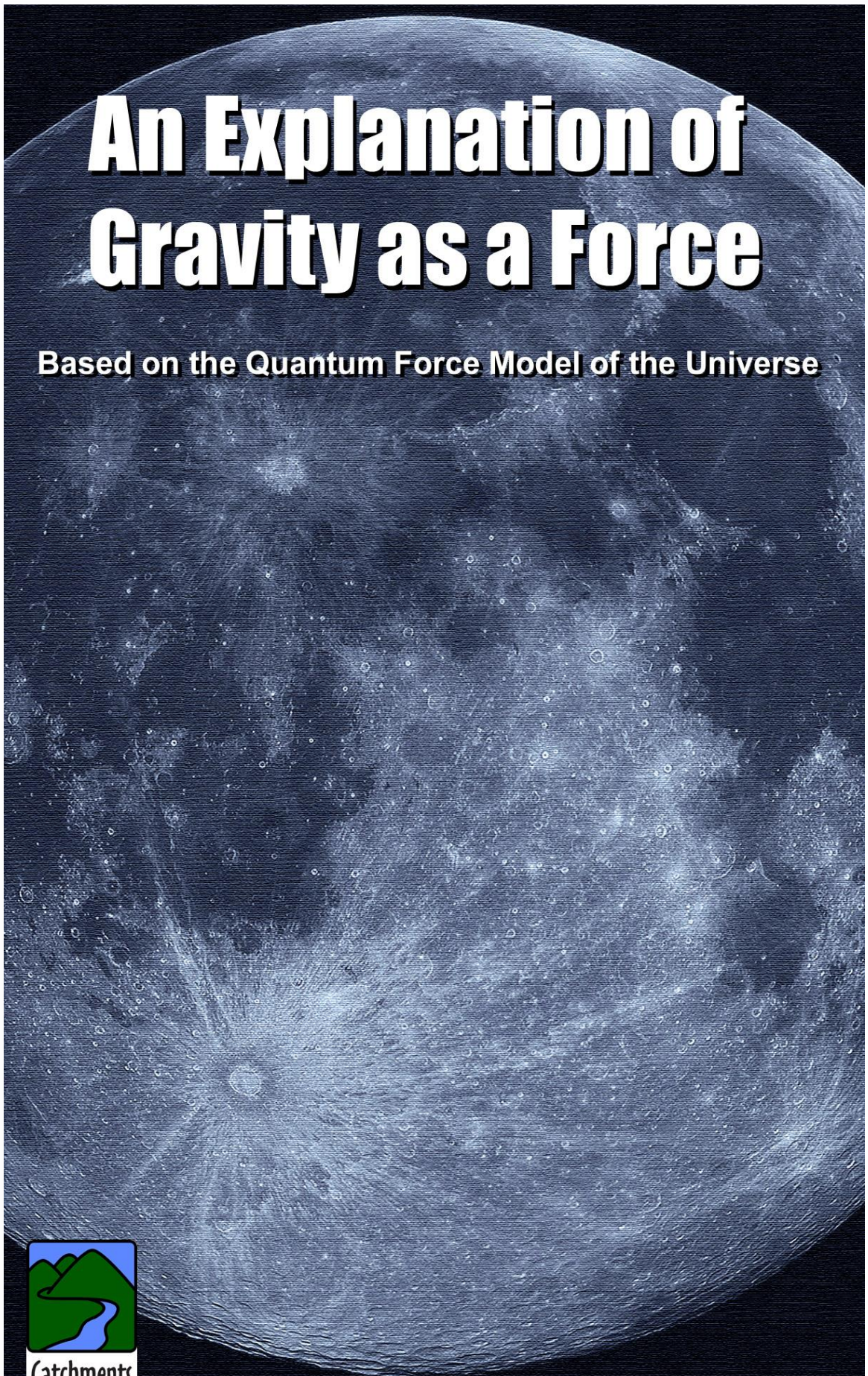
An Explanation of Gravity as a Force

Based on the Quantum Force Model of the Universe



Catchments & Creeks

Version 2, 2025

An Explanation of Gravity as a Force

Based on the Quantum Force Model of the Universe

Version 2, August 2025

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Cover: Earth's pet rock in a blue mood.

About the author

Grant Witheridge is a retired civil engineer with both Bachelor and Masters degrees from the University of New South Wales. He has over 40 years experience in the fields of hydraulics, stormwater management, creek engineering, and as a lecturer in coastal engineering.

Grant brings to this discussion an understanding of fluid mechanics, and his belief that:

- the mechanics of the Universe must be founded on basic (non-magical) physics
- all forces originate from quantum forces, which are the building blocks of aether (space)
- mystery and complexity exist only in the absence of knowledge.

Introduction

As a person that has always searched for rational explanations, I have lived for many years with the desire to discover a more rational explanation of gravity, and the forces involved in the generation of ocean tides. As a past lecturer in coastal engineering, I struggled with the idea that I was teaching my students that ocean tides were caused by the gravitational 'pull' of the Moon. This idea suggests that the Moon's gravity is actually pulling on water particles within our oceans. I knew this explanation wasn't logical, if not outright 'silly', but I had no other explanation that I could give my students at the time (sad!).

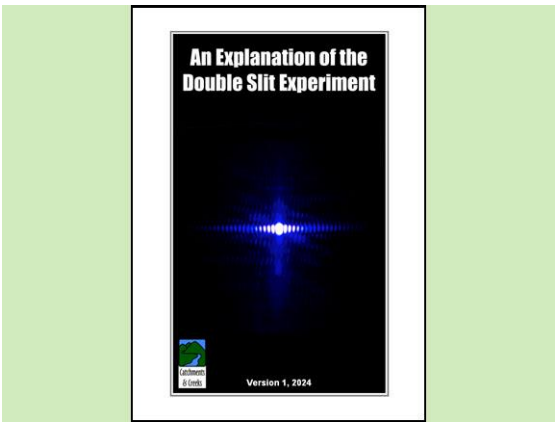
That mental conflict began my 30 year quest to look for a more rational explanation of gravity and ocean tides. I am not an astrophysicist. I am a retired civil engineer that one day stumbled into a darkened room, and then spent the next 30 years searching for the light switch. The act of retirement just gave me more time to dedicate myself to the mental gymnastics of astrophysics.

I started my research by investigating if my knowledge of fluid mechanics and ocean waves could be used to explain the mechanics of space. I initially focused on how potential energy is able to store and release energy when an object is lifted into the air. However, the most difficult task proved to be finding what causes inertia and momentum. My awakening came when I reminded myself that every action within the universe resulted from the application of a force. The idea of a 'universal force' then seemed more important than the idea of 'universal energy'. I named this possible force, a quantum force.

I then realised that Einstein, and many others, had confused some aspects of wave mechanics. Past researchers had confused the properties of energy waves with the properties of particle waves, and the properties of transverse waves with longitudinal waves. The lesson being: just because one type of wave has an observed property, does not mean all waves have that property. Einstein may have been a brilliant mathematician and physicist, but he lack adequate knowledge of wave mechanics.

This realisation lead me to a better understanding of the make-up of light and how light moves, which lead me to a better understanding of the speed of causality, which lead me to a better understanding of time, which finally lead me to a better understanding of gravity. And now that I have found the 'light switch', I would like to bring my readers into the light.

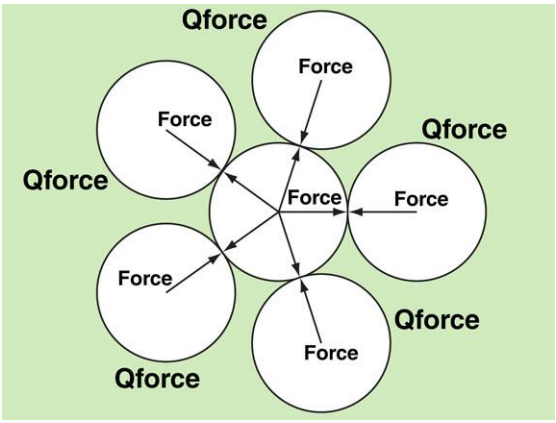
Introduction



Double Slit Experiment, Version 1

Introduction

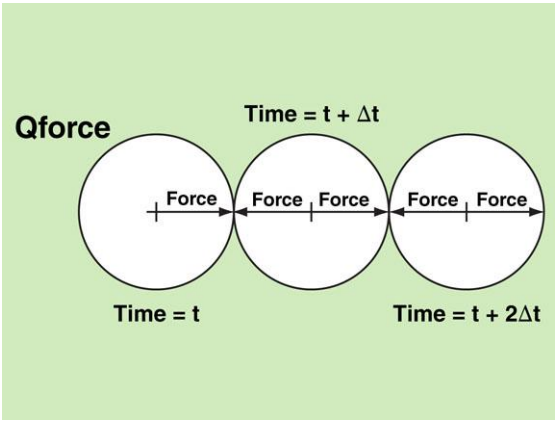
- The quantum force model of the universe was introduced in *'An Explanation of the Double Slit Experiment'* (V1, 2024).
- In this publication I stated that quantum forces generate all four of the fundamental forces:
  - gravity (the focus of this document)
  - electromagnetism
  - weak interaction
  - strong interaction.



Quantum forces

A quantum force

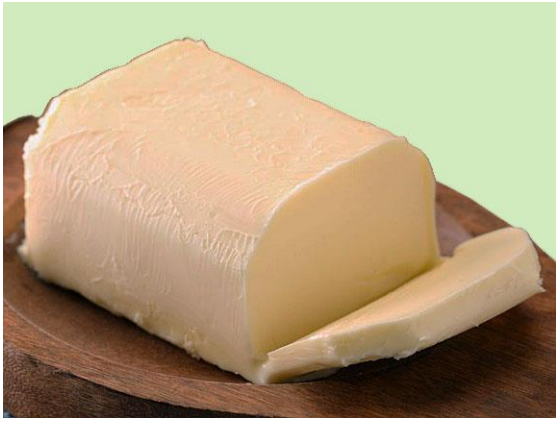
- The quantum force model of the universe is based on the idea that:
  - the Big Bang (or big expansion), was created by the expansion of highly concentrated quantum forces
  - being a 'force', a quantum force has no physical dimensions
  - space consists of a continuum of independent quantum forces, which has in the past been known as aether.



Reaction time

Time and the speed of causality

- The forces exerted by a quantum force are not instantaneous.
- These forces have a response time.
- This response time not only governs the rate of response of a quantum force to a change in the surrounding forces, but also the rate that an energy message can pass through a field of quantum forces (i.e. the speed of causality).

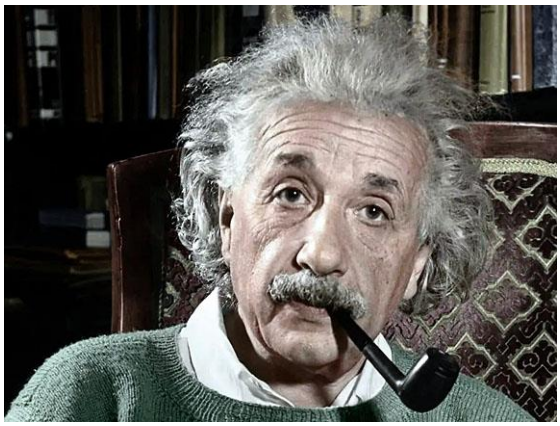


Butter

Time, temperature and aging

- The response time of quantum forces is governed by, or at least influenced by, density, temperature and velocity.
- Temperature and velocity, at a quantum force level, are two sides of the same coin.
- I believe Albert Einstein was correct when he stated that time is affected by velocity, but indirectly, this suggests that the speed of causality is affected by temperature.
- Thus, lowering the temperature of butter will slow its rate of aging.

Einstein's theory of relativity



Albert Einstein (~1947)

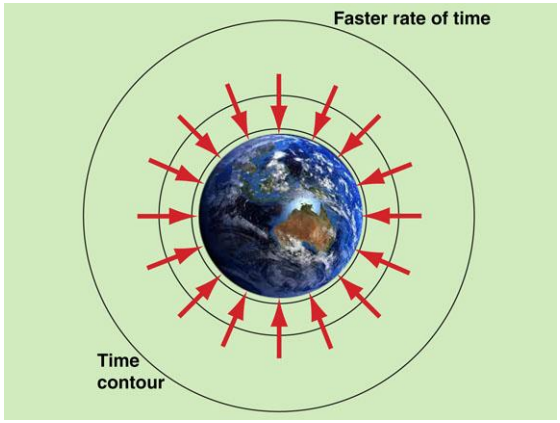
Introduction

- Einstein published his paper on special relativity in 1905.
- He subsequently published his paper on general relativity in 1915.
- Both of these papers centred around the idea that spacetime acts as the fourth dimension.
- Einstein's belief was that the properties of space cannot be separated from the properties of time, but I would suggest that it is the speed of causality that is the key, not time.

Space

Space and time

- What I am proposing in this paper is that space consists of a field of ever-expanding quantum forces, without the existence of vacuous zones.
- These quantum forces react to a changing force at the speed of causality, suggesting that the speed of causality, and therefore clock time exists as an property of the ever-expanding quantum forces.
- Thus, time is linked to the 'speed of causality' rather than to 'space'.



Variations in time near Earth

Variations in time near Earth

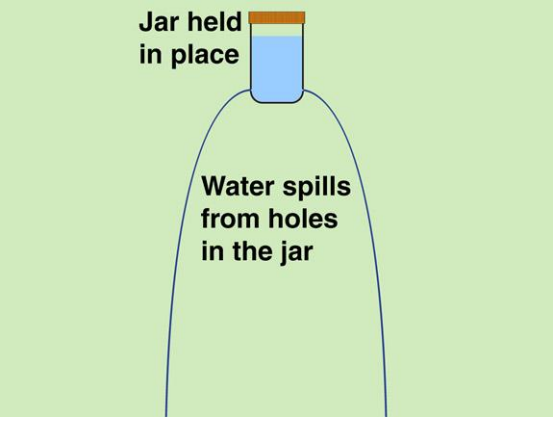
- A study of quantum forces indicates that the speed of causality is affected by two actions:
  - the velocity of a force message travelling across the region of influence of a quantum force
  - a time delay in crossing between each region of influence.
- Therefore, the speed of causality would vary with time and the density of quantum forces.

Einstein's falling man

Einstein's falling man theory

- Let us now consider Einstein's thought experiment about a falling man.
- Such a person is said (by Einstein) to be weightless because they feel weightless.
- In a car we feel the force of acceleration because the force is applied to the outside of our body.
- However, gravity is an internal force, which is applied equally to every atom in your body; consequently, a falling man would never feel the force of gravity.

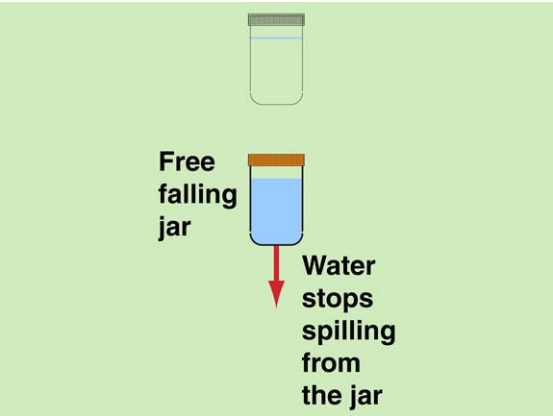
Falling water bottle experiment



Water bottle held still

Classroom experiment

- Now let us consider the physics experiment involving a leaky jar, which is filled with water, and then held in the air.
- When the jar is held still, water spills from the holes in the base of the jar; as would be expected.
- Oh, and the lid is loose, thus allowing air to enter the jar.



Water bottle in free fall

Reported physics

- If the jar is released into free fall, water stops spilling from the jar.
- It has been suggested (by some) that this experiment proves that the water is now weightless, and no longer feeling the effects of gravity.

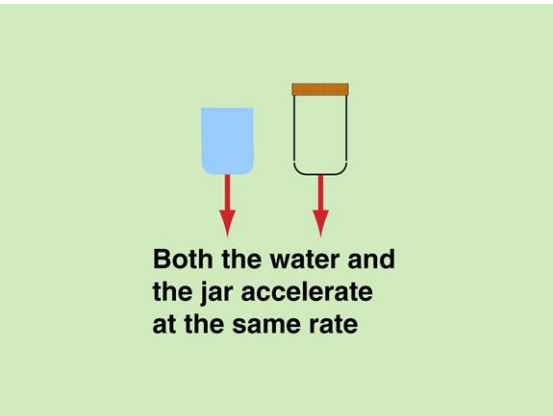
But is that true?

- **I thought that all things accelerated at the same rate (ignoring the effects of friction).**

Separation of bottle and water

Alternative experiment

- Let us repeat the experiment, but this time we will separate the water and the jar, and we will use a touch of magic to hold the unconfined water stationary.
- If we let both the water and jar go at the same time, then both the water and the jar will accelerate at the rate of 9.8 m/s/s.
- This means the water will stay level with the jar—which is the real reason why water stops spilling from the jar while in free fall.



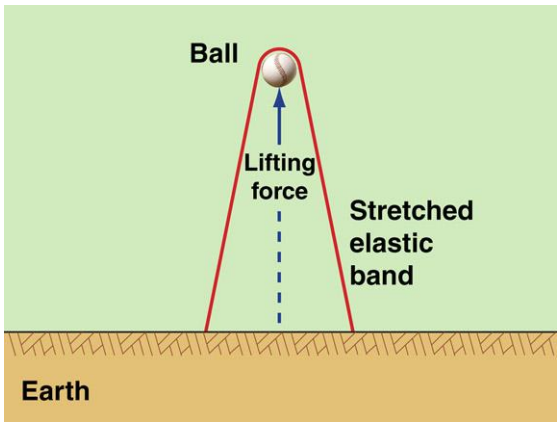
Falling bottle and water

Experiment outcomes

- In free fall, water stops spilling out of the jar not because it is weightless, but because if it were to continue to spill from the jar, the water surface within the jar would need to be accelerate faster than 9.8 m/s/s as the jar continued to empty.
- Therefore, this experiment does not prove that objects are weightless while in free fall.

Oops! Looks like gravity is a force after all.

The missing potential energy

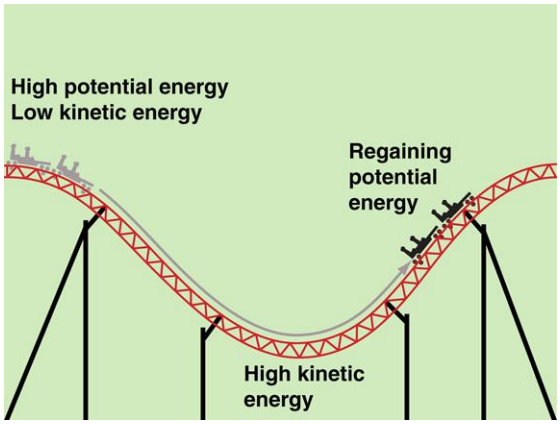


Lifting a ball

Introduction

- If an object of mass is lifted from the surface of Earth to a higher elevation, it is said to have gained potential energy in the form of 'height'.
- But where is this potential energy actually being stored?

The elastic band in the diagram represents the force of gravity on the ball.

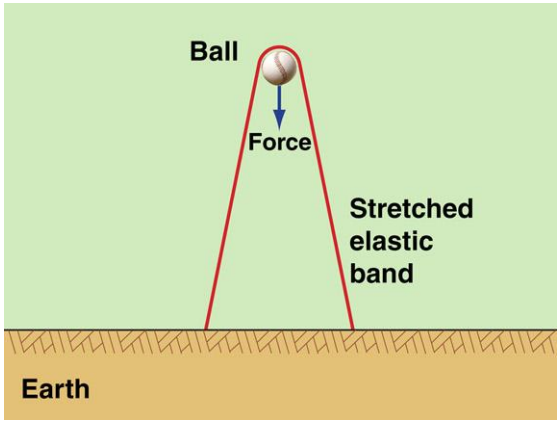


Roller-coaster

Potential and kinetic energy

- A roller-coaster is said to convert potential energy to kinetic energy and back again several times as it travels.
- It has been suggested (by some) that this potential energy is stored as:
  - height
  - additional stretching of spacetime, or
  - additional mass within the roller-coaster.

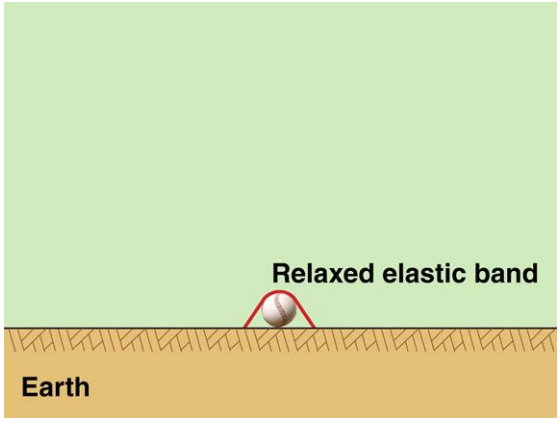
But is this true?



Pushing force applied to the ball

'Height' isn't a form of energy

- 'Height', unfortunately, is not a form of energy, it is only a measure of the potential work that this energy can perform.
- Einstein suggested that the potential energy is stored within the additional 'stretching' of spacetime.
- This means that if an object is released from a height, it is spacetime that injects energy back into the system, similar to the relaxing of a stretched elastic band.

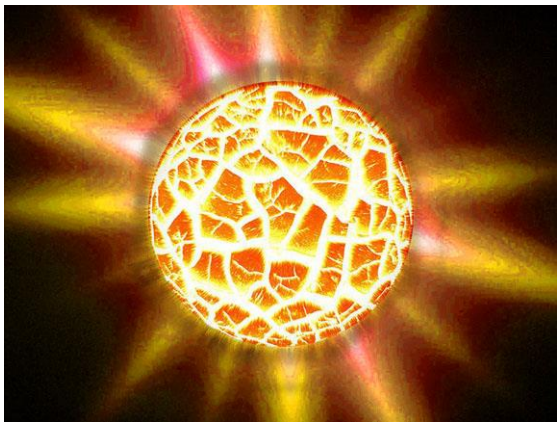


Ball returned to the Earth's surface

The storage of potential energy

- The potential energy that is gained by lifting a ball against the force of gravity is stored as additional 'gravity'.
- But the action is not like an elastic band.
- As the ball is lifted higher and higher, the force on the ball reduces—it does not increase as would occur for an elastic band.
- The potential energy is actually stored as the potential for quantum forces to do more work, i.e. by pushing the ball back down to the Earth's surface.

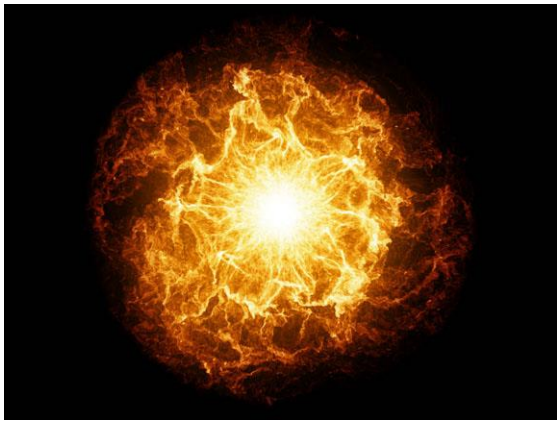
The Big Bang



The Big Bang

The Big Bang

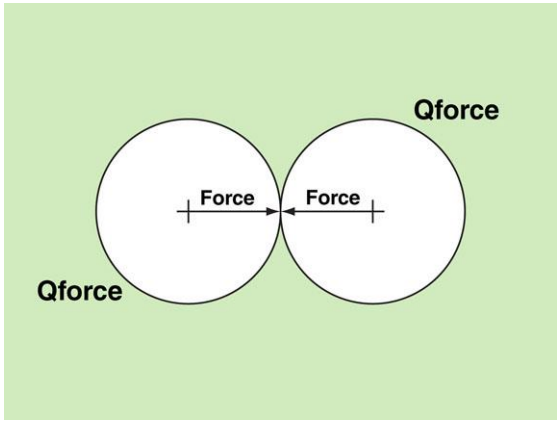
- In order to understand gravity, we need to go back to the beginning of gravity, the Big Bang.
- The Big Bang was not an explosion in the same manner as a dynamite explosion.
- The Big Bang did not start with a bang that caused things to be thrown into space.
- There was no bang, no noise, just a silent but rapid expansion, which we call the Big Bang, and which is an event that continues to this day—it never stopped!



The big expansion

The big expansion

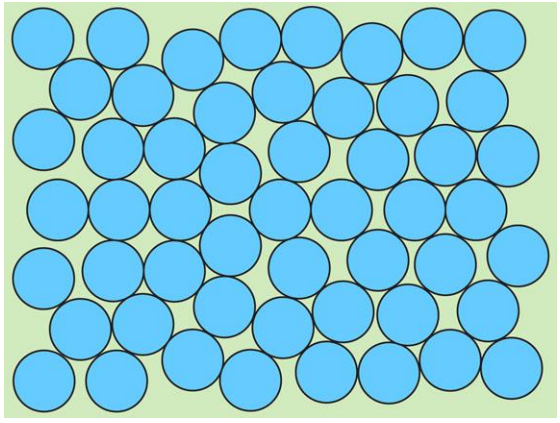
- If we accept that prior to the Big Bang, the universe consisted of a highly compressed substance, which we can call 'aether':
  - and, if we accept that aether consists of something that can produce a force; and
  - if we accept that the smallest of all forces, is a quantum force; then
  - the expansion of the universe involved the expansion of quantum forces.



Quantum forces

Region of influence

- Quantum forces have just one task (one action), that being to push away from other quantum forces.
- Even though a 'force' has no dimensions, it is associated with a region of influence within which that force can be applied.
- While expansion occurs, the region of influence of these quantum forces must stay in 'contact' with each other, because that is the only way they can deliver their repelling force.



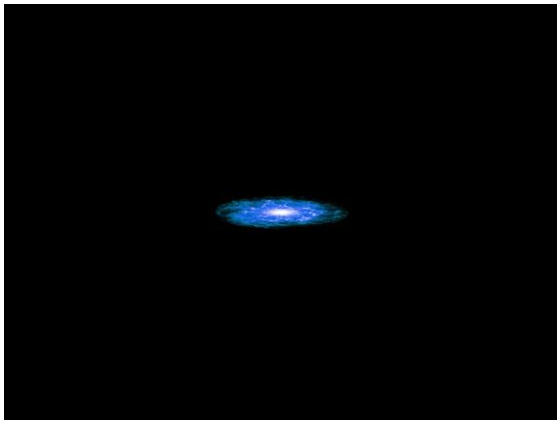
Aether as a field of quantum forces

Aether

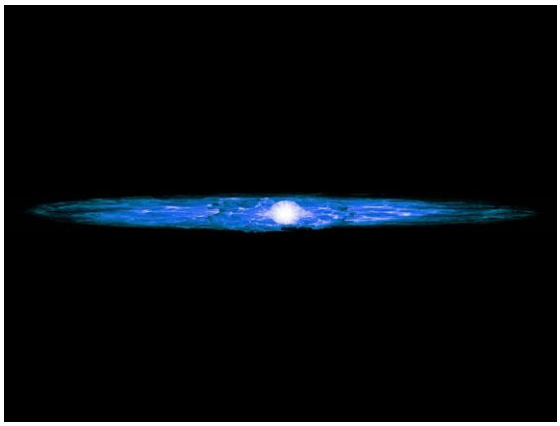
- So, aether consists of a continuum of every-expanding quantum forces.
- This means that free quantum forces exert a near-uniform force, which is applied over an expanding area.
- This means that aether can be looked upon as a fluid-like substance that behaves like a gas under pressure; however, the forces act in a manner that has a critical difference from that of gas pressure.

Expansion of a singularity

Singularity



Initial expansion



Expansion in two dimensions

Expansion in three dimensions

Introduction

- One of the many outstanding questions in astrophysics is: *Why did the universe expand primarily along a two-dimensional plane, rather than expanding equally in all three dimensions?*
- In order to answer this question, or actually, in order to propose an answer to this question, it is necessary to think very carefully about what a singularity formation actually means.

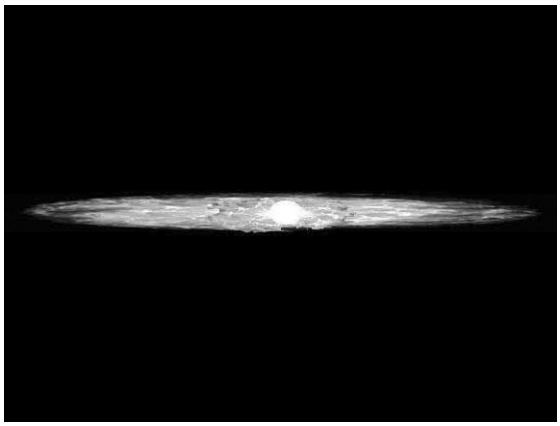
Singularity: A difficult concept!

- I imagine that it is difficult for people to picture the internal stacking of an almost infinite amount of quantum forces into a singularity.
- It is difficult to think of an expansion of quantum forces that would not spread equally in all three dimensions, but that is because we humans would always imagine the Big Bang as being like an explosion, not an expansion.

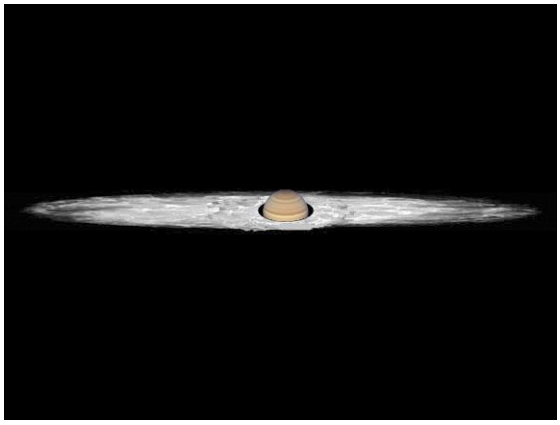
The expansion of a singularity

- When we think about a singularity it is very important that we do not think of the quantum forces being very tightly packed into a grid-like structure.
- There is no three-dimensional form within a singularity.
- The existence of a singularity means that all of the expanding quantum forces are, in effect, clones of each other.
- This means that in whatever manner one quantum force expanded occurred, all quantum forces will want to expand in exactly that same way (i.e. direction).
- Consequently, the expansion of the universe initially occurred across a two-dimensional plane, with the ‘depth’ of the plane being defined by the region of influence of a quantum force.
- The gradual expansion of this two-dimensional plane into a three-dimensional universe would have been caused by collisions, which were ultimately caused by the non-uniformity of the universe.
- Non-uniformity occurred because force messages arrived at different locations at different times.
- A non-uniform universe results in chaos, which results in collisions, which results in the expansion of the universe in the third dimension.

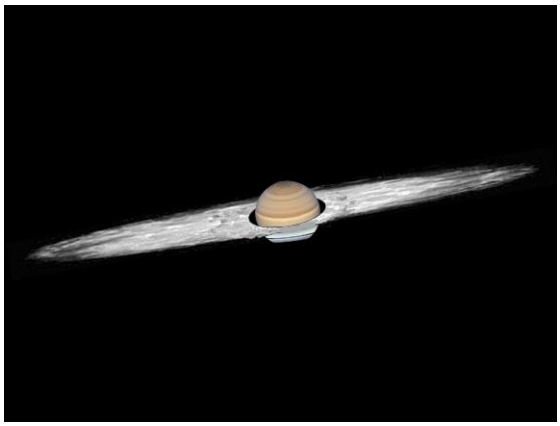
The formation of Saturn



Initial expansion



A growing planet



A tiled and spinning Saturn

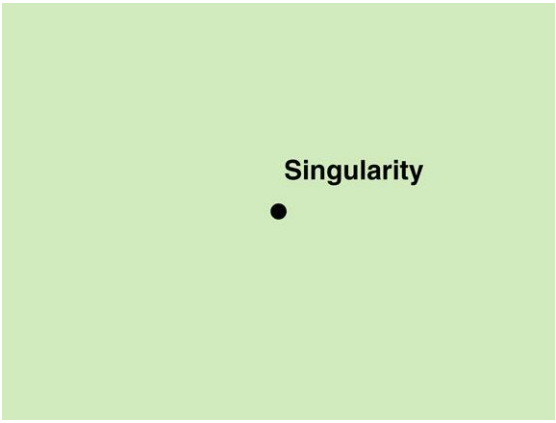
Saturn and its rings

Introduction

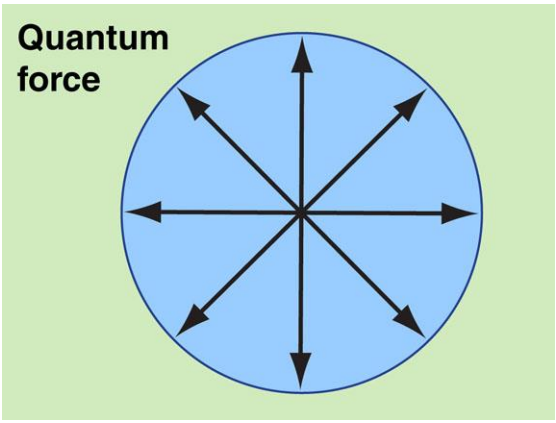
- I need to remind all readers once again that I have not studied astrophysics, I am just a retired civil engineer, so my discussions of astrophysics should be treated with an appropriate degree of caution.
- Consequently, I accept that the following discussion may be completely wrong!

The birth of a planet

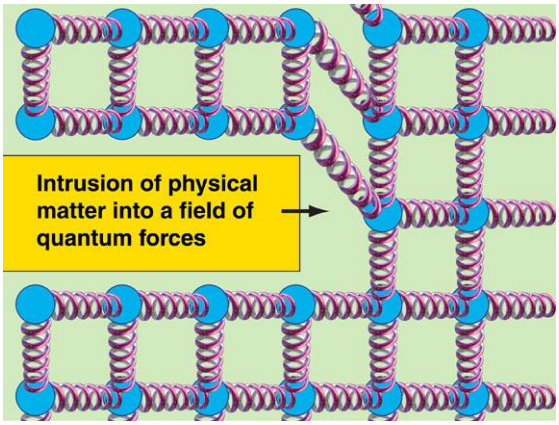
- When I look at Saturn and its rings I see a planet that is in its final stages of becoming a planet.
- We are all gifted to have a planet like Saturn in our solar system that can show us, visually, how all planets are formed.
- The expansion of a singularity would have given us a two-dimensional, disk-like universe.
- Because of the properties of quantum forces, any form of concentration that began to occur within the expanding universe would have continued to concentrate quantum forces until a field of individual units of matter was formed.
- Saturn's rings are an example of what a concentrated field of individual units of matter would look like.
- Over time, these individual pieces of physical matter would begin to collect into larger and larger objects of matter.
- As these objects (young planets) grew in size, their physical appearance would become more three-dimensional as their mass increased.
- Eventually these planets would have gained so much mass that the crushing effects of gravity would produce a liquid core, which would allow the object to be reshaped into a sphere.
- Movement of the core would generate a magnetic field, which would start the planet spinning around the axis of this moving core, which would cause the surrounding field of individual units of matter (that is within this magnetic field) to start to spin around the same axis, which would begin to place this material in an orbit around the planet, which would slow the 'pushing' of this material toward the planet by the surrounding quantum forces, which would allow time for moons to start forming within the remain field of attached particles (the rings) in much the same way as the planet gained mass.



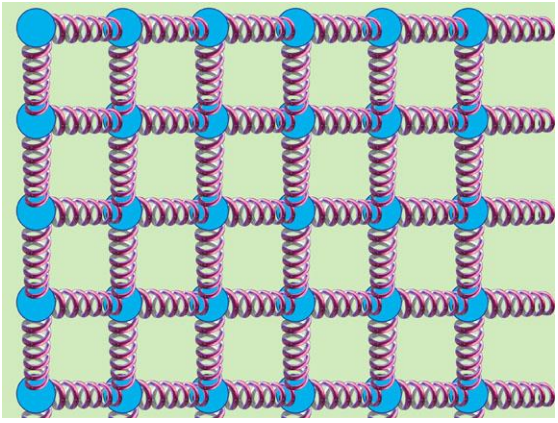
Singularity



Region of influence



Matter moving through quantum forces



Representation of a field of quantum forces

Introduction

- If we go back to the beginning, prior to the Big Bang, then we may think of the universe existed as a singularity, consisting of an almost infinite amount of dimensionless energy, or forces, existing at a single location.
- For now, I have chosen to call these forces: 'quantum forces'.
- The properties of a quantum force are assumed to be:
  - dimensionless in size, but each force has a region of influence, which expands as the universe expands
  - able to experience the effects of mass and inertia
  - quantum forces push against each other with a force that appears (?) to reduce as its region of influence expands, and
  - this pushing force varies with the inverse square of its distance of separation from physical matter.
- What held these forces in a singularity prior to the Big Bang was possibly the zero speed of causality that existed within the singularity.

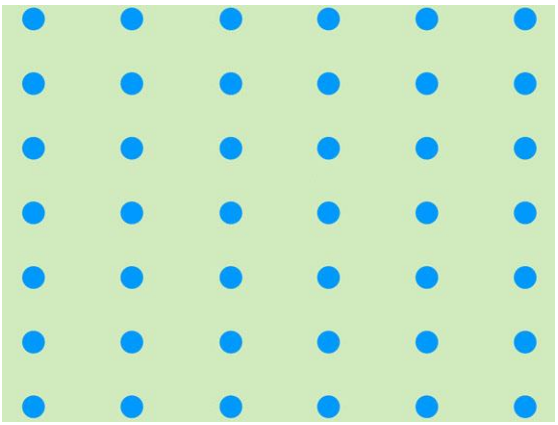
The existence of quantum forces as individual elements

- The quantum forces that fill space must consist of individual elements that can be separated.
- The separation of individual quantum forces is necessary for:
  - physical matter (e.g. a planet) to pass through a field of quantum forces, and
  - one field of quantum forces (e.g. a magnetic field) to pass through another field of quantum forces.

The various states of quantum forces

- Quantum forces are assumed to exist in three different states:
  - free
  - attached (including 'travelling')
  - concentrated.
- Physical matter is created through the concentration of quantum forces.
- Light exists as a transient form of concentrated quantum forces (i.e. a virtual particle) created by a compression wave.

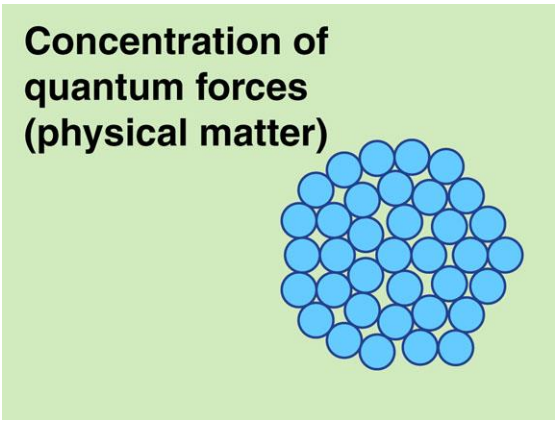
Different forms of quantum forces



Representation of free quantum forces

Free quantum forces

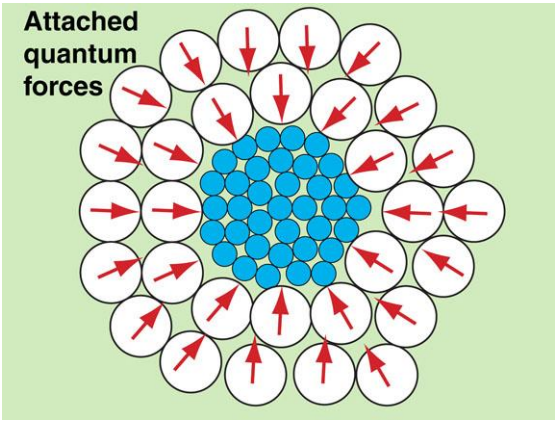
- Free quantum forces are the forces that make up the majority of space.
- The element we call 'aether' is formed from free quantum forces.
- Free quantum forces are mostly stationary, except for the ongoing expansion of the universe.
- Quantum forces also exist within physical matter—some attached to the matter, while others remaining free to move within the matter (travelling quantum forces).



Concentration of quantum forces

A concentration of quantum forces

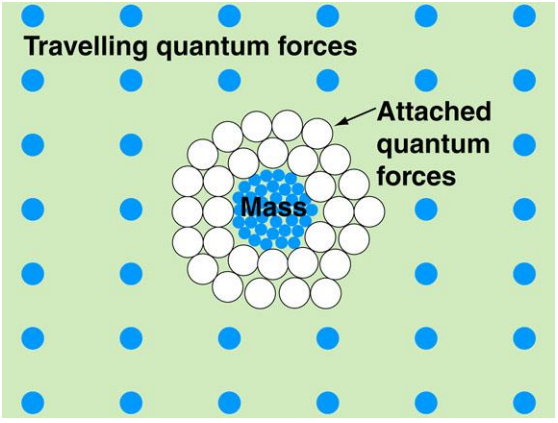
- Free quantum forces can be considered to exist at a background density that reduces as the universe expands.
- Concentrated quantum forces (i.e. matter) exist in a concentration much, much greater than the background density of free quantum forces.
- Concentrated quantum forces can exist as virtual particles (light), or physical particles (matter).



Quantum forces surrounding matter

Forces acting on matter

- Quantum forces, whether free or attached, surround any concentration of quantum forces (i.e. physical matter), thus causing the matter to be:
  - stable
  - spherical in shape (if possible)
  - compressed (i.e. concentrated)
  - and causing isolated objects of matter to move towards each other (i.e. a net force of attraction), thus increasing the size and density of the concentration.



Concentration in a field of free Qforces

Attached quantum forces

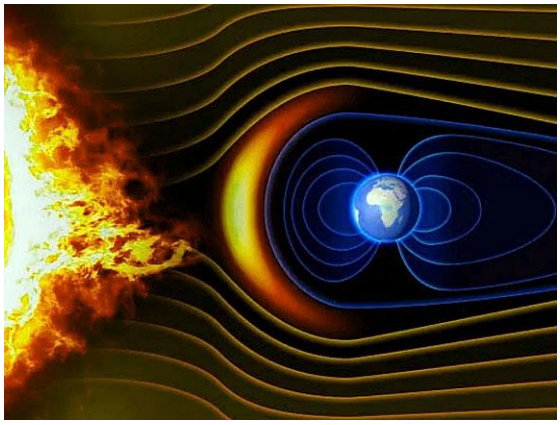
- Even though quantum forces push against physical matter, they are also being pushed by outer QForces, which ultimately results in a net attraction force.
- Because of this force, some quantum forces can become firmly (but not permanently) attached to physical matter.
- If the matter moves, then these attached quantum forces will move, which in-turn will induce the movement of any travelling quantum forces that surround the attached quantum forces.

Different forms of quantum forces

Space

Free quantum forces (aether)

- Most quantum forces exist in a uniformly distributed gird that exists in a concentration that is constantly reducing as the universe expands.
- Aether is the substance that exists when quantum forces exist in this background concentration, which I, from time to time, refer to as 'non-concentrated'.
- Magnetism is simply a moving form of aether, which has a concentration linked to the concentration of the physical matter that it is attached to.



Attached magnetic (quantum) field

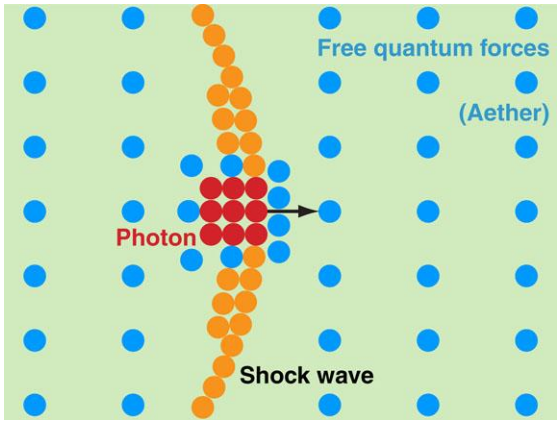
Attached quantum forces

- Even though quantum forces repel each other, this repelling action causes some quantum forces to concentrate around matter as attached quantum forces.
- The Earth has a massive volume of attached quantum forces, some firmly attached to matter, some free to move as travelling quantum forces.
- The Earth's magnetic field is made-up of those quantum forces travelling with the electrons that make-up the Earth's magnetic core.

Earth: a concentration of forces

Concentrated quantum forces

- In the current energy-based model of the universe, matter was considered to be a concentration of energy.
- In the force-based model of the universe, matter is considered to be made-up of concentrated quantum forces.
- All matter, including all electrons, are surrounded by attached quantum forces.
- When electrons move (i.e. electricity) their attached quantum forces also move, thus creating the attached magnetic field.

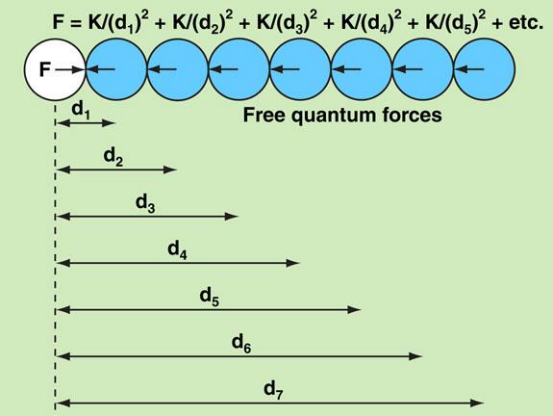


A photon of light

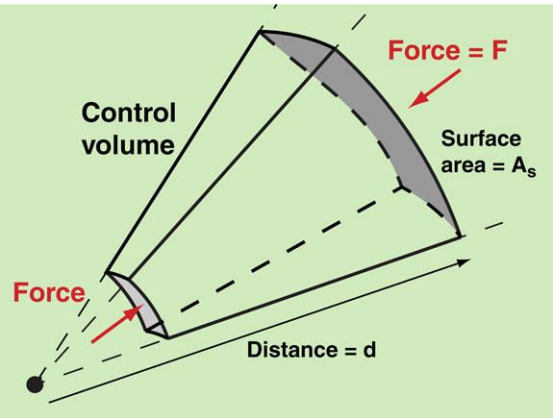
Transient concentrations of quantum forces

- When a compression wave passes through aether, a portion of the aether temporarily becomes concentrated above background levels, and then relaxes.
- Just like sound waves move as a transient concentration of air particles, light travels as a transient concentration of aether.
- It is believed (by the author) that the lateral variation in this concentration of aether is what generates the different colours that travel with white light.

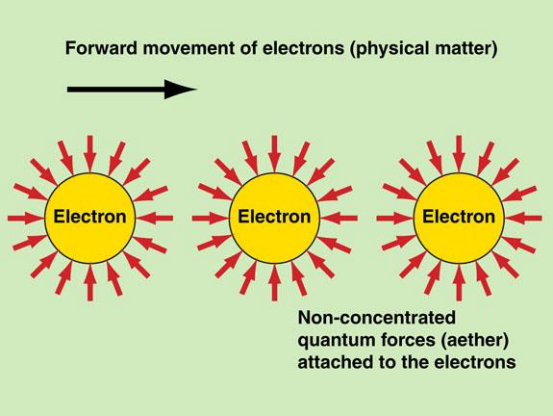
Attached quantum forces



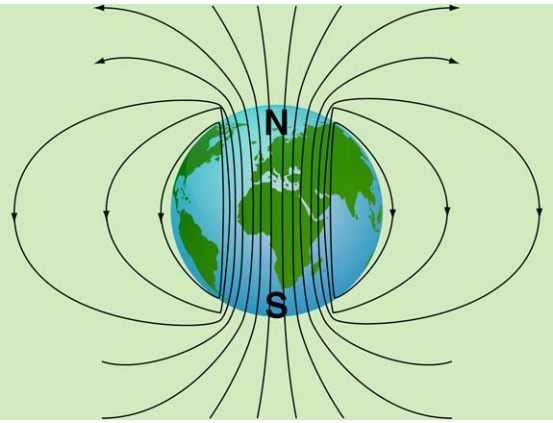
Interaction between quantum forces



Forces acting on a segment of a sphere



Quantum forces attached to electrons



Quasi-free quantum forces

The effects of distance

- As previously mentioned, quantum forces have just one task, or action, that being to repel all other quantum forces.
- The magnitude of the force exerted by one quantum force on an adjacent quantum forces depends on:
  - the sum of the mass of quantum forces, in a given direction, divided by the square of the distance of each quantum force from the principal quantum force
  - in other words, the force increases with the concentration of quantum forces.

Forces acting on a central object

- In a force-based system, if we:
  - consider the forces acting on a control volume where there is no force applied to the sides, then we find that the force per unit area acting at each end must be inversely proportional to the square of the distance from the centre in order to the total force (F) to be constant
  - this is because the surface area of a sphere increases with the square of its radius (surface area = $4\pi r^2$).

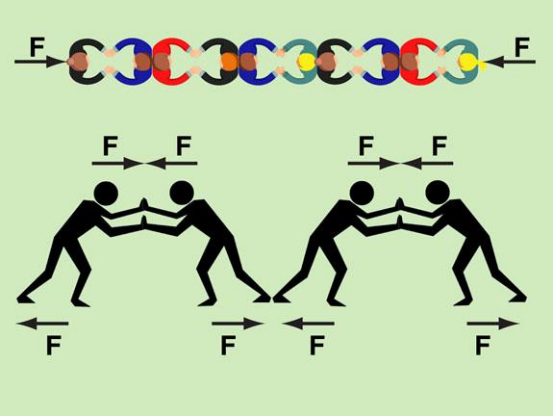
Quantum forces attached to electrons

- The region of influence of a quantum force is significantly smaller than an electron.
- Quantum forces will push inwardly upon electrons because electrons are formed from a concentration of quantum forces (just like a planet).
- Thus, electrons will always be surrounded by a ring of attached quantum forces, which will likely influence the spacing a electron shells for any given background pressure.

Quantum forces attached to Earth

- Quantum forces are attached to every element of a planet, including every electron and nucleus—they are what makes every free-forming object want to take the shape of a sphere.
- Within any planet, there will be quantum forces that can move freely through the planet while staying within the planet, and those that can spend part of their time within the planet, and part of their time outside the planet, such as in the Earth's magnetic field.

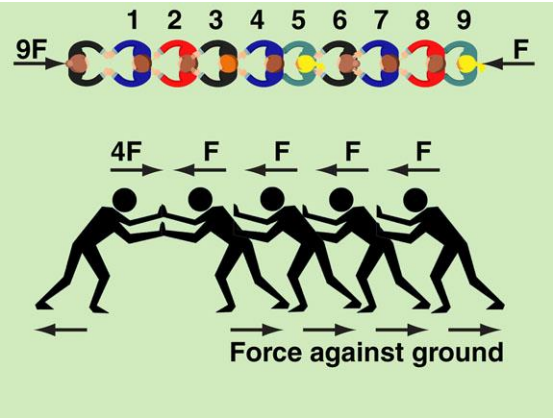
Quantum forces act point forces, not like pressure



Simulating pressure force

The action of pressure

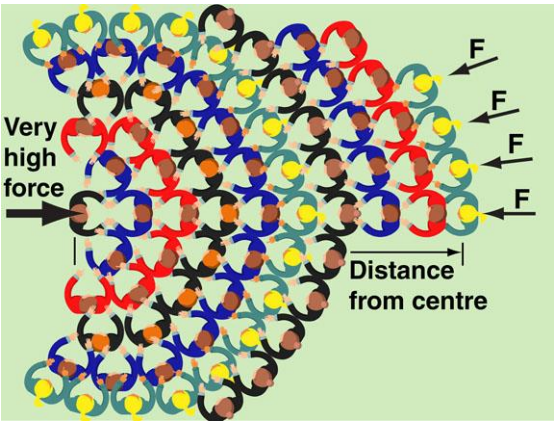
- It would seem logical to think of quantum forces as acting like a fluid in a pressure container, but quantum forces don't act like pressure, they act like a collection of individual point forces.
- The following discussion is not perfect, but I hope that it will give you a bit of an idea.
- The action of pressure is like a crowd of people standing back-to-back, pushing each other such that the net force is balanced between any two people.



Simulating quantum force

The action of quantum forces

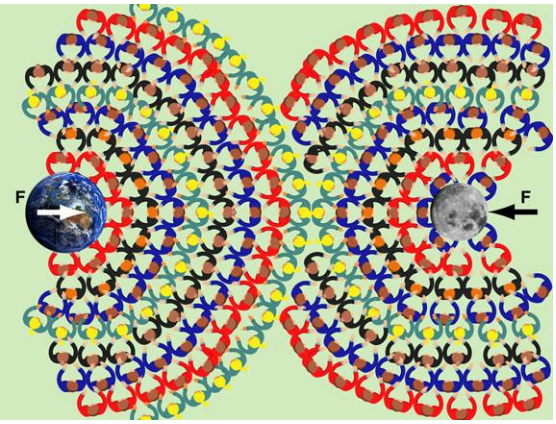
- However, the quantum forces that fill space work in a different way—if a concentration occurs (i.e. matter), then:
  - a concentration of attached quantum forces surrounds the matter
  - they push against each other, as well as pushing against the matter
  - as much as they push outwards, they are pushed inwards with a greater force.



Simulating gravitational forces

Forces on a central object

- The surface area of a sphere varies with the square of its radius (area = $4\pi r^2$).
- When quantum forces surround a planet, the surface area of the net force pushing towards the plant also increases with the square of the distance from the planet.
- This means that the force acting on each quantum force decreases with the square of the distance, which causes the region of influence of each quantum force to increase with its distance from the planet (not shown in these diagrams).

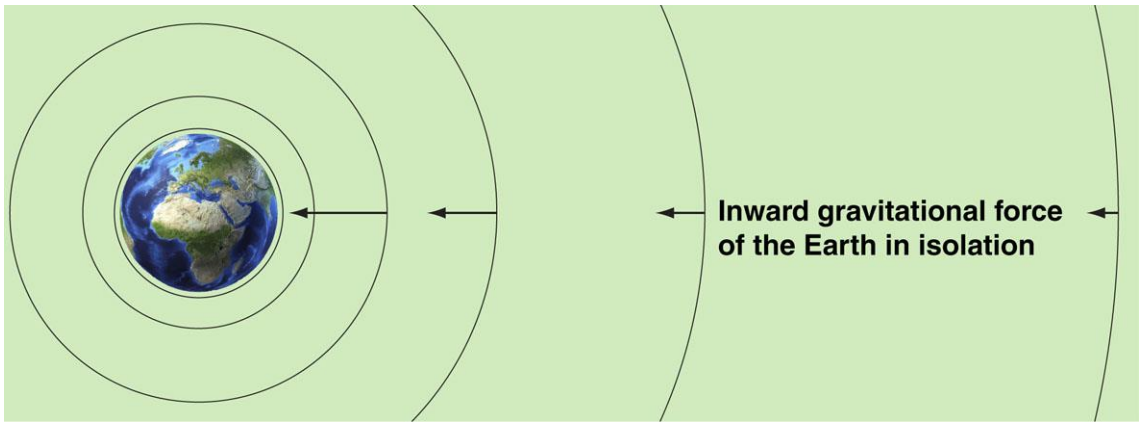


Simulating planetary 'attraction'

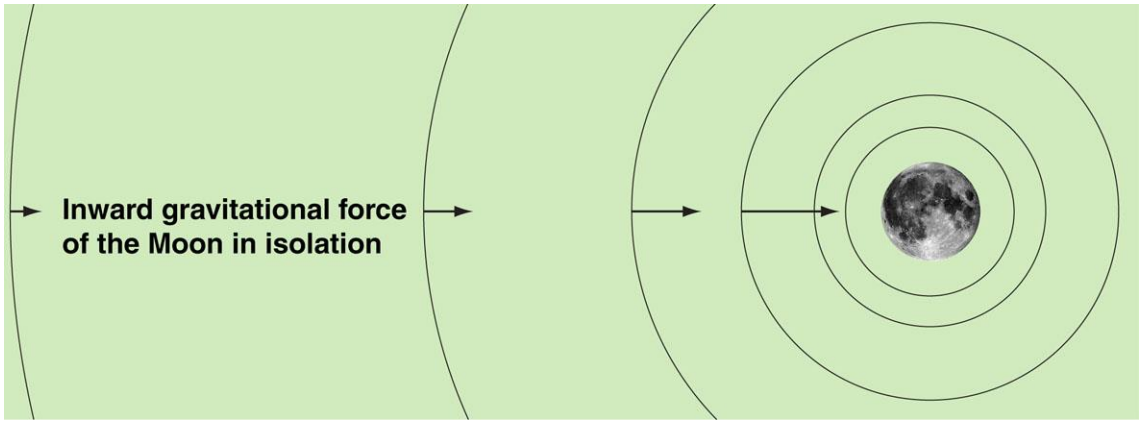
Action of forces on two objects

- The forces that surround any star, planet or moon, extend across space for vast distances, but not indefinitely.
- When two celestial bodies are close to each other, the sphere of influence of the quantum forces that surround each moon or planet will overlap each other, and the attracting forces will be superimposed.
- Ultimately this action causes a net force to push these two objects towards each other, which is the force we call 'gravity'.

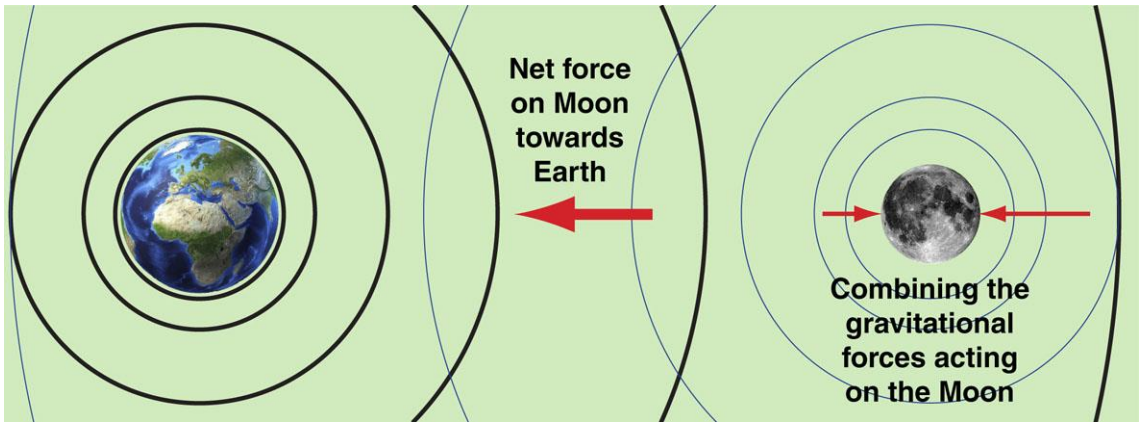
Gravitational forces acting on the Earth and Moon



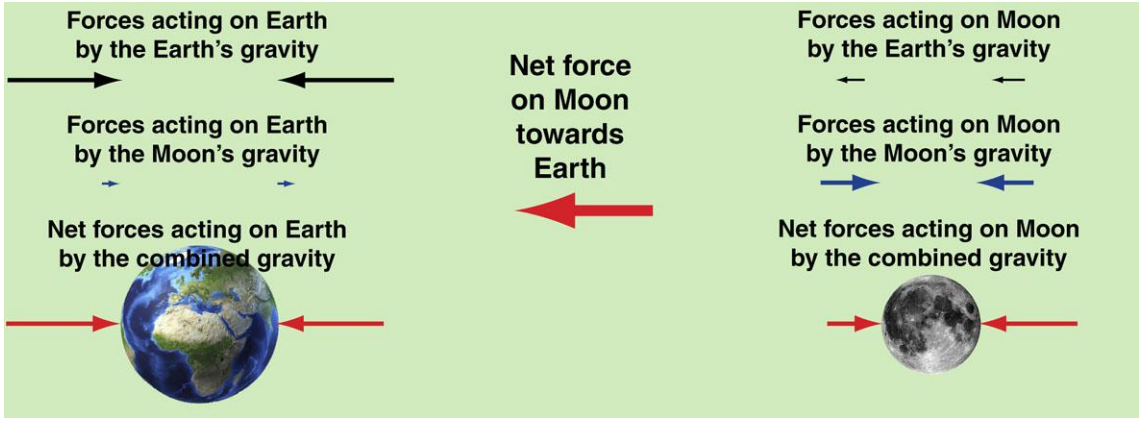
Inward compressing force on the Earth in isolation



Inward compressing force on the Moon in isolation

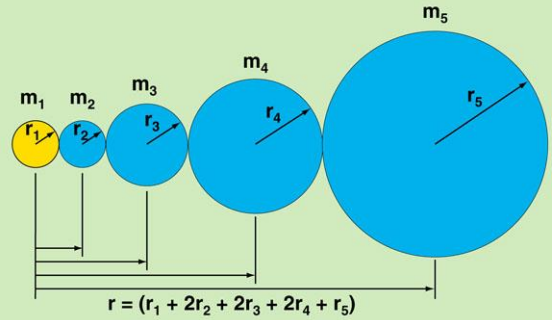


Combined forces acting on the Earth and Moon



Combined gravitational forces acting on the Earth and Moon

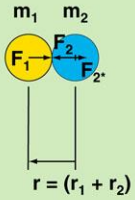
Creating the force of attraction and repulsion



Electron and attached quantum forces

$$F_1 = F_2 - F_{2^*} + F_3 - F_{3^*} + F_4 - F_{4^*} + F_5 - F_{5^*} + \text{etc}$$

$$F_2 = \frac{G.m_1.m_2}{(r_1 + r_2)^2}$$



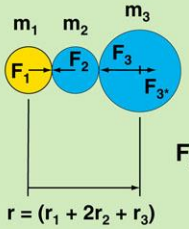
$$F_{2^*} = \sum \frac{(G.m_2.m_n)}{(r_2 + 2r_3 + 2r_4 + 2r_5 \ldots)^2}$$

F_{2^*} = sum of forces of attraction to outer quantum forces

Forces acting on mass-2

$$F_1 = F_2 - F_{2^*} + F_3 - F_{3^*} + F_4 - F_{4^*} + F_5 - F_{5^*} + \text{etc}$$

$$F_3 = \frac{G.m_1.m_3}{(r_1 + 2r_2 + r_3)^2} + \frac{G.m_2.m_3}{(r_2 + r_3)^2}$$

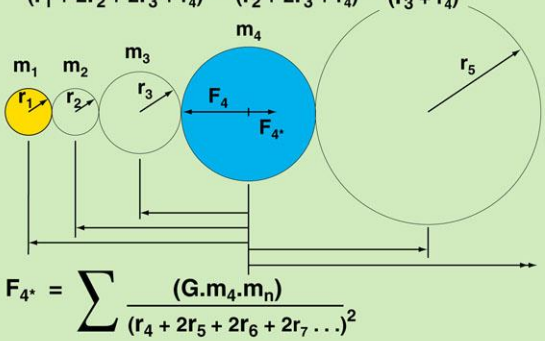


We could assume $m_2 = m_3$

$$F_{3^*} = \sum \frac{(G.m_3.m_n)}{(r_3 + 2r_4 + 2r_5 + 2r_6 \ldots)^2}$$

Forces acting on mass-3

$$F_4 = \frac{G.m_1.m_4}{(r_1 + 2r_2 + 2r_3 + r_4)^2} + \frac{G.m_2.m_4}{(r_2 + 2r_3 + r_4)^2} + \frac{G.m_3.m_4}{(r_3 + r_4)^2}$$



$$F_{4^*} = \sum \frac{(G.m_4.m_n)}{(r_4 + 2r_5 + 2r_6 + 2r_7 \ldots)^2}$$

Forces acting on mass-4

Introduction

- On this page I will describe the type of mathematics that demonstrates how the attached quantum forces ultimately generates a net force of attraction.
- This is NOT the correct mathematics, because in this example I have assumed that the effective size of the quantum force increases in proportion to distance, which is not correct (I believe).
- The correct analysis requires consideration of the mechanics in three dimensions, which is too hard for me!

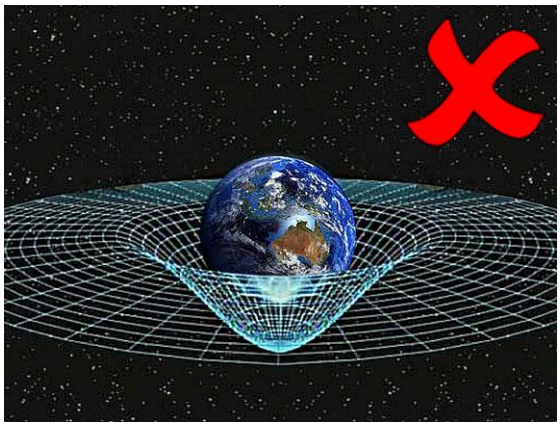
Forces acting on primary mass (m_1) and first secondary mass (m_2)

- There is a repelling force that exists between the primary mass (m_1) and the first attached quantum force (m_2).
- The primary mass can be anything from an electron to a planet, or a black hole.
- Key to this analysis is the relative size of the primary mass (r_1) compared to the attached quantum forces (r_2, r_3, r_4, etc.).
- For an electron; $r_1 > r_2$.
- For a nucleus; $r_1 >>> r_2$.
- The repelling force (F_2) that exists between the primary mass (m_1) and the first attached quantum force (m_2) is governed only by masses m_1 and m_2.
- The repelling force (F_{2^*}) that exists between the first attached quantum force (m_2). and the outer attached quantum forces involves mass m_2 and all the masses outside m_2.
- This same analysis is repeated for all the attached quantum forces until the outer most attached quantum force has an inward acting force equal to the local background repelling force of free aether.

The effect of particle size

- For a mass the size of our Sun, the attached quantum forces will extend beyond Pluto before the attached quantum force 'pressure' equals the background aether, after which, the net force converts to the repelling force of aether.
- For a primary mass the size of an electron, the distance from the electron before the net force converts from attraction to repelling in microscopic, which means electrons repel each other, rather than attract each other.

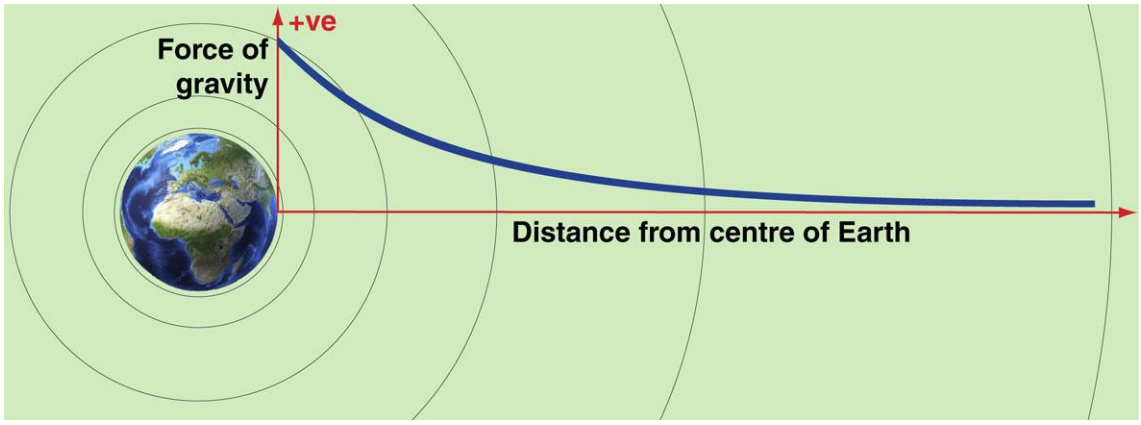
Creating the force of attraction and repulsion



'Spacetime' does not exist

The force of gravity adjacent the Earth

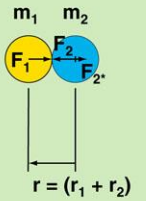
- Sorry Einstein, but gravity is <u>not</u> an action resulting from curved spacetime.
- 'Time' doesn't even exist in reality; it is just a human invention used as a measuring tool.
- Gravity, like everything in the universe, is a product of quantum forces, and the result of how these forces manage to turn a fundamental repelling force into a net force of attraction when applied in three dimensions around a central concentration of quantum forces (Wow!).



Variation in the force of gravity with distance from Earth

$$F_1 = F_2 - F_{2^*} + F_3 - F_{3^*} + F_4 - F_{4^*} + F_5 - F_{5^*} + \text{etc}$$

$$F_2 = \frac{G.m_1.m_2}{(r_1 + r_2)^2}$$



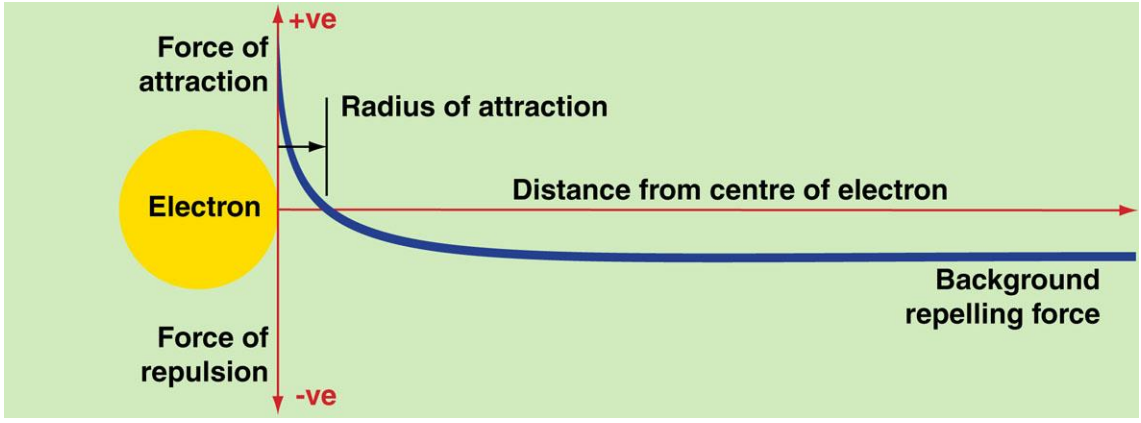
$$F_{2^*} = \sum \frac{(G.m_2.m_n)}{(r_2 + 2r_3 + 2r_4 + 2r_5 \ldots)^2}$$

F_{2^*} = sum of forces of attraction to outer quantum forces

The relative size of mass and Q-force

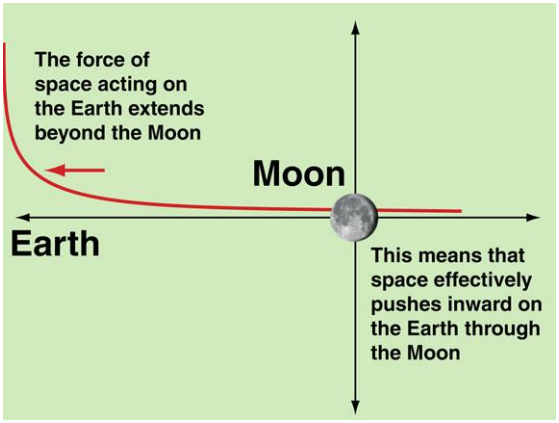
The force of gravity adjacent an electron

- The net force of attraction reduces with the square of the distance of separation.
- As the distance of separation increases, the net force reduces until it can no longer overcome the background force of repulsion shared by all free quantum forces, after which this repulsion force dominates.
- The distance to this attraction–repulsion inflection varies with the relative size of the primary mass relative to the size of the adjacent quantum force (another Wow!).



Variation in the force of gravity with distance from an electron

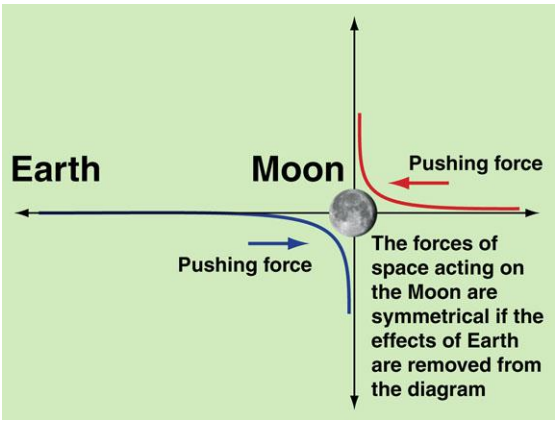
The effects of concentrating quantum forces



The force of Earth's gravity

The force of space acting on the Earth

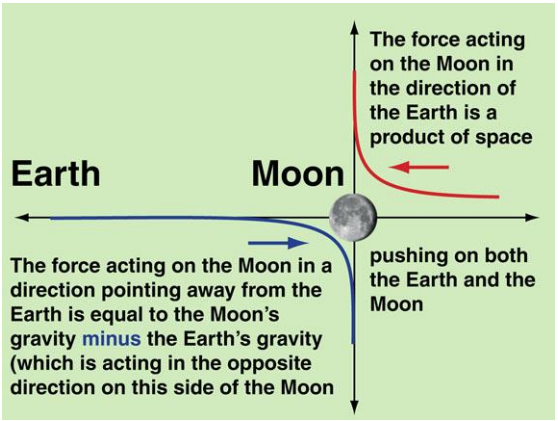
- So, why doesn't a concentration of quantum forces simply explode due to its combined internal, repelling forces? and . .
- Why doesn't the repelling force of all the quantum forces that make-up the Earth, simply push the Moon away?
- In order to understand this issue, we need to look at the combined forces exerted between the Earth and the Moon.
- This diagram graphs the force intensity acting by space towards the Earth.



The force of the Moon's gravity

The force of space acting on the Moon

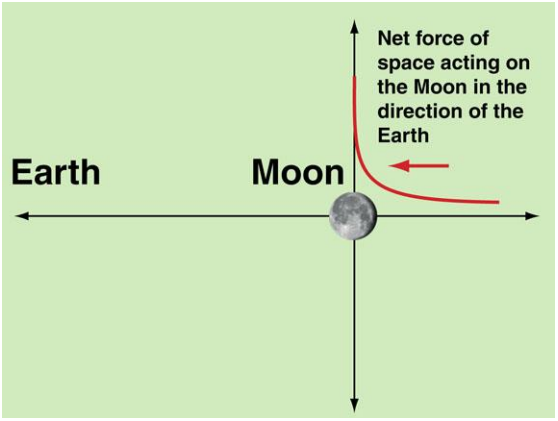
- If we consider the Moon in isolation, then there is a similar, but much smaller, parabolic force curve positioned around the Moon.
- The diagram shows the direction towards the left (i.e. towards the Earth) as +ve (red), and towards the right as -ve (blue).



The combined forces acting on the Moon

Combining the forces acting on the Moon

- Thus the net force generated by the quantum forces, will result in:
  - the Earth pushing on space & Moon
  - the Moon pushing on space & Earth
  - space pushing on the Earth & Moon.
- However, it is important to note that the forces acting between the Earth and space, extend through, and beyond, the Moon.
- Ultimately this results in a net force **pushing** the Moon towards the Earth.

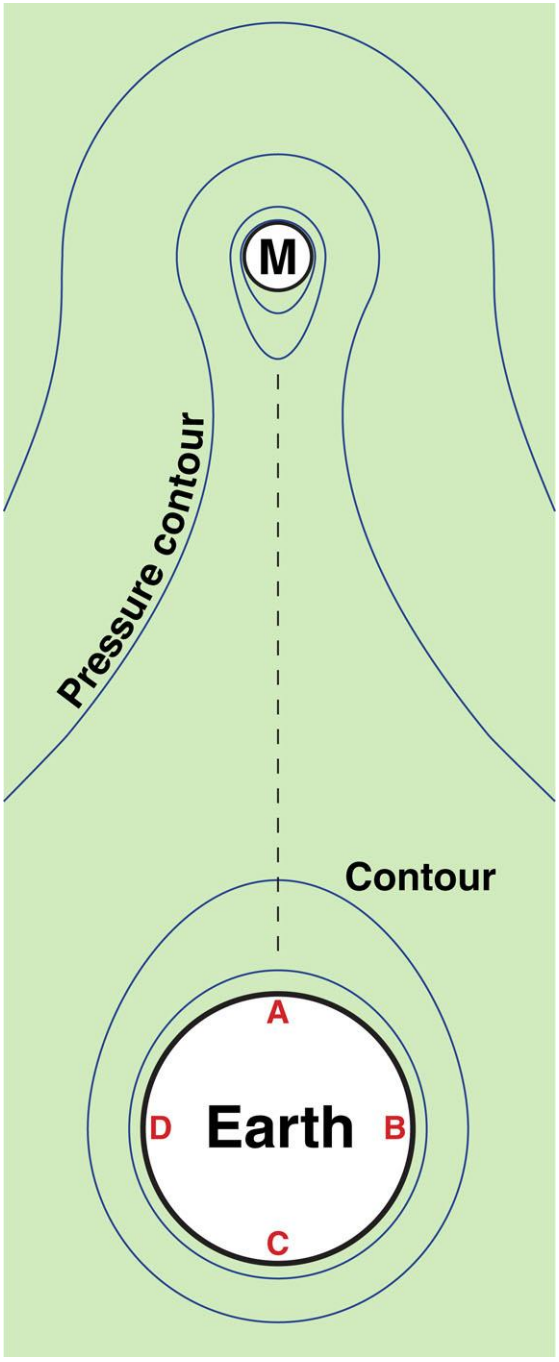


The net force acting on the Moon

The net force acting on the Moon

- Summing all these forces, we will find that there is a net force acting on the Moon in the direction of the Earth.
- This means that in a field of evenly-spaced (free) quantum forces, these quantum forces will:
  - push inward on a concentration of quantum forces (e.g. a planet), and
  - push any two concentrations of quantum forces (e.g. a planet and moon) towards each other.

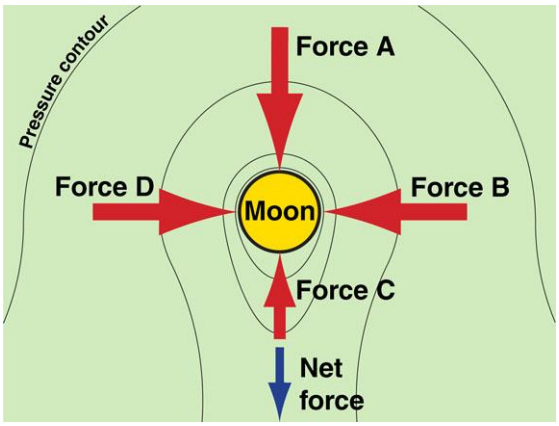
Gravitational forces surrounding the Earth and Moon



Gravitational field (time contours)

Forces acting on the Earth and Moon

- Because the Earth and Moon exist in close proximity to each other, the forces acting on the Earth and Moon, by space, are asymmetric.
- The asymmetric nature of the forces acting on the Moon result from the fact that the Earth's gravitational field extends through the Moon, and beyond.
- The superposition of the Moon's gravitation forces, onto the Earth's gravitation forces, generates a net force acting on the Moon in the direction of the Earth.
- **Analogy 1:** Readers may wish to think of the pressure forces exerted by space on planets as being similar to the way that fluids in a glass will exert a pressure on bubbles of gas rising through the fluid.
- In a glass of sparkling water, the surface of the water represents the point of 'zero' water pressure, which can be compared to the edge of space (i.e. the edge of our universe).
- **Analogy 2:** Alternatively, readers may wish to consider the pressure gradients (blue lines) displayed in this diagram as representing the depressions left by a bowling ball (the Earth) and a shot-put (the Moon) when placed on a foam mattress.
- If we consider the effects of a bowling ball and a shot-put placed on a mattress, we should not be surprised to find that the bowling ball and a shot-put will slowly move towards each other.
- **Conclusion:** Gravity is a force, and ultimately, gravity is a consequence of the Big Bang causing the ongoing expansion of space.

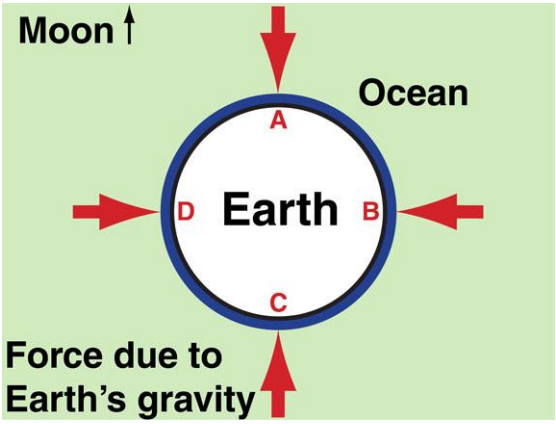


Forces acting on the Moon

Forces acting on the Moon

- The gravitational force generated by 'space' are shown here as point forces.
- Forces B and D are equal in magnitude.
- Force C is less than Force A because this side of the Moon is closer to the Earth.
- Force A is greater than forces B and D because the Earth's gravity increases the pressure gradient at location A, but not the at locations B and D.
- The net force acting on the Moon is Force A minus Force C.

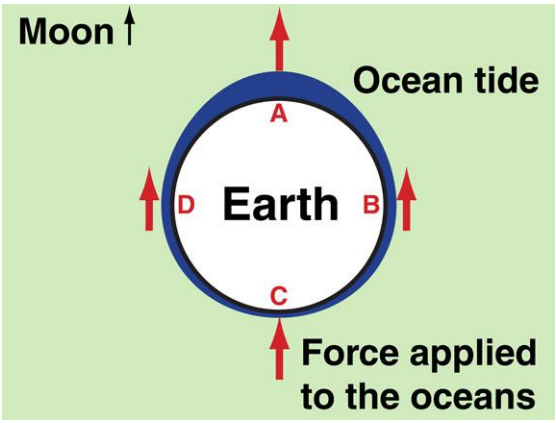
The cause of ocean tides



Earth's gravity acting on oceans

Earth's gravity and Earth's spin

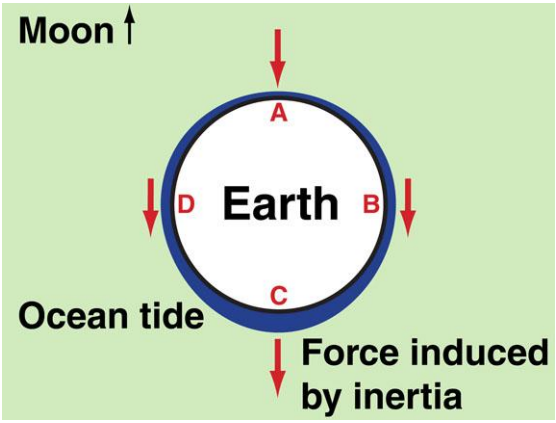
- The force (actually pressure) placed on the Earth's oceans by the Earth's gravity is near uniform around the planet.
- The spinning of the Earth around its own axis causes a bulging of the oceans near the equator, but this effect is constant and therefore does not interfere with the occurrence of ocean tides.
- Given that the Earth also bulges at the equator relative to the poles, this bulge in the Earth's oceans is less noticeable.



Moon's gravity acting on oceans

The effect of the Moon's gravity

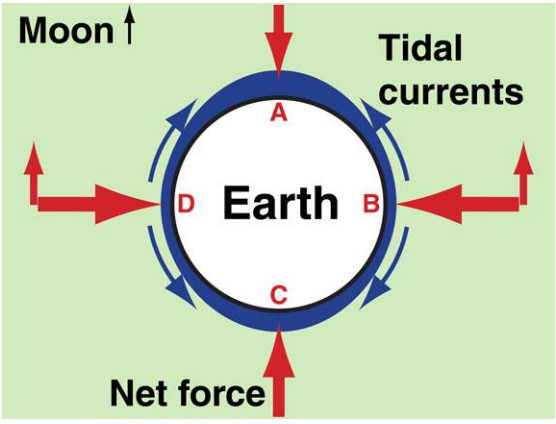
- The presence of the Moon generates an increased Space-induced force across all aspects of the Earth (i.e. this effect passes through the Earth).
- This gravitational force is acting towards the Moon.
- In isolation, this force would naturally cause the Earth's oceans to move towards the Moon.



Rotational inertia acting on oceans

The effect of the Earth-Moon rotation

- However, the Moon does not rotate (orbit) around the centre of the Earth; instead, the Earth and Moon rotate around their combined centre of gravity.
- The resulting rotation of the Earth around this centre of gravity causes an inertia-generated centripetal force, which acts on all parts of the Earth, including its oceans.
- In isolation, this force would cause the Earth's oceans to move away from the Moon.



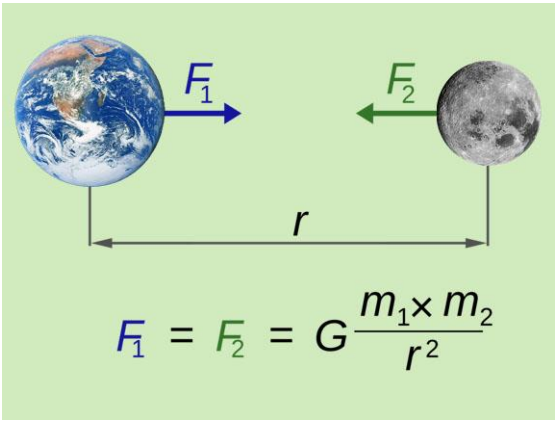
Net forces and tidal conditions

Ocean tides

- Combining the effects of the Moon's gravity and the ocean's inertia causes a higher high-tide on the side of the Earth facing the Moon, and a lower high-tide on the opposite side of the Earth.
- A high tide is not caused by the Moon 'lifting' the water, but by gravity pushing down harder at locations B and D.

The forces applied to Earth's oceans are only shown (left) at locations A, B, C & D, but in reality these forces apply over the complete surface of the oceans.

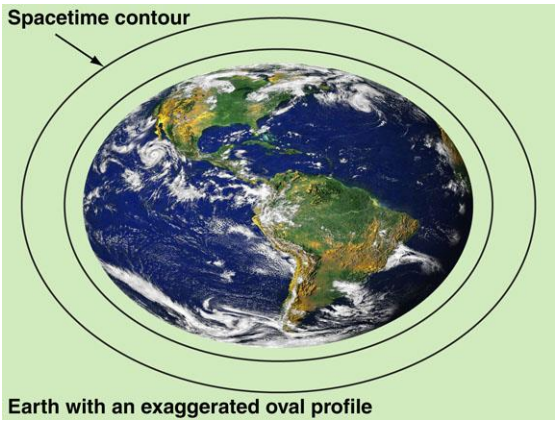
Variations in gravity around the surface of Earth



Equation for gravitational force

Warning:

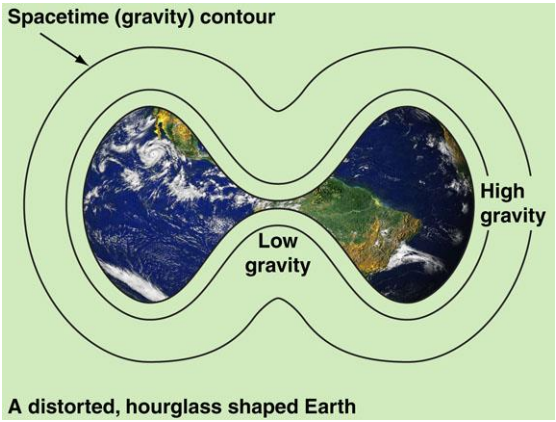
- The force of Earth's gravity is said to reduce with the square of the distance from the centre of the Earth.
- **However**, this relationship does not apply within the mass of the Earth, or around the surface of the Earth.
- The forces equation (left) suggests that the value of (F,r^2) is a constant around the surface of the Earth, but it is only a constant along a given axis.



Distorted, non-spherical shape

Non-spherical planets

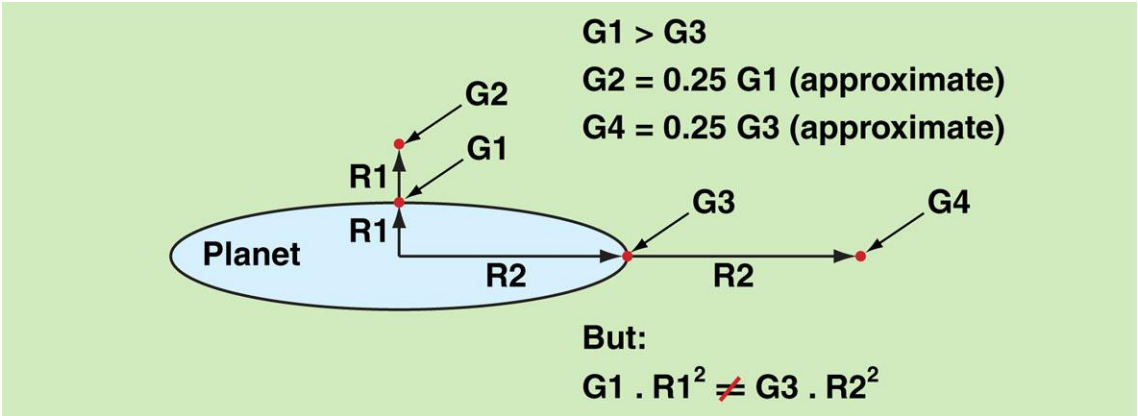
- If a planet had a non-spherical shape (like the Earth does), then the gravitational forces generated around the planet would also be non-spherical.
- The fact that the Earth's radius is 22 km shorter at the poles compared to the equator does not mean that variations in gravity from the equator to the poles will be proportional to changes in the radius of the Earth at these locations.



Hourglass-shaped planet

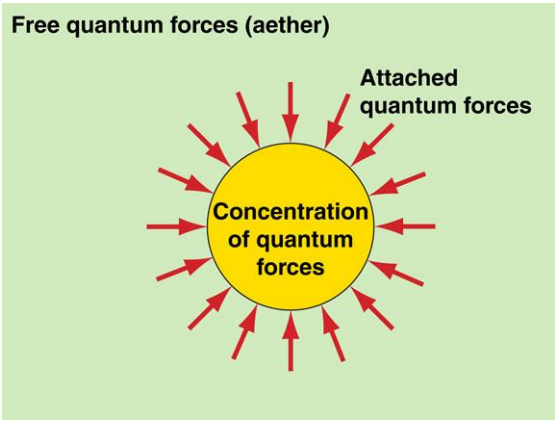
Consider an extreme case

- If you consider the extreme example of an hourglass-shaped planet, then the gravitational effect at the narrow neck would approach zero, not an infinite value as would be suggested by the equation.
- In the diagram below:
  - 'G' = gravitational force
  - 'R' = distance from centre of planet
  - G1 is greater than G3 because it is closer to the centre of mass, but not by a factor of ($R2^2/R1^2$).

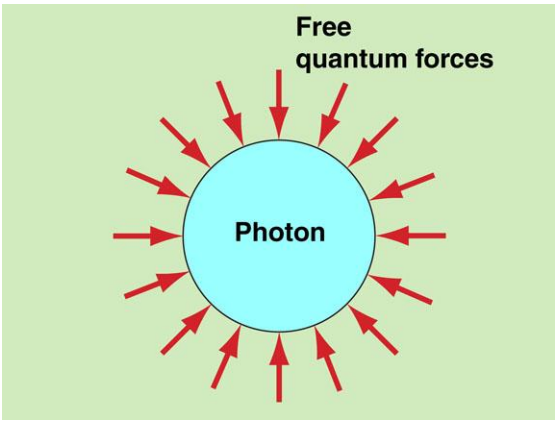


Variations in gravity around an oval-shaped planet

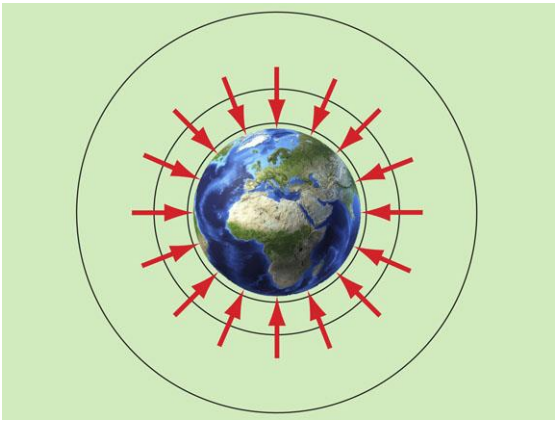
The binding power of quantum forces



External forces acting on a matter



Forces acting on the Earth



Forces acting on the Earth

Question

A concentration of quantum forces

- If a concentration of forces begins to occur within a field of free quantum forces, then the surrounding quantum forces will increase their interactive forces in the direction of the concentration.
- This will cause the concentration of forces to become more concentrated.
- Also, because there is always a direct contact between quantum forces, there will be a 'ring' of quantum forces that stay attached to this concentration because of this increase force.

Forces applied to an element of light

- A photon is a virtual particle formed from the temporary concentration of quantum forces.
- However, the forces that stabilise a photon at any given instant are transient, which means these forces migrate through a field of quantum forces causing the concentration to move with this transient wave of forces (energy).
- In this way, quantum forces are able to stabilise a photon even though the photon travels as a virtual particle.

Forces applied to physical matter

- The same actions and forces that stabilise the temporary existence of a virtual particle, also stabilise physical particles.
- This means that the physics of the forces applied to a photon are identical to the physics of gravity.
- Thus the inward force of gravity is proportional to:
  - mass of the planet
  - the distance from the centre of that planet.

Questions:

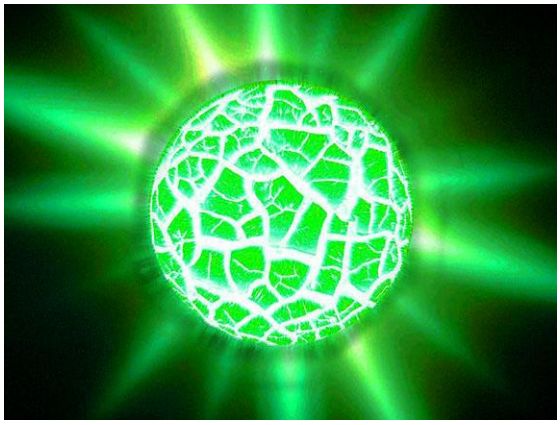
- If the quantum forces that fill space will always cause a concentration of matter to become more concentrated, then:
  - Why did the Big Bang occur, why didn't this initial concentration of quantum forces stay in its original concentrated form? and
  - Why does a collapsing sun (star) suddenly explode?
- For my answers, see over the page.

Final word

I may be wrong!

Warning:

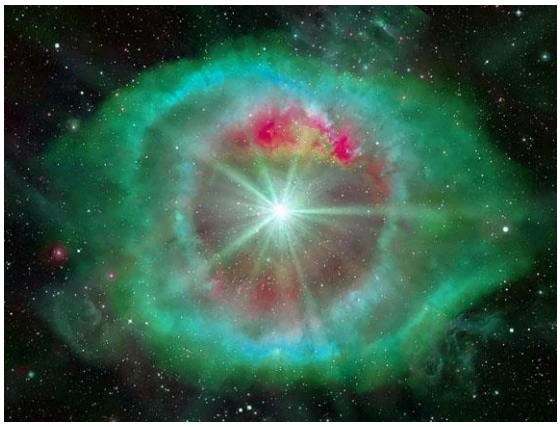
- Readers need to remember that the author of this document is NOT a trained astrophysicist.
- Readers are advised to treat everything in this document as speculation—i.e. as unproven statements.
- The purpose of this document is to challenge our understanding of gravity and space, not to say that every thing we thought we knew about space is wrong.



The Big Bang

Answer to the first question

- The reason the Big Bang occurred, and the reason the initial concentration of quantum forces was unstable, was because this concentration was surrounded by empty space,
- This empty space (vacuum) which could not apply a force to the concentration.
- Similarly, the current universe is surrounded by empty space, which allows the universe to continue to expand.



Exploding star

Answer to the second question

- With regards to an exploding star, I can only speculate (guess) that the final stages of a collapsing star must occur at the speed of causality;
  - which means the surrounding aether cannot respond to these changes in a 'timely' manner
  - which means the surrounding aether will not be able to register the true concentration of remaining matter at any given instant.

Time

The speed of causality

- What allows a diverse universe to be created from a single element, is a change in the speed of causality.
- Diversity occurs because of the time delay experience by quantum forces when they respond to any form of 'change'.
- This means that the universe cannot respond to a 'change' in a uniform manner, which creates a non-uniform universe, which creates variations in the concentration of quantum forces, which creates opportunities for matter to be formed and to expand.

Glossary

Aether	The cloud of expanding quantum forces that make ‘empty’ space.
Attached quantum forces	Quantum forces that are attached to, and travel with, matter due to the binding actions of the quantum forces.
Big Bang	The assumed expansion of quantum forces that formed the universe, and which continues to the present day.
Concentrated quantum forces	Quantum forces that have a concentration greater than background levels (i.e. matter and virtual particles).
Critical velocity	The speed of causality of a fluid.
Double slit experiment	An experiment involving light passing through two narrow slits located in close proximity to each other.
Energy	Traditionally considered to be the primary product of the Big Bang. In this document the term can be interchanged with ‘quantum forces’.
Energy field	What is assumed to fill space. Equivalent to the terms ‘aether’ or a cloud of quantum forces. (I have avoided using the term ‘quantum force field’ for obvious reasons, and because the term ‘quantum’ means small, while the term ‘field’ is suppose to represent the vastness of space.)
Fluid mechanics	The study of fluids in motion.
Free quantum forces	Non-concentrated quantum forces that primarily fill space (i.e. the aether)
Mathematics	The **science** of describing physics in numerical terms, independent of whether the physics is observed or imagined.
Photon	Considered to be the central core (element) of a unit of light
Physics	The study of objects in motion.
Qforce	An abbreviation of ‘quantum force’ that is used in this document to condense the size of some text boxes.
Quantum force	The assumed element that was the single product of the Big Bang, and which subsequently made the universe.
Shock wave	A wave formed when a fluid is disturbed by a force travelling at either the critical velocity, or a speed greater than the critical velocity of the fluid.
Speed of causality	The maximum rate a force or pressure can transfer through a fluid.
Time	The mechanism that generates time (e.g. universal time).
time	The action or progress of time (e.g. clock time).
Triple filter experiment	An experiment involving light passing through three polarised filter, each aligned in a different direction.
Virtual wave	A wave that appears to exist, but is only a visual ‘trick’, such as a series of flashing, but static, lights.
Wave	Movement that oscillates either transverse or longitudinally to the direction of travel, or movement that simulates wave motion, or images that describe wave motion.
Wave mechanics	The physics of wave motion.