.189 \times 1.5^3 \times 10^9} = 1.415 \times 10^{20} \text{ kg/m}^3$$

I am not able to visualize density of $1.415 \times 10^{20} \text{ kg/m}^3$

The density of a Neutron star is estimated to be 3.7×10^{17} to $5.9 \times 10^{17} \text{ kg/m}^3$.

I am not able to visualize density of a Neutron star either.

Appendix E

Volume Middle of Cell	Density at Middle of Cell	Kinetic Energy Accumulated to Middle of Cell	Actual Pressure at Middle of Cell	Adjusted Work in this Cell	PV Product up to this Cell
V	D=1/V	KE=KE+W	P=KE/2xV	W=0.01xP	PV
1.000	1.0000000000	2.0000000000		0.0050251256	1.0000000000
0.995	1.0050251256	2.0050251256	1.0075503144	0.0100755031	1.0025125628
0.985	1.0152284264	2.0151006288	1.0228937202	0.0102289372	1.0075503144
0.975	1.0256410256	2.0253295660	1.0386305467	0.0103863055	1.0126647830
0.965	1.0362694301	2.0357158714	1.0547750629	0.0105477506	1.0178579357
0.955	1.0471204188	2.0462636221	1.0713422105	0.0107134221	1.0231318110
0.945	1.0582010582	2.0569770442	1.0883476424	0.0108834764	1.0284885221
0.935	1.0695187166	2.0678605206	1.1058077650	0.0110580777	1.0339302603
0.925	1.0810810811	2.0789185982	1.1237397828	0.0112373978	1.0394592991
0.915	1.0928961749	2.0901559961	1.1421617465	0.0114216175	1.0450779980
0.905	1.1049723757	2.1015776135	1.1610926042	0.0116109260	1.0507888068
0.895	1.1173184358	2.1131885396	1.1805522568	0.0118055226	1.0565942698
0.605	1.6528925620	2.5651208448	2.1199345824	0.0211993458	1.2825604224
0.595	1.6806722689	2.5863201906	2.1733783114	0.0217337831	1.2931600953
0.585	1.7094017094	2.6080539737	2.2291059604	0.0222910596	1.3040269869
0.575	1.7391304348	2.6303450333	2.2872565507	0.0228725655	1.3151725167
0.565	1.7699115044	2.6532175988	2.3479801759	0.0234798018	1.3266087994
0.555	1.8018018018	2.6766974006	2.4114390996	0.0241143910	1.3383487003
0.545	1.8348623853	2.7008117916	2.4778089831	0.0247780898	1.3504058958
0.535	1.8691588785	2.7255898814	2.5472802630	0.0254728026	1.3627949407
0.525	1.9047619048	2.7510626840	2.6200596991	0.0262005970	1.3755313420
0.515	1.9417475728	2.7772632810	2.6963721175	0.0269637212	1.3886316405
0.505	1.9801980198	2.8042270022	2.7764623784	0.0277646238	1.4021135011
0.205	4.8780487805	4.3547998133	10.6214629592	0.1062146296	2.1773999066
0.195	5.1282051282	4.4610144429	11.4384985715	0.1143849857	2.2305072214
0.185	5.4054054054	4.5753994286	12.3659444016	0.1236594440	2.2876997143
0.175	5.7142857143	4.6990588726	13.4258824932	0.1342588249	2.3495294363
0.165	6.0606060606	4.8333176975	14.6464172653	0.1464641727	2.4166588488
0.155	6.4516129032	4.9797818702	16.0638124845	0.1606381248	2.4898909351
0.145	6.8965517241	5.1404199950	17.7255861898	0.1772558619	2.5702099975
0.135	7.4074074074	5.3176758569	19.6950957664	0.1969509577	2.6588379285
0.125	8.0000000000	5.5146268146	22.0585072584	0.2205850726	2.7573134073
0.115	8.6956521739	5.7352118872	24.9357038573	0.2493570386	2.8676059436
0.105	9.5238095238	5.9845689258	28.4979472655	0.1424897363	2.9922844629
0.100	10.0000000000	6.1270586621	30.6352933104		3.0635293310

Table E-1, Numerical Solution for Adiabatic Compression, 10:1
Only 12+11+12 of 101 steps are shown