

# A QUANTUM THEORY OF GRAVITY, THE ILLUSION OF ATTRACTION

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## PROLOGUE

**There is a remarkably simple solution to the “gravity problem” (a.k.a. the “dark matter problem”), which explains the machinations of the universe from a truly revolutionary perspective.**

The late American physicist, John Wheeler, penned a short verse to the notion of finding such underlying simplicity. His poem was published in the book “Stephen Hawking, Quest For A Theory Of Everything”, authored by Kitty Ferguson [1]. I should dare to reproduce it here:

(Untitled poem, by John A. Wheeler)

Behind it all  
is surely an idea so simple,  
so beautiful,  
so compelling that when –  
in a decade, a century,  
or a millennium –  
we grasp it,  
we will all say to each other,  
how could it have been otherwise?  
How could we have been so stupid  
for so long?

I sincerely believe I understand the idea to which he was alluding, and I wish to make the most of this unexpected chance I now have to share ‘my *vision* of the facts’.

## INTRODUCTION

Simplicity is often paradoxically difficult to discern. Great simplicity is hidden within great complexity where, but for the occasional tantalising glimpse, it slips by unnoticed, unrecognised, only just out of reach, like a word on the tip of one’s tongue.

Simplification has long been a goal of physicists who, in their quest for the ultimate equation of the universe, a summary of the laws of nature embodied in a single phrase, have written books they know will be made obsolete by the success of their aim. Little does anyone suspect that *all* books with the mere mention of gravity face the same fate! I have arrived at conclusions of my own, which I simply offer for your own consideration now.

I have some shocking news, I’m afraid:

- DARK MATTER DOES NOT EXIST, AND...

- GRAVITY DOES NOT ATTRACT.

Do read on please, when you have stopped laughing at the perceived insanity of one of “any number of crackpots who think they have single-handedly discovered a new theory of the universe and cannot understand why nobody will listen to them” [2]. The words of Professors Cox and Forshaw in 2009 leave me with little hope of getting a fair hearing from mainstream scientists here in the U.K. who appear to be illogically confusing being crazy with being wrong!

Therefore, for affording me an unprecedented opportunity to present my case ‘across the water’, and in the less formal format of an essay also, I will be eternally grateful to the FQXi competition for publicly asking the pertinent question, “Which Of Our Basic Physical Assumptions Are Wrong?”

In reply, I choose to challenge the most foundational assumption explicit in Newton’s law of gravitation, and I assert that the resultant effect we call “gravitational attraction” is an **illusion**, and a hangover from pre-Copernican days.

I suspect you think that I have as much chance of convincing you that gravity does not attract, as I would perhaps have had in making Ptolemy see that the Earth moves around the sun!

Therefore, everybody, please be prepared to kick yourselves!

## DARK MATTER

The idea of dark matter was first postulated in the 1930s, in a paper written by the Belgian-born Swiss astronomer, Fritz Zwicky, after he came across a problem in the anomalous movement of individual galaxies within a group or ‘cluster’. Whilst investigating the motion of the Coma Cluster specifically, he had learned that the velocities of the individual galaxies in the group were exceeding the speed limits imposed by the known laws of physics. This meant that, if the only thing contributing to the cluster’s gravitational motion was its visible mass, then it should *not* be able to keep its formation.

However, because the cluster does hold together instead of flying apart, Zwicky concluded that there had to be ten times more material present *invisibly* than the amount of mass that could be seen, and he named the unknown, unseen component “dark matter”.

There the subject rested for the next forty years, until the 1970s, when the astronomer Vera Rubin took a research position at the Carnegie Institute in Washington, where she teamed up with another astronomer, Kent Ford, who had developed an extremely sensitive spectrometer. Together they carried out pioneering work on galaxy rotation rates, measuring the speeds of individual stars in distant galaxies orientated side-on to us.

As the majority of any galaxy’s stars are found in its centre, it was just natural to **assume** that most of the galaxy’s mass, and therefore its gravitational force, would be concentrated there. This meant that the stars located around the central region were expected to move faster in their orbit around the centre, than the stars positioned further away, closer to the outer edge of the galaxy’s disc.

However, Rubin and Ford were surprised to discover that, in reality, this was not the case. The stars in the sparsely-populated outermost areas, far from the galactic centre, were actually travelling equally as fast as those closer in.

At such speeds, stars like our sun, which is in the outer region of our own galaxy (of its "Sagittarius Arm", to be precise) should not be able to stay in position within its boundary, but should instead fly off out into inter-galactic space!

This obviously does not happen, so something must be holding it in place.

This fact is an important clue, as will be seen in due course.

The work of Rubin and Ford appeared to confirm Zwicky's 1930s paper, and dark matter found a following.

Interestingly, Vera Rubin herself has never been convinced. Apparently, she has always been quick to tell people that she would favour a different solution, possibly involving a modification of Newtonian dynamics, or "M.O.N.D."

I believe I am now in a position to let everyone know she was absolutely right to remain sceptical, and I find myself wondering how many other people in her place would have remained as open to possible alternatives!

I sincerely assure you that Zwicky *has* drawn the wrong conclusions. The **implicit assumption** in his theory, of course, is that only **one** conclusion fits the data, and this is greatly mistaken.

## NEWTON, EINSTEIN AND PTOLEMY

For all practical purposes, there is no difference between Newton's concept and Einstein's, which is why Newton's simpler equations are still used in astronomy even though 'superseded'. Both are equally reliable ways of calculating the orbital paths of the planets, and predicting their positions in space at any given time, to a high degree of accuracy.

Ptolemy's system too for that matter (today called "deferments and epicycles") in his book, the "Almagest", was the original method of calculation used. It was more than fit for purpose, despite the philosophical differences of the model behind the mathematics. Initially devised by a brilliant Greek mathematician, Apollonius of Perga, two hundred years before the birth of Christ, the sun, moon and each planet was imagined as being set in the circumference of its own small rotating sphere. Each small sphere was then balanced with its axis on the circumference of its own much larger rotating sphere. The large spheres, each with the horizontal plane circumference representing the orbital path of its planet, sat one inside another like Russian dolls. Positioned motionless in the centre was the Earth.

Today our picture of the universe contrasts greatly with Ptolemy's geocentric one, both conceptually and mathematically, but the point is that the mathematics of Ptolemy are *no less valid* for his model **now** than they were throughout the **almost two thousand years** during which they had no competition. Subsequent developments in the field did not render them unworkable, as may sometimes be innocently assumed, only *unfashionable*.

## REVOLUTION BY REVELATION

The sun rose on a new dawn of thought, quite literally, when Copernicus advanced the shocking and heretical theory that placed our star at the centre of the solar system instead of the Earth. Although heliocentricity found support in his native Poland and

in Eastern Europe, the new philosophy came up against strong opposition in Rome, and the resulting controversy greatly delayed its acceptance in the West.

The concept seemed to defy both the Bible and common sense. It contradicted the far more natural geocentric, *and egocentric*, long-held belief in a static Earth, not only viewed as the centre of the universe (around which the rest of the cosmos was clearly seen by all to rotate on a daily basis), but also as the centre of human existence and God's attention. It is therefore unsurprising that it was **not** an easy position to relinquish!

Nor did revolution happen quickly. Acclimatisation to the new paradigm was a gradual and lengthy process. It is generally considered that the sun did not finally go down on the old philosophy until Newton produced his book, the "Principia", which offered astronomers an alternative to Ptolemy's mathematical model for the first time.

It may be an impression of the totality of the transformation, both within its pages and in our own scientific progress since, or something else entirely, which allows us to imagine that *everything* had changed between the publications of the books of Copernicus and Newton. However, whilst a great deal *did* indeed change during this period, at least one vital detail did not.

## ORIGINS OF THE IDEA OF GRAVITY

In an essay concerning wrong assumptions it would be most appropriate here, if a little embarrassing also, to admit to a couple of early misconceptions of my own, as a result of my inexcusably poor knowledge of history.

At first, I incorrectly presumed that the concept of gravity had originated with the start of modern astronomy, by which I mean when Galileo, having used an instrument originally designed as a surveying aid to look into the night sky, championed the heliocentric cause on behalf of the late Copernicus.

Then, when I read the history of Isaac Newton, I realised I was mistaken but for all the wrong reasons, and I made my second erroneous assumption. Upon reading the oft-quoted words of a Newton biographer, William Stukeley, relating the well-known anecdote of the apple, I misinterpreted the sentence "... when formerly the notion of gravitation came into his mind", taking it to mean that 'gravitation' was Newton's concept instead of an existing one! [3]

I discovered my error a short while later when I learned, of course, that everyone had *always* known gravity was the force that draws everything to the ground! However, it immediately struck me that there was **no scientific basis** for believing it. The whole idea of gravity *as a force of attraction* was really an **unproven assumption** carried forth from the egocentric era of Ptolemy's concentric circles.

My own misguidance had shown me where the problem likely originated!

## EINSTEIN'S GRAVITY

When, at the top of this essay, I stated my assertion that gravity is not a force of attraction, I was **not** at all following Einstein's example in general relativity, in which he relegates the concept from its classification as a force altogether!

Gravity most assuredly IS a force, an energy field in the physical world, and I feel it is terribly wrong to presuppose that it is not.

It is the underpinning force of the rest of the universe, the greatest force of all.

If the big bang was the first word, then gravity was the first reply!

**Gravity is the equal and opposite reaction to the very birth of the universe, a reaction still happening to this day.**

However, I am getting ahead of myself!

The whole idea of gravitational force is regarded as a mistake in general relativity. In a *mathematical* solution of sheer brilliance, the gravitational motion of any object becomes merely a consequence of the curved nature of space-time, as I am sure you already know.

You will, I hope, shortly see *why* this (mathematical, figurative) concept actually matches the observed effect. Also how Einstein could be said to have circumnavigated the problem in reality, by sort of summarising the **force** as a whole into its resultant effect. He ingeniously created the perfect *mathematical overview* of gravity, and all without knowing the reality - as you will soon understand it - of the situation he was describing!

**Paradoxically, at least with regard to general relativity, I will show *how*, or rather why, the *FORCE* of gravity gives space-time its apparent curvature!**

#### MISINTERPRETATION OF THE PRINCIPIA

Newton's great leap of intuition, as we all now know, was to connect the force that keeps our feet on the ground to the force that keeps the moon in orbit around the Earth, plus the Earth and other planets in orbit around the sun. This he did in a moment or two of idle thought on a pleasant summer afternoon, while relaxing in his own garden here in Lincolnshire (not many miles from where I sit now actually), whilst the Great Plague was raging through London.

Almost twenty years later, following a 'light-bulb moment' whilst Edmond Halley (later famed by 'Halley's Comet') was visiting him at Cambridge, their discussion of the geometry and mathematics of astronomy precipitated the creation of Newton's 'great work'. His book, the Principia, is regarded as *the foundation* of modern **physics**, and rightly so, containing as it does the three irrefutable laws of motion. Also, for the first time, it gave the gravitational force a definition, in order to better illustrate the meaning and use of his equations on the subject.

However, this is where our problem with gravity really begins. **Not with the book itself, but with OUR INTERPRETATION of it as an authority on *physics*.**

The clue is in its title: the "*Mathematical Principles Of*" the workings of nature, i.e. *of* the physical world.

It is a common misconception to assume the Principia is a book of physics as we see the subject today when, *first and foremost*, it is a book of **mathematics**, which laid the *foundations* of dynamics for future physicists. Newton was *not* a "physicist". He wrote the Principia as a book of **applied mathematics**, *in which he described their application to the real world and to astronomy to the best of his understanding of the underpinning scientific principles for the time in which he lived.*

Newton had studied mechanical matters and had puzzled over the nature of light years before the speed of the light wave was first measured, this being achieved only a decade before the publication of his book. He was unaware of so many things we take for granted: the electric current, the structure of the atom, quarks, neutrinos...

... Black holes (or "invisible stars", to use my own preferred term)...

... Our place in a universe of billions of galaxies, the expansion of space...

... And the quantum of energy.

## ACTION AT A DISTANCE

The Principia contained a lot of new information and, with regard to gravity in particular as I have already shown, knowledge based on established belief. However, despite the intuitive progress Newton made in connecting the action of gravity to the motions of the planets, he was not comfortable with the idea of the force acting on an object without physical contact between object and force, the push and pull of everyday experience on Earth.

To quote Einstein:

“It was Newton’s theory of gravitation that first assigned a cause for gravity by interpreting it as action at a distance proceeding from masses” which “seemed to be in conflict with principle springing from the rest of experience that there can be reciprocal action only through contact, and not through immediate action at a distance”. [4]

To quote Bertrand Russell on the subject:

“Even Newton regarded this ‘action at a distance’ as impossible, **and believed that there was some hitherto undiscovered mechanism by which the sun’s influence was transmitted to the planets**”. [5]

## THE ILLUSION OF ATTRACTION

With the passage of time came the discovery of the electron and the electro-magnetic (“e-m”) field. Because of how the field acts, the obvious example being the way a magnet causes an object such as a steel screw, or nail, to jump into contact with it through the intervening gap, we envisage a field of energy emanating from the magnet as the (premature) answer to the ‘action at a distance’ conundrum of gravity.

To quote Einstein again:

“As a result of the more careful study of electro-magnetic phenomena, we have come to regard action at a distance as a process impossible without the intervention of some intermediary medium”. [6]

Hence the concept of a field around an object, filled with waves (of particles) that convey change, passing on the action because of something **real** that fills the space, i.e. the magnetic force, pictured around the magnet, which operates on the steel screw.

However, whilst the Earth’s own magnetic field appears to stretch into space a fair distance compared to our own puny human height, in relation to any other distance in space, the field’s reach is unimaginably insignificant. In fact, taking relative size into account, the Earth’s field of magnetic force is a very close-range entity, comparable to the field of a simple bar magnet!

Furthermore, both electricity and magnetism are (to use my own term) ‘two-tone’ forces, by which I mean that electricity has two opposing charges (positive and negative) and magnetism has two opposing poles (north and south), the latter always appearing in pairs. The gravitational force has no such identifying features.

The reality is that we only **assume** the gravitational effect occurs in an analogous manner to the magnetic field, despite having not one iota of evidence that the Earth (or any other body) *produces* a gravitational field around itself!

## ETHER

Newton had no knowledge of ‘field theory’ (which I believe originated with Michael Faraday in the 19<sup>th</sup> century) or the electron (discovered by J. J. Thomson at

Cambridge later). Neither did the French philosopher, Descartes. Therefore, when the latter conceived the idea of an “ether” field, in an attempt to explain the motion of the planets, all he had for an analogy was the movement of water with which to describe it. This Newton, having studied the motion of liquids, went out of his way to debunk in the Principia.

The idea of “luminiferous ether” persisted until the last century, however, in order to address the phenomenon of light waves, because of the fact that waves need a medium through which to travel.

## A MISINTERPRETATION OF RESULTS?

The final nail in the coffin for the ether came when the famous Michelson-Morley experiment seemed to fail in its attempt to detect it. I have not the space for any great elucidation here (the ether as a subject would be an essay in itself anyway), but I must just point out something about the experiment, which seems to have been overlooked. At least, I can find no mention of it.

The experiment itself was an attempt to detect movement to the left or right of the ‘interference fringes’ produced when light passes through a lens, in order to show that the Earth was passing through an ether field on which the light waves were travelling. Despite the apparatus being incredibly sensitive, nothing was observed.

When the photon was discovered, an explanation for the negative result was given that it was because light was made up of a stream of particles.

The relativistic explanation is that nothing happened because the apparatus can be said to shrink in the direction of the motion, mathematically anyway.

However, unless I am greatly mistaken in my comprehension of the ‘redshift’ phenomenon of the light spectrum, surely the real reason that nothing was noticed is because its **colour would have changed** slightly, becoming a little more blue due to a slight compression of the **wavelength**, and no-one was actually looking for that?

If I am mistaken, I would welcome the rebuttal.

## THE FACTS OF THE PROBLEM OF GRAVITY

There are **two** details to be addressed as regards the problem of gravity, these being 1) whence the force arises, and 2) how it operates, such as to carry the specific information of an object’s mass to another object through space.

By keeping Newton’s law of gravitation itself whilst ignoring his interpretation of it, *all* we have left is a specific three-way relationship, between **mass** and **weight** and **distance**, of every object in space in relation to every other. **Nothing** else.

Incidentally, I define:

1. **mass**, as in the amount of matter, i.e. the total number of individual protons and neutrons in all the atoms in an object,
2. **weight**, as in pressure, energy, a cause of attempted motion which can be converted into another energy form, i.e. a different force/motion/wave *or* into a particle (which Einstein mathematically proved by the fact of energy/matter equivalence in  $E = mc^2$ ), which cannot be lost and must always move forward somehow (which, by the way, is why time cannot go backwards, I believe),
3. **distance** as in gap (!).

## THE SOLUTION – PART ONE

The key to understanding from where gravity arises is the change of perspective I mentioned at the top of this essay.

When I set out to understand gravity about eight years ago (as part of a much larger ongoing investigation towards other ends), the first book I read – from the local library and long since returned – was John Gribben’s “Galaxies”, which contains a most revealing and illusion-highlighting contradiction, the gist of which I have never forgotten.

**Describing the motion of the stars in the centre of the Milky Way, orbiting close to the super-massive invisible star (or “black hole”) said to be there, Gribben says that *gravitationally-speaking, THEY DO NOT KNOW that it is there.***

Surely that would not be possible if it really was pulling on them?

It could only be true if the massive star/hole is not pulling on them...

...But perhaps the opposite?

I suggest that the only alternate explanation that fits all the facts I have presented (plus more which I lack space to include), and also without requiring alteration of the existing mathematics, is the solution that ***the force of gravity emanates from outside the galaxy, from intergalactic EXPANDING space, and acts to PUSH the stars in a galaxy into the really big invisible one in the middle, thus driving them forward in their orbits through momentum in the meantime.***

The **ILLUSION OF ATTRACTION** is therefore created by the **mass** of one object ***blocking off the force of gravity*** from another object, in a straight line of course (as proven by light) between the two, thus preventing that part of the field reaching the other object from the direction of the first one, and vice versa.

Therefore, when a solid body in space, such as a passing comet, comes close enough to another body, such as a planet or star, so as to fall within its gravitational ‘shadow’, the path of its trajectory will lean towards the shadow’s source until its forward motion carries it out of range.

This is the real explanation of “space-time curvature”, I promised earlier. Space itself does not curve. It can be regarded as doing so *mathematically*, however, because of the straight-line forward **motion** of an object, whose **path** in space is seen to curve.

Newton’s law of gravitation already quantitatively describes the mathematical relationships of all the variables involved more than adequately.

In the case of the tidal motion on Earth caused by the presence of the moon, the moon *does not pull* on the tides, but rather blocks the force that otherwise pushes the water down.

I said it was simple! (But don’t start kicking yet).

(Incidentally, for further proof, may I direct your attention to the Cosmic Background Radiation first detected in the 1960s by Penzias and Wilson using the Bell communications antenna in New Jersey. U.S.A.).

## THE SOLUTION – PART TWO

One question remains: how could a small dense neutron star act like a much more massive star in blocking the force of gravity by an equal amount?

The answer is the **quantum**, the minimum package size, of graviton energy, as I finally realised after a few years of reading physics – in contrast to my methodology for the ‘part one’ answer which, I will not lie, I derived using a combination of blind logic and ignorance. Had Newton had our data, he would have done it properly!

I read somewhere that the size of an atom’s nucleus is a millionth of a billionth of the atom’s total size. Now I have no idea how many quanta of graviton energy waves pass through every atom *without* hitting its nucleus (or an electron?), but the relevant detail here is the bit of it that **does** make contact, and is either absorbed or reflected back, to be deducted from the total that passes through. It does not matter whether a body’s mass is compacted in a relatively small area or spread out over a massive one, as the total number of atoms is the same either way and it stops the same proportion of the energy from passing through whatever its density.

Therefore, the reason an object’s size is **irrelevant** in blocking gravity, is the same reason that its mass is relevant: the quantum.

(You may like to compare the graviton with the “Higgs boson”, by the way)

## CLASSICALISATION OF QUANTUM DUALITY

As I may never have your attention again, it would be unforgivable of me to fail to offer a classical explanation for the “particle/wave duality” in quantum physics, as it bears direct relevance to the above.

As we know, light (and therefore all other e-m energy also) is sometimes a particle and sometimes a wave. However there is nothing magical or mysterious about it. Each has a common denominator. So, what is the difference between a wave and a particle? Answer: e-m wave speed! (or “the speed of light”, as it is more commonly termed).

To put it another way, just as there are the 3 ‘states of matter’: “solid, liquid, gas”, there are 2 states of energy: the wave and the particle. The first is when in motion and the second is when stationary (relative to another object or particle, of course).

Again, it is as simple as that!

(Or am I mistaken?)

## FINAL NOTE

I did have more to tell, but the page limit prevents me elucidating any further. I hope I have helped and that you will read between the lines for that which now must remain unsaid.

May I suggest that you investigate the unique geometry of the gravitational field, which contains a very definite repeating pattern, a “wave signature” left throughout the whole of Mother Nature by impacting particles of energy. The detail is visible in the water vapour that condenses in our atmosphere (especially in the “mackerel sky” cloud form, photographs of which can be viewed on my ‘blog’, called “wavecapture” on Wordpress), and the geology under our feet, both of which one must *learn* to see in all its three-dimensional glory. Only then will the incredible and amazing secret of how gravity is responsible for our very existence be revealed to your eyes as it was to mine.

That really does sound rather crazy, doesn’t it?

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