

Definition of Cosmology

From its Greek etymology **cosmology** (*kósmos* world; *lógos*, knowledge or science) means the **science of the world**.

Cosmology is the natural complement of the special sciences. It begins where they leave off, and its domain is quite distinct from theirs. The scientist determines the immediate cause of the phenomena observed in the mineral or the organic world: he formulates their laws and builds these into a synthesis with the help of certain general theories, such as those of light, of heat, and of electricity. The cosmologist, on the other hand, seeks the ultimate causes, not off this or that class of beings or of phenomena, but of the whole material universe. He inquires into the constituent nature of corporeal beings, their destiny, and their first cause.

History of Cosmology Timeline

Many different ancient cultures developed mythology based upon the cosmos.

Scientific cosmology - understanding the universe without recourse to divine beings is said to begin with the Ancient Greeks.

500 BC - 300 BC Pythagoras believed the earth was in motion and had knowledge of the periodic numerical relations of the planets, moon, and sun. The celestial spheres of the planets were thought to produce a harmony called the music of the spheres.

Aristotle taught that rotating spheres carried the Moon, Sun, planets, and stars around a stationary Earth. The Earth was unique because of its central position and its material composition.

Greek philosophers estimated the distance to the Moon, and tried to calculate the size of the finite universe.

300 BC - 210 BC - Aristarchus of Samos. Greek astronomer and mathematician. He is considered the first person to propose a scientific heliocentric model of the solar system, placing the Sun, not the Earth, at the center of the known universe. He correctly deduced the other planets in correct order from the Sun.

200 AD - The Ptolemaic system. Ptolemy proposes an Earth centered Universe, with the Sun and planets revolving around the Earth. Perfect motion should be in circles, so the stars and planets, being heavenly objects, moved in circles. However, to account for the complicated motion of the planets, which appear to periodically loop back upon themselves, epicycles had to be introduced so that the planets moved in circles upon circles about the fixed Earth.

1401 - 1464 Nicholas de Cusa suggests that the Earth is a nearly spherical shape that revolves around the Sun, and that each star is itself a distant sun.

1500 onwards - Several astronomers propose a Sun-centered Universe, including Aryabhata, Bhaskara I (Indian mathematician astronomers) Ibn al-Shatir (Arab Islamic astronomer) and Copernicus (European).

Nastier al-din altissimo (Arabian astronomer) created a particularly innovative addition to Ptolemy's circular motions. The "Tustin couple" calculates a linear motion from a combination of uniform circular motions. In his revolutionary work on the solar system published in 1543, Copernicus used a very similar device. Copernicus cited the works of Islamic astronomers and certainly learned from them. Historians are still trying to determine the full extent of his intellectual debt.

1576 - Thomas Digges modifies the Copernican system - proposing a multitude of stars extending to infinity.

1584 - Giordano Bruno proposes a non-hierarchical cosmology, wherein the Copernican solar system is not the Centre of the universe, but rather, a relatively insignificant star system, amongst an infinite multitude of others (God had no particular relation to one part of the infinite universe more than any other). A universe which, like that of Plotinus in the third century A.D., or Blaise Pascal's nearly a century after Bruno, had its center everywhere and its circumference nowhere.

1600 - Tycho Brahe realised that if the Earth was moving about the Sun, then the relative positions of the stars should change as viewed from different parts of the Earth's orbit. But there was no evidence of this shift, called parallax. Either the Earth was fixed, or else the stars would have to be fantastically far away.

Tycho himself was not a Copernican, but proposed a system in which the planets other than Earth orbited the Sun while the Sun orbited the Earth.

1609 - Johannes Kepler uses the dark night sky to argue for a finite universe. Kepler discovered the key to building a heliocentric model. The planets moved in ellipses, not perfect circles, about the Sun - known as the Laws of planetary motion.

Newton later showed that elliptical motion could be explained by his inverse-square law for the gravitational force.

1609 - Galileo Galilei observes moons of Jupiter in support of the heliocentric model. (Heliocentrism is the theory that the Sun is at the center of the Universe and/or the Solar System. The word is derived from the Greek (Helios = "Sun" and kentron = "Center").)

1687 - Newton: Laws of motion, law of universal gravitation, basis for classical physics

1720 - Edmund Halley puts forth an early form of Olbers' paradox

1744 - Jean-Philippe de Cheseaux puts forth an early form of Olbers' paradox

1791 - Erasmus Darwin pens the first description of a cyclical expanding and contracting universe.

1826 - Heinrich Wilhelm Olbers puts forth Olbers' paradox

1848 - Edgar Allan Poe offers a solution to Olbers' paradox in an essay that also suggests the expansion and collapse of the universe.

1900 - The astronomer and mathematician Bessel finally measured the distance to the stars by parallax. The nearest star (other than the Sun) turned out to be about 25 million, million miles away! (By contrast the Sun is a mere 93 million miles away from the Earth.)

1905 - Albert Einstein publishes the Special Theory of Relativity, positing that space and time are not separate continuums.

1915 - Albert Einstein publishes the General Theory of Relativity which requires a finite spherical universe (it cannot be infinite because of Mach's Principle, with which Einstein strongly agreed, that the mass of a body is finite, is determined by all other matter in the universe, thus all other matter in universe must be finite). What then surrounds this finite spherical universe? Einstein used his spherical ellipsoidal geometry of General Relativity to propose curved space. What stops finite spherical universe gravitationally collapsing? Einstein proposed his Cosmological / Antigravity Constant.

1922 - The Russian mathematician and meteorologist Friedmann realised that Einstein equations could describe an expanding universe. Einstein was reluctant - believing in a static (non-expanding universe).

1929 - The American astronomer Hubble established that some nebulae (fuzzy patches of light on the night sky) were indeed distant galaxies comparable in size to our own Milky Way.

Hubble discovers the red shift with distance. If Doppler shift caused this redshift then it meant stars / galaxies were moving apart. This is interpreted as evidence that the universe is expanding. Einstein, swayed by this argument, changed his mind - thus his comment 'My biggest blunder' referring to the Cosmological Constant.

1950 - The British astronomer Fred Hoyle dismissively coins the phrase "Big Bang", and the name stuck. i.e. the Universe had been born at one moment, about ten thousand million years ago in the past and the galaxies were still travelling away from us after that initial burst. All the matter, indeed the Universe itself, was created at just one instant.

1965 - Penzias and Wilson discovered a cosmic microwave background radiation. This was interpreted as the faint afterglow of the intense radiation of a Hot Big Bang, which had been predicted by Alpher and Hermann back in 1949.

Since the **1970's** almost all cosmologists have come to accept the Hot Big Bang model.

1986 - Dr Milo Wolff discovers the Wave Structure of Matter.

1997 - Geoff Haselhurst independently discovers the [Wave Structure of Matter](#). Describing an [infinite eternal space](#) full of matter, but matter only interacts with other matter in a finite spherical region of space (our finite spherical 'observable' universe within infinite space). It is the Out Waves from this other matter in our observable universe that forms into our In Waves (Huygens Principle) which then explains [Mach's Principle](#) and the [redshift with distance](#).

Brief Summaries of Famous Astronomers

Pythagoras (582 BC – 496 BC)

In astronomy, the Pythagoreans were well aware of the periodic numerical relations of the planets, moon, and sun. The celestial spheres of the planets were thought to produce a harmony called the music of the spheres. These ideas, as well as the ideas of the perfect solids, would later be used by Johannes Kepler in his attempt to formulate a model of the solar system in his work The Harmony of the Worlds. Pythagoreans also believed that the earth itself was in motion.

Claudius Ptolemaeus (85 – c. 165)

Claudius Ptolemaeus, known in English as Ptolemy, was a Greek geographer, astronomer, and astrologer who probably lived and worked in Alexandria in Egypt.

Ptolemy was the author of the astronomical treatise known as the Almagest ("The Great Treatise") some time around the 2nd century, C.E. It was preserved, like most of Classical Greek science, in Arabic manuscripts and only made available in Latin translation in the 12th century.

In this work, one of the most influential books of Antiquity, Ptolemy compiled the astronomical knowledge of the ancient Greek and Babylonian world; he relied mainly on the work of Hipparchus of three centuries earlier. Ptolemy formulated a geocentric model of the solar system (explaining the motions of the heavens in which the earth was the center of the universe and all other celestial bodies rotated around it) which remained the generally accepted model in the Western and Arab worlds until it was overthrown by the Copernican revolution after Galileo Galilei and Copernicus discovered that the planets orbited the sun (heliocentrism).

Nicholas of Cusa (1401 - 1464)

Nicholas is also considered by many to be a man ahead of his time in the field of science. Though he predated Copernicus by half a century, Nicholas suggested in some of his scientific writings that the Earth was a nearly spherical shape that revolved around the Sun, and that each star is itself a distant sun. He was not, however, describing a scientifically verifiable theory of the universe: his beliefs (which proved uncannily accurate) were based almost entirely on his own personal speculations and numerological calculations. He made contributions to the field of mathematics by developing the concepts of the infinitesimal and of relative motion. Cusa was the first to use concave lenses to correct myopia.

Nicolaus Copernicus (1473 – 1543)

Nicolaus Copernicus was a Polish astronomer, mathematician and economist who developed the heliocentric (Sun-centered) theory of the solar system in a form detailed enough to make it scientifically useful.

His theory about the Sun as the center of the solar system is considered one of the most important discoveries ever, and is the fundamental starting point of modern astronomy and modern science itself, (it inaugurated the scientific revolution). His theory affected many other aspects of human life as well, opening the door to young astronomers everywhere to challenge the facts and never take anything at face value.

Tycho Brahe (1546 – 1601)

Tycho Brahe was a Danish nobleman, well known as an astronomer, astrologer and alchemist.

Tycho was the preeminent observational astronomer of the pre-telescopic period, and his observations of stellar and planetary positions achieved unparalleled accuracy for their time. For example Brahe measured Earth's axial tilt as 23 degrees and 31.5 minutes, which he claimed to be more accurate than Copernicus by 3.5 minutes. After his death, his records of the motion of the planet Mars enabled Kepler to discover the laws of planetary motion, which provided powerful support for the Copernican heliocentric theory of the solar system.

Tycho himself was not a Copernican, but proposed a system in which the planets other than Earth orbited the Sun while the Sun orbited the Earth. His system provided a safe position for astronomers who were dissatisfied with older models but were reluctant to accept the Earth's motion. It gained a considerable following after 1616 when Rome decided officially that the heliocentric model was contrary to both philosophy and Scripture, and could be discussed only as a computational convenience that had no connection to fact.

Giordano Bruno (1548 – 1600)

Giordano Bruno was an Italian philosopher, astronomer, and occultist executed as a heretic, popularly regarded as a martyr to the cause of freedom of thought because his ideas went against church doctrine.

In the second half of the 16th century, the theories of Copernicus began diffusing through Europe. Although Bruno did not wholly embrace Copernicus's preference for mathematics over speculation, he advocated the Copernican view that the earth was not the center of the universe, and extrapolated some consequences which may seem like common sense in the 21st century, but which were radical departures from the cosmology of the time.

Bruno went beyond the heliocentric model to envision a universe which, like that of Plotinus in the third century A.D., or like Blaise Pascal's nearly a century after Bruno, had its center everywhere and its circumference nowhere. Bruno believed, as is now universally accepted, that the Earth revolves and that the apparent diurnal rotation of the heavens is an illusion caused by the rotation of the Earth around its axis. He also saw no reason to believe that the stellar region was finite, or that all stars were equidistant from a single center of the universe. In these respects, his views were similar to those of Thomas Digges (1576).

In 1584, Bruno published two important philosophical dialogues, in which he argued against the planetary spheres. Bruno's infinite universe was filled with a substance - a pure air, aether, or spiritus - that offered no resistance to the heavenly bodies which, in Bruno's view, rather than being fixed, moved under their own impetus. Most dramatically, he completely abandoned the idea of a hierarchical universe. The Earth was just one more heavenly body, as was the Sun. God had no particular relation to one part of the infinite universe more than any other. God, according to Bruno, was precisely as present on Earth as in the Heavens, an immanent God rather than a remote heavenly deity. Bruno also affirmed that the universe was homogeneous, made up everywhere of the four elements (water, earth, fire, and air), rather than having the stars be composed of a separate quintessence. Essentially, the same physical laws would operate everywhere, although the use of that term is anachronistic. Space and time were both conceived as infinite. There was no room in his stable and permanent universe for the Christian notions of divine Creation and Last Judgement.

Galileo Galilei (1564 – 1642)

Galileo Galilei was a Tuscan astronomer, philosopher, and physicist who is closely associated with the scientific revolution. His achievements include improving the telescope, a variety of astronomical observations, the first law of motion, and supporting Copernicanism effectively.

On January 7, 1610 Galileo discovered three of Jupiter's four largest moons: Io, Europa, and Callisto. Ganymede he discovered four nights later. He determined that these moons were orbiting the planet since they would occasionally disappear; something he attributed to their movement behind Jupiter. He made additional observations of them in 1620. Later astronomers overruled Galileo's naming of these objects, changing his Medicean stars to Galilean satellites. The demonstration that a planet had smaller planets orbiting it was problematic for the orderly, comprehensive picture of the geocentric model of the universe, in which everything circled around the Earth.

Galileo noted that Venus exhibited a full set of phases like the Moon. The heliocentric model of the solar system developed by Copernicus predicted that all phases would be visible since the orbit of Venus around the Sun would cause its illuminated hemisphere to face the Earth when it was on the opposite side of the Sun and to face away from the Earth when it was on the Earth-side of the Sun. By contrast, the geocentric model of Ptolemy predicted that only crescent and new phases would be seen, since Venus was thought to remain between the Sun and Earth during its orbit around the Earth. Galileo's observation of the phases of Venus proved that Venus orbited the Sun and lent support to (but did not prove) the heliocentric model.

Johannes Kepler (1571 – 1630)

Johannes Kepler, a key figure in the scientific revolution, was a German astronomer, mathematician and astrologer. He is best known for his laws of planetary motion.

Like previous astronomers, Kepler initially believed that celestial objects moved in perfect circles. These models were consistent with observations and with the Platonic idea that the sphere was the perfect shape. However, after spending twenty years doing calculations with data collected by Tycho Brahe, Kepler concluded that the circular model of planetary motion was inconsistent with that data. Using Tycho's data, Kepler was able to formulate three laws of planetary motion, now known as Kepler's laws, in which planets move in ellipses, not circles. Using that knowledge, he was the first astronomer to successfully predict a transit of Venus (for the year 1631).

Kepler discovered the laws of planetary motion while trying to achieve the Pythagorean purpose of finding the harmony of the celestial spheres. In his cosmologic vision, it was not a coincidence that the number of perfect polyhedra was one less than the number of known planets. Having embraced the Copernican system, he set out to prove that the distances from the planets to the sun were given by spheres inside perfect polyhedra, all of which were nested inside each other. The smallest orbit, that of Mercury, was the innermost sphere. He thereby identified the five Platonic solids with the five intervals between the six known planets — Mercury, Venus, Earth, Mars, Jupiter, Saturn; and the five classical elements.

Does the Most Simple Science Theory of Reality Work?

*Any intelligent fool can make things bigger, more complex, and more violent.
It takes a touch of genius - and a lot of courage - to move in the opposite direction.
(Albert Einstein)*

*Simplicity is the ultimate sophistication.
(Leonardo da Vinci)*

Introduction: The following short article shows you how to deduce the most simple science theory of reality, the wave structure of matter in Space, then deduce from this to show that it works. There is no opinion involved - it shows that science does work - we just needed the correct (most simple) foundations.
Geoff Haselhurst

PS - It is a significant fact that there is not another page on the internet that considers what the most simple science theory of reality is - which is strange given Occam's Razor (principle of simplicity) is fundamental to science. Thus it seems premature to claim science does not really work (the logical positivist / social construct view of postmodern science) without having considered this most simple solution.

1. Deduce the Most Simple Science Theory of Reality

First we deduce that the most simple theory that abides by rules of science (logic from principles = knowledge from senses) must be founded on Space and its properties. This then leads to the spherical standing wave structure of matter in Space (where Space exists with the properties of a wave medium).

Reasons

1.1 The most simple theory must be founded on One thing (substance) existing with properties

This is necessary to abide by two universally accepted principles of Science and Metaphysics;

Science has a Principle of Simplicity / Occam's Razor - "*Essentia non sunt multiplicanda praeter necessitatem*". i.e. The theory which deduces the most things from less assumptions is better, thus the best theory must be founded on the most simple foundation of only one thing existing.

Metaphysics is founded on the Dynamic Unity of Reality - that One Thing / Substance necessarily exists and interconnects the many changing things we experience in the universe.



(Bradley, 1846-1924) We may agree, perhaps, to understand by Metaphysics an attempt to know reality as against mere appearance, or the study of first principles or ultimate truths, or again the effort to comprehend the universe, not simply piecemeal or by fragments, but somehow as a whole.

So our task is now clearer as we are limited to a foundation of only one thing / substance existing from which to explain the reality of this world that we experience.

Aristotle (who first formalized metaphysics and physics) and Leibniz explain this well;



(Aristotle, 340BC) The first philosophy (Metaphysics) is universal and is exclusively concerned with primary substance. ... And here we will have the science to study that which is just as that which is, both in its essence and in the properties which, just as a thing that is, it has. ... That among entities there must be some cause which moves and combines things. ... There must then be a principle of such a kind that its substance is activity.

things with one material or general.



(Gottfried Leibniz, 1646 - 1716) Reality cannot be found except in One single source, because of the interconnection of all another. ... I do not conceive of any reality at all as without genuine unity. ... I maintain also that substances, whether immaterial, cannot be conceived in their bare essence without any activity, activity being of the essence of substance in

As we shall see,

there is an important clue here relating to motion / activity being a necessary property of substance.

1.2 This One Thing / Substance must be Space (that we all commonly experience)

There are many different minds and material things but only One common Space. This is true when we consider the Space around us - we all experience many different humans (their bodies & minds) living on Earth which orbits the Sun, which orbits our galaxy as one amongst many billions within the observable universe - yet all this occurs within one common Space.

We can confirm this by asking "*What one thing must we remove if we are to imagine nothing existing?*" Well it cannot be matter or mind or time, because we can remove all of those things and there would still be empty space. However, it is impossible to imagine matter, mind or time existing without Space (and this is never experienced).

From this most simple foundation of Space as the one substance that exists we can then deduce that it must be infinite (not bounded by another substance), eternal (not created by another substance) and continuous (not made of parts). As Aristotle wrote;

This shows us two things: you cannot have parts of the infinite and the infinite is indivisible.

1.3 Matter is formed from the Wave Motion of Space

It is well known that there is a particle-wave duality for light and matter. Given this most simple science theory is founded on One substance, Space, we must consider the Properties of Space, thus we cannot add 'parts / particles' to Space. So we are left only with waves.

Thus there is only one solution - Space must exist with the Properties of a Wave Medium, and matter is formed from wave motions of Space.

So Aristotle and Leibniz were largely correct, they just did not realize that matter's activity / motion really came from the wave motion of Space (a vibrating Space / substance is a simple way to imagine it).

1.4 Matter's Particle Effect is Caused by the Wave Center of the Spherical Standing Wave

Note: This is a two dimensional cross section of a spherical standing wave (there is a moving image below) but it is obviously hard to show a sphere / spherical wave on a flat computer screen so some imagination is needed!

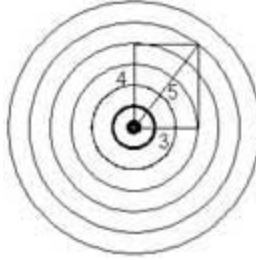


Fig. 1 - The Electron / Positron

The image represents the most simple form of matter, the electron. The positron (anti-matter) is simply the opposite phase standing wave which sensibly explains matter / anti-matter annihilation due to destructive wave interference. (The proton and neutron are more complex wave structures which still need further study)

It is easy to see how the particle effect of matter is formed at the Wave Center.

You can also see why Pythagoras' theorem is not just a mathematical (axiomatic) truth, but **fundamental to physical reality**. If you draw two lines at right angles to one another, radiating from the wave center, one 3 wavelengths, the other 4 wavelengths, then complete the rectangle, magically! you find the hypotenuse is exactly 5 wavelengths long. This is because this wave diagram truly represents how matter interacts / forms its spatial dimensions.

Further, three dimensional space and spherical space are equivalent, as it takes three variables to describe a sphere. In fact the cause of three dimensional space is simply that matter interacts spherically (see Einstein quote below). The fourth dimension of 'time' is really just the motion of the wave (motion causes time).

It is important to realise that this conception of matter founded on waves in Space has a different metaphysical foundation. Currently in physics we have a Metaphysics of Space and Time to which we add discrete 'particles' and thus also continuous 'fields' to connect them (thus we have four different things - space, time, matter particles and fields).

The Wave Structure of Matter is founded on one thing, Space, existing as a wave medium. i.e. A Metaphysics of Space and (wave) Motion - where matter is formed from the spherical standing wave motions of Space. **This unites Space, Time, Motion and Matter**. Thus Aristotle was also correct when he wrote;

Movement, then, is also continuous in the way in which time is - indeed time is either identical to movement or is some affection of it. ... there being two causes of which we have defined in the Physics, that of matter and that from which the motion comes. (Aristotle, Metaphysics)

This is also consistent with the fact that atomic clocks use the natural resonance frequency of the cesium atom (9,192,631,770 Hz) to measure time.

Albert Einstein's Theory of Special Relativity

The argument is really complete - but I just wanted to briefly mention Einstein's relativity as you will then see how close he was to the truth with his rejection of the 'particle' and his attempt at a continuous field theory of matter.

The metrics of **Einstein's special relativity** are founded on Pythagoras' theorem (see **Lorentz Transformation** below) where an electron changes from having a spherical shape to a squashed ellipsoidal shape when it is in motion (which is why an electron contracts in length with motion). The important point is that the mathematics is founded on a sphere because matter interacts spherically with other matter in the Space around it. As Einstein writes;

From the latest results of the theory of relativity it is probable that our three dimensional space is also approximately spherical, that is, that the laws of disposition of rigid bodies in it are not given by Euclidean geometry, but approximately by spherical geometry. (Albert Einstein, 1954)

Special relativity is still based directly on an empirical law, that of the constancy of the velocity of light where $dx^2 + dy^2 + dz^2 = (cdt)^2$ and cdt is the distance traveled by light c in time dt .

The defining equation of the metric is then nothing but the Pythagorean theorem applied to the differentials of the co-ordinates. (Note: In the above diagram $dx=3$, $dy=4$, $dz=0$, $cdt=5$)

In the special theory of relativity those co-ordinate changes (by transformation) are permitted for which also in the new co-ordinate system the quantity $(cdt)^2$ equals the sum of the squares of the co-ordinate differentials. Such transformations are called Lorentz transformations. (Albert Einstein, 1934)

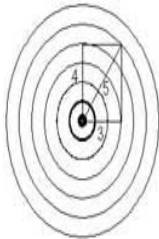


Fig. 2 - The Lorentz Transformation

In the Lorentz Transformations matter becomes a squashed ellipsoid with motion. However, pythagoras' theorem remains true even when the sphere is a squashed ellipsoid.

It is this change in curvature of the sphere when an electron is accelerated that Einstein then related to matter's gravity / energy fields which curve the 4D space-time continuum. But really the 4D space time continuum of Einstein's general relativity is simply a moving spherical wave in Space. Thus the 'curvature of the 4D space-time continuum' is just the curvature of the spherical (ellipsoidal) wave, which changes when the wave center 'particle' is accelerated.

Thus the most simple science theory of reality requires that matter is not a tiny particle separate from Space, instead it is a large spherical spatially extended wave structure of Space (the size of the **observable universe within infinite Space**).

Einstein's relativity agrees that matter is a structure of space (not a discrete particle in space). His error was to work with continuous

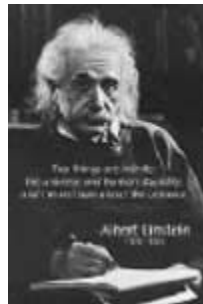
fields in space-time rather than discrete standing waves in continuous Space.

When forced to summarize the general theory of relativity in one sentence:

Time and space and gravitation have no separate existence from matter. ...

Physical objects are not in space, but these objects are spatially extended. In this way the concept 'empty space' loses its meaning. ... The field thus becomes an irreducible element of physical description, irreducible in the same sense as the concept of matter (particles) in the theory of Newton. ... The physical reality of space is represented by a field whose components are continuous functions of four independent variables - the co-ordinates of space and time. Since the theory of general relativity implies the representation of physical reality by a continuous field, the concept of particles or material points cannot play a fundamental part, nor can the concept of motion. The particle can only appear as a limited region in space in which the field strength or the energy density are particularly high. (Albert Einstein, 1950)

History shows that **Einstein's continuous field theory of matter in space-time** does not explain the discrete properties of light and matter found in **quantum theory**. And Einstein also came to suspect this was the case, he writes;



All these fifty years of conscious brooding have brought me no nearer to the answer to the question, 'What are light quanta?' Nowadays every Tom, Dick and Harry thinks he knows it, but he is mistaken. ... I consider it quite possible that physics cannot be based on the field concept, i.e., on continuous structures. In that case, nothing remains of my entire castle in the air, gravitation theory included, [and of] the rest of modern physics. (Albert Einstein, 1954)

We now realize that his relativity theory can be simplified by working with real wave motions of a continuously connected space, rather than 'continuous fields' in 'space-time' (a mathematical construction).

Summary

The rules of science (simplicity) and metaphysics (dynamic unity of reality) force us to conclude that matter is formed from spherical standing wave motions of Space (rather than [Newton's particles](#), or [Einstein's continuous fields](#)). This is why matter can interact with other matter in the Space around it, because all matter (in the observable universe) is interconnected in Space by its spherical in and out waves. The Wave Center causes the discrete 'particle' effect of matter that we see and interact with. The spherical in and out waves cause the field effects, but in a slightly different way than Einstein imagined because they are discrete standing wave effects, rather than his continuous field effects. i.e. Einstein's continuous field theory of matter does not explain discrete properties of light and matter as determined by quantum theory - whereas standing wave interactions (resonant coupling) only occur at discrete wavelengths / frequencies thus explaining the discrete properties of light quanta 'photons'.

The above arguments all seem true to me, none of it is my opinion, they simply state common scientific knowledge combined with our common experience of existing in Space. And I should add that [Erwin Schrodinger](#) actually proposed a wave structure of matter 80 years ago (unfortunately his wave equations were used by Max Born as probability waves to find the location of the particle, rather than treating them as real waves in Space). As Schrodinger explains:



*What we observe as material bodies and forces are nothing but shapes and variations in the structure of space. **Particles are just schaumkommen** (appearances). ... The world is given to me only once, not one existing and one perceived. **Subject and object are only one.** The barrier between them cannot be said to have broken down as a result of recent experience in the physical sciences, for this barrier does not exist. ... Let me say at the outset, that in this discourse, I am opposing not a few special statements of quantum physics held today (1950s), I am opposing as it were the whole of it, I am opposing its basic views that have been shaped 25 years ago, when **Max Born** put forward his **probability interpretation**, which was accepted by almost everybody. I don't like it, and I'm sorry I ever had anything to do with it. (Erwin Schrödinger, The Interpretation of Quantum Physics.)*

So now we must see if this Spherical Wave Structure of Matter works - does it correctly deduce the fundamentals of modern physics? Well thanks to the work of retired Professor of Maths Physics, [Dr Milo Wolff](#), we can show with mathematical / logical precision that it works perfectly.

2. The Wave Structure of Matter Deduces Fundamentals of

Quantum Theory, Einstein's Relativity & Cosmology

Note: To keep things simple I will just explain the most important deduction here, the remainder of the 'Simple Science' arguments are in separate (short) pages which are listed below. The [mathematical physics](#) page has the full list of [Wave Structure of Matter mathematical deductions](#) (which is substantial, though there is still obviously much to do).

The most fundamental (and simple) thing to check is what we deduce for relative motion and see if it matches known results of the two fundamental theories of physics. i.e. Matter's relativistic mass increase (Einstein's special relativity) and the de Broglie wavelength (quantum theory and the wave properties of matter) which are both deduced from the relative motion of matter.

So we should find that the Doppler shifted wave equations for two spherical standing waves with relative motion (of their wave center 'particles') show terms in the resultant wave equations that exactly match quantum theory's de Broglie wavelength and Einstein's relativistic mass increase (where mass **m** equates to frequency **f** as **E=hf=mc²**).

We find that it exactly deduces these two terms. This is absolutely remarkable - for the first time the two central theories of modern physics (quantum theory and Einstein's special relativity) are united by a single theory, which was itself deduced as the most simple science theory of reality.



You can read the [deduction by Dr Milo Wolff](#) (Retired Prof. of Maths Physics) or you can view his video where he explains this (I filmed this back in 2000 at Berkeley university - it is well worth watching!). [Milo Wolff Video Interview - See all Milo Wolff Videos](#) (The video is also on my [physics philosophy](#) page at YouTube)

Summary / Conclusion

I have known of the wave structure of matter for ten years now. And over that time I have slowly read the history of [physics](#), [philosophy](#) and [metaphysics](#). It is now blindingly obvious to me that Science does actually work - we just had to get rid of the wrong foundation of matter with particle properties, and consider space and its wave properties.

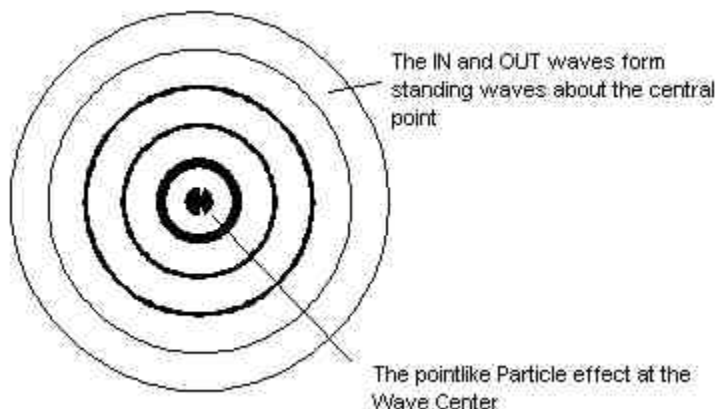
Thus we can now easily recognize the error of Physics (since the time of Newton), where reality is described in terms of many things - the Interconnected Motion of Matter 'Particles' in Space and Time - which further requires continuous 'Forces/Fields' to connect the discrete 'Particles'.

The correct foundation is to describe matter in terms of one thing - the **Wave Motion of Space**. Thus motion applies to space, not matter, i.e. the (wave) motion of Space causes matter, time and forces / fields (interconnection).

Note: We have a page of [wave diagrams](#) that will help you visualise the spherical standing wave structure of matter (WSM) in space. Basically, we only see the high wave amplitude wave-center and have been deluded into thinking matter was made of tiny little 'particles'. A very naive conception in hindsight - and [quantum physics](#) was telling us all along that waves were central to light and matter interactions!

In ending, it is important to emphasize / repeat - this is the most simple science foundation for describing reality - and most importantly, it works. And this surprisingly simple solution was anticipated by some physicists, as John Archibald Wheeler wrote:

Someday we'll understand the whole thing as one single marvelous vision that will seem so overwhelmingly simple and beautiful that



we may say to each other: 'Oh, how could we have been so stupid for so long? How could it have been otherwise!' (J. A. Wheeler)

This is wonderful news for scientists, and for humanity. They just need to be made (gently / urgently) aware of these facts given the [profound consequences](#) for humanity.

As David Bohm wrote;



The notion that all these fragments is separately existent is evidently an illusion, and this illusion cannot do other than lead to endless conflict and confusion. Indeed, the attempt to live according to the notion that the fragments are really separate is, in essence, what has led to the growing series of extremely urgent crises that is confronting us today. Thus, as is now well known, this way of life has brought about pollution, destruction of the balance of nature, over-population, world-wide economic and political disorder and the creation of an overall environment that is neither physically nor mentally healthy for most of the people who live in it. Individually there has developed a widespread feeling of helplessness and despair, in the face of what seems to be an overwhelming mass of disparate social forces, going beyond the control and even the comprehension of the human beings who are caught up in it. (David Bohm, Wholeness and the Implicate Order, 1980)

Geoff Haselhurst (June, 2007)

Personal Note: I am not being arrogant or egotistical at all in writing this (I am a quiet evolutionary philosopher of science who lives in the country, likes to read and think about about truth and reality, to understand how things work). I know this knowledge is very important to our world. The absolute nature of the writing is simply to emphasize the point that science does work if we take simplicity / dynamic unity of reality (metaphysics / necessary connection / Occam's Razor) seriously. However, this obviously requires rejecting the discrete particle conception of matter (which is clearly a naive and primitive conception of matter that pre-dates quantum theory and relativity). And all students of history know that old habits die hard (those standard model particle physicists and big bang cosmologists will not change how they think, instead their discrete and separate 'particle' ideas will die with them). Reality is clearly interconnected and changing, a dynamic unity - this has been known for over three thousand years, and is confirmed by modern physics. The Wave Structure of Matter in Space (vibrating Space or waving energy fields if you prefer) explains how this interconnected change occurs. It is effectively the source code for how the universe functions, obviously with great power and potential for humanity (for good and bad). At least by knowing the truth it gives us greater potential to act wisely - but this is up to us. And the future of Humanity will be decided by this.



(Galileo Galilei, 1600) I wish, my dear Kepler, that we could have a good laugh together at the extraordinary stupidity of the mob. What do you think of the foremost philosophers of this University? In spite of my oft-repeated efforts and invitations, they have refused, with the obstinacy of a gluttoned adder, to look at the planets or Moon or my telescope. ... In questions of science, the authority of a thousand is not worth the humble reasoning of a single individual.



(Max Planck, 1920) A new scientific truth does not triumph by convincing its opponents and making them see the light, but rather because its opponents eventually die, and a new generation grows up that is familiar with it.



Simple Science Quotes

The deepest sin against the human mind is to believe things without evidence.

Science is simply common sense at its best - that is, rigidly accurate in observation, and merciless to fallacy in logic.
(Thomas Huxley)

Ignorance more frequently begets confidence than does knowledge: it is those who know little, not those who know much, who so positively assert that this or that problem will never be solved by science.

(Charles Darwin, Introduction to *The Descent of Man*, 1871)

We are to admit no more causes of natural things than such as are both true and sufficient to explain their appearances.

(Sir Isaac Newton, *Principia: The system of the world*)