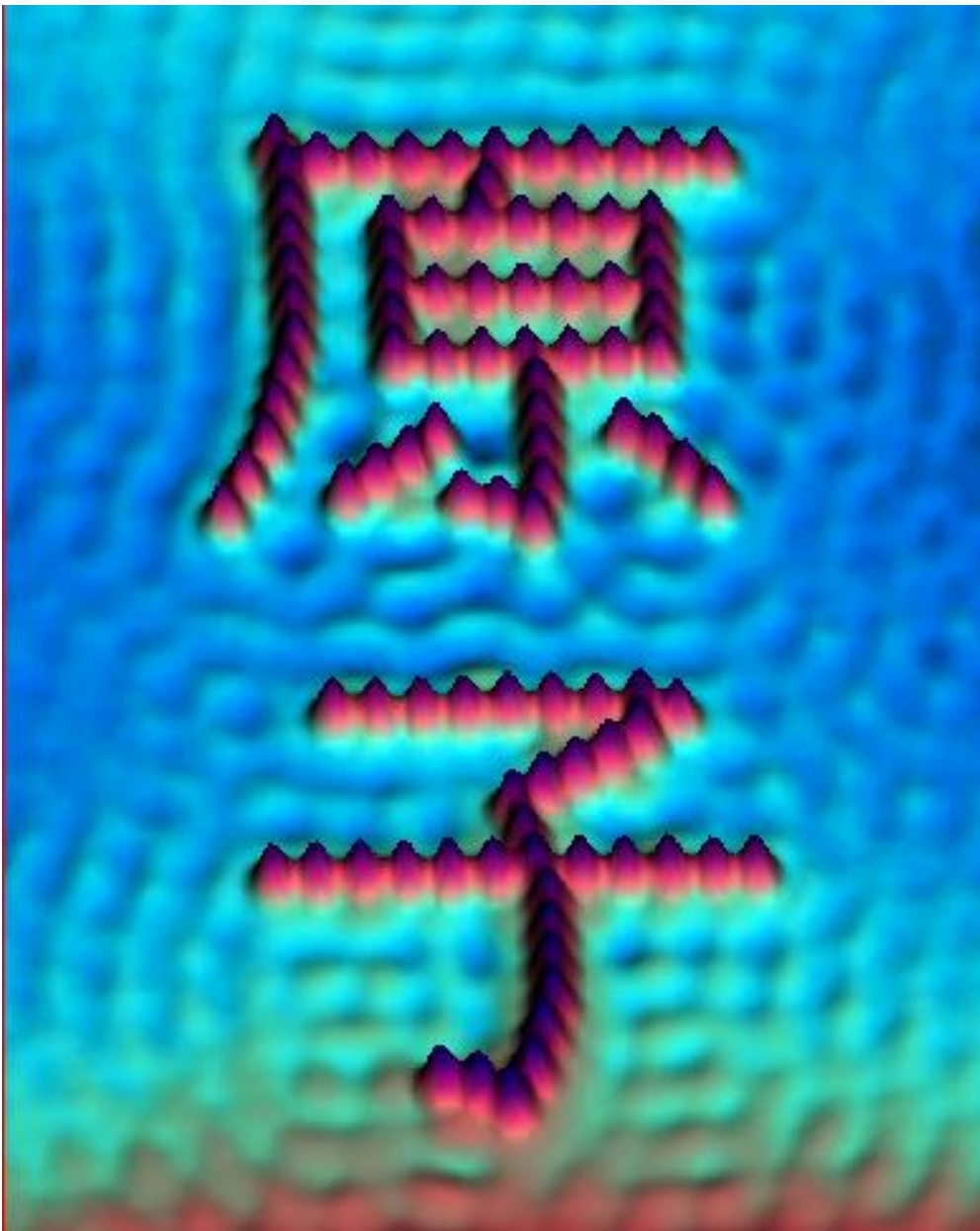


Continuous Atoms

It is now known that atoms are the ultimate **natural** division of matter, in other words it is effectively proven that this is the case.

But up until around 35 years ago the atom was still a hypothetical entity. And, while for most of the last century its existence was almost a certainty, a definitive proof had to wait until the technology of electron microscopy was perfected in the early 1980's.

Since then many thousands of images of atoms in solid matter have been produced and published for all to see, and individual atoms have even been manipulated into positions on surfaces to create company logos, rings and other shapes, as in the image below.



Dalton introduced his solid, spherical, indestructible atoms at the beginning of the 1800's, and, if we ignore the belated acceptance of Avogadro's multi-atomic molecular structures and J J Thompson's 'plumb pudding' model atom later that century, the next significant change to the structure of atoms was Rutherford's model in the early 1900's.

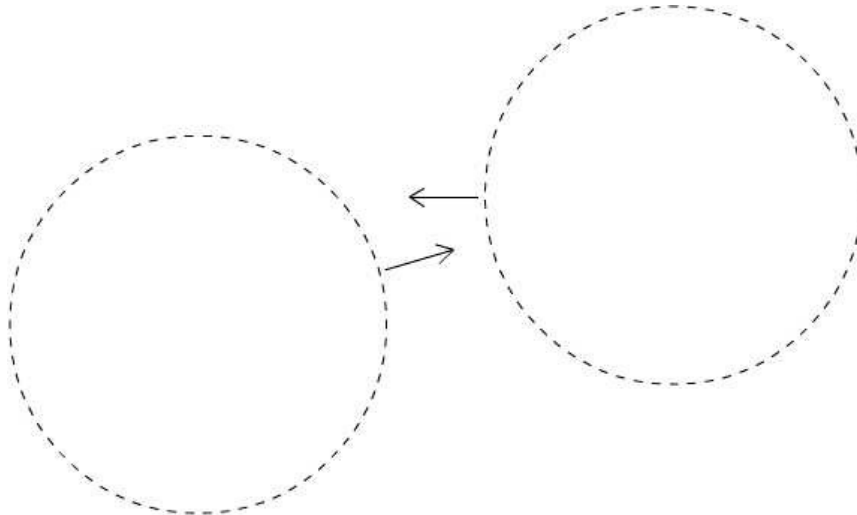
Since then physicists have focused their attention on examining this structure and today have arrived at a hypothetical structure described, broadly speaking, as the Standard Model.

Which model atom, in essence, is composed of a nucleus, and the extent of the atom's influence is defined by a 'cloud' of particles – electrons. The nucleus and the surrounding electrons are said to be separated by a **“perfect vacuum”** (1), which vacuum occupies almost all of the volume of an atom, while the proportion of matter represented by all these sub-atomic particles is one trillionth of its total volume.

So the hypothetical atomic structure has changed dramatically from an indestructible solid sphere to what could be termed, essentially, as a 'vacuum' atom, and if this model is put into a comprehensible perspective with a nucleus of a hydrogen atom presented as having the diameter of 1mm (the dot below on the left represents such a nucleus) the atom's single electron would be orbiting at an altitude from it of over 2 metres. (Note that on this scale the electron, the dot on the right, would not be visible on this page as it would be less than one pixel in diameter)

Nucleus ▪ <----- 2.3 metres -----> · Electron

This 2mm diameter nucleus of such an atom would exert influence over a nominally spherical 'empty space', as defined by its electron, having a diameter of 4.6 metres and two such atoms are presented below at the point of a 'kinetic' collision. (The nuclei are not included as obviously on this scale they would be invisible, while the dashed circles represent the extent of the nominal orbits of their single electrons.)



This projected collision, at a combined velocity of up to 3600 metres per second is, in terms of the kinetic atomic theory of gases, required to be one of perfect elasticity with no loss of energy and of the average motion of both atoms. But it is rather difficult to imagine how a collision of these 'vacuum' atoms could result in such a 'perfect' collision.

However this picture is a simple one and the material structure of the atom today as postulated by particle physicists is one of extreme complexity, the nucleus said to be composed of around 300 particles. This hypothetical structure is the result of a huge investment by governments (i.e. taxpayers) around the world over the last 70-80 years, exemplified by the cost of the Large

Hadron Collider at CERN which has cost over \$13 billion to date and has an annual budget of \$1 billion.

But for all this effort a commentator has said ***“There have been tremendous advances in most areas of physics, such as materials science and hydrodynamics, which remain tied to experiment, but since the development of QED in 1928-1930 there have been no major gains in our understanding of the underlying structure of matter”*** (2).

It could be said that these advances are due to the fact that in these disciplines solid and liquid matter are analysed using continuum mechanics, in other words atoms in these states are treated as forming a continuous structure.

And today, for theoretical physicists the ultimate structure of macroscopic matter remains in essence that as postulated following Rutherford’s experiments at the turn of the last century, in that atoms are almost entirely a “perfect vacuum” and that atomic interactions are based upon their ‘kinetic’ motion within an extra-atomic vacuum.

Perhaps the reason for physicist’s focus on the atom’s internal structure is that, as there is no possibility of the transmission of gravitational forces through and between the vacuum separating such discontinuous atoms, and they live in hope that somehow the answers could lie in the sub-atomic structure of the atom itself.

But if the atom is itself almost entirely a perfect vacuum and its mass is overwhelmingly concentrated in the nucleus, then again there is no possibility of an sensible explanation for the transfer of a gravitational force from the mass of the nucleus outward to and beyond its outer periphery.

Clearly this Standard Model ‘vacuum’ atom is an absurdity, however the suggestion that its mass is concentrated at its central core is not, but that does not mean that the remaining volume is empty of matter, as no one, and certainly no physicist, knows what matter is ultimately and so they cannot say with any certainty that matter is confined to the nucleus and electrons and so is ‘here’ and not ‘there’.

But gravity is a function of mass and perhaps it is time, after decades of failure, to consider that there is something fundamentally wrong with the theory on which all of theoretical physics is based, and which needs a vast inter-atomic, non-material, ‘empty space’ to function - the kinetic atomic theory of gases.

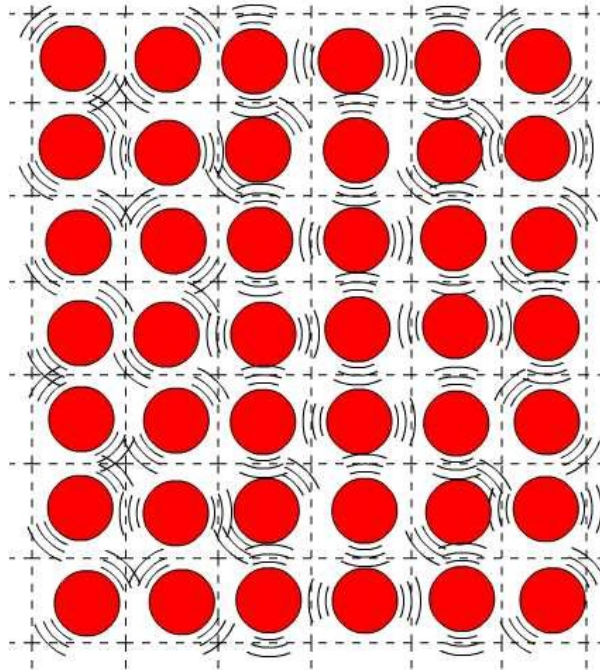
“Atoms are the basic units of matter and the defining structure of elements.”

“Atoms are the basis of chemistry and they are the basis for everything in the Universe.”

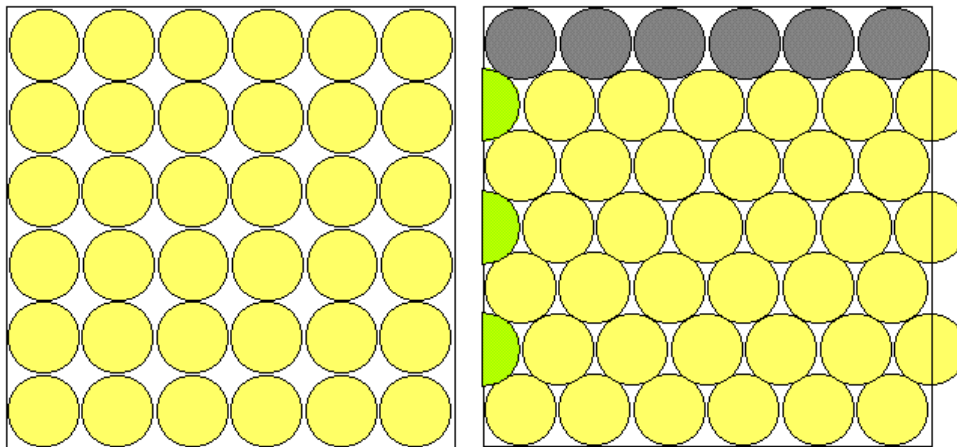
(Textbook quotes)

If the atom is the ultimate natural repository of matter, then surely it is also, both collectively and individually, the ultimate natural source of all forces and the ultimate natural vehicle for transmission.

Prior to the introduction of electron microscopy technology in the early 1980’s atoms in solid matter were depicted in most textbooks as oscillating in lattice structures similar to that shown in the first diagram below, where the proportion of inter-atomic ‘empty space’ or vacuum would be in excess of 500% of the volume of the atom.



Today they are shown as having a closer distribution, below on the left is a square packed array compared to the more densely packed close packed array on the right.



And so it is now suggested that instead atoms occupy most of the volume of solids, examples are the metals Beryllium, Magnesium and Titanium which form the structure on the right above that is described as 'Hexagonal Close Packing'. (4)

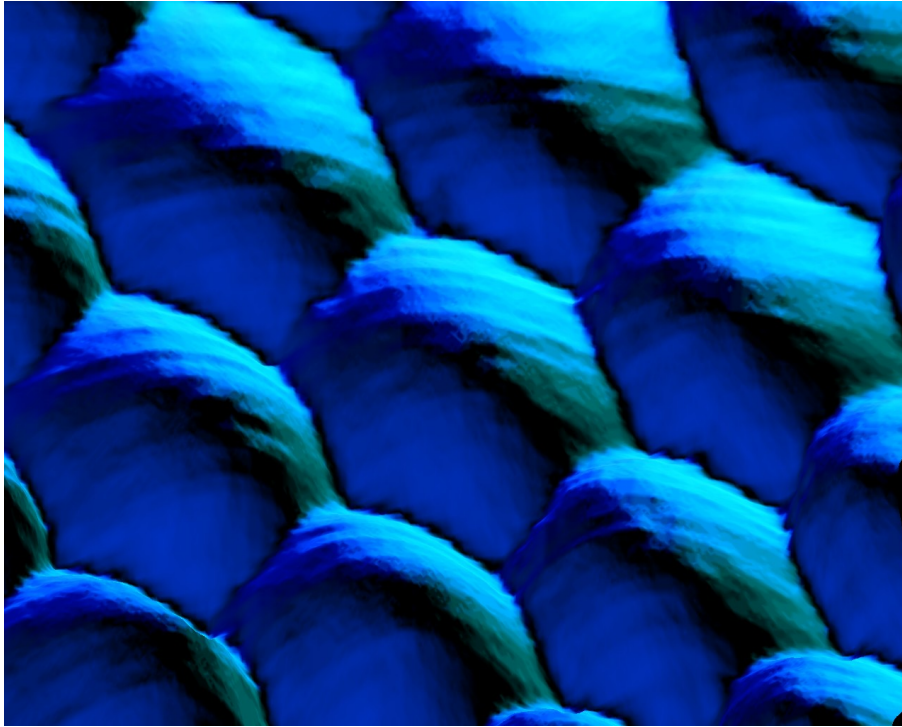
This structural change is entirely due to the technology of electron microscopy that has produced numerous images of the surfaces of solid matter that show such closely packed arrangements of atoms.

So this is a significant revision of the hypothetical structure of solid matter from individual atoms oscillating in a lattice structure and a vacuum that is five times its volume, to spherical atoms that in this particular case are touching along the face diagonals and are occupying 74% of the available space.

This means that the hypothetical inter-atomic vacuum in these metals has now been reduced from 500% to 26%, and that there is no room for any oscillatory motion of individual atoms, and nor is there any indication of such a motion in these images.

The image below (from IBM Almaden) shows a surface of platinum atoms and there is no sign of the ‘lattice structure’ or of an oscillating motion of these atoms as predicted by kinetic theory.

Of course, as with any prior evidence that tended to contradict the kinetic atomic theory of gases, this ‘*apparent continuousness*’ was excused (in 1991) by saying that these images are “*limited in sharpness - because the probe is too clumsy*”. (3)

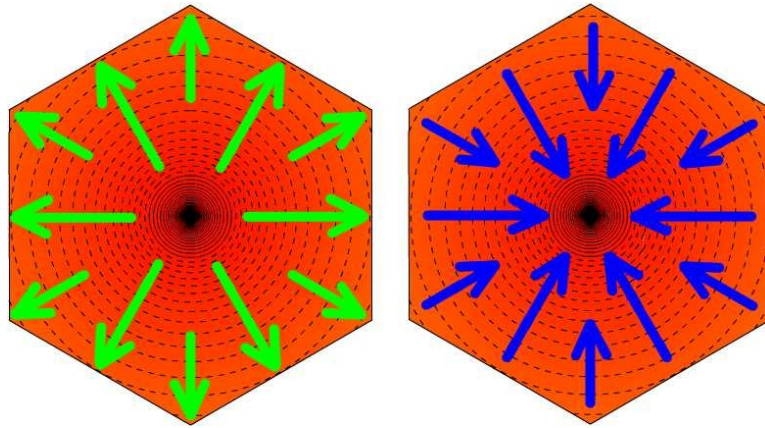


However 25 years later this technology has advanced significantly and there are thousands of images similar to this, clearly indicating, as was first suggested by Newton, that atoms are “*pressing upon each other*”, and in the image above the distortion from a natural spherical shape to a hexagonal form at the borders between these atoms can only be the result of the actions of a mutually acting repulsive force.

This would also mean that an attractive force is opposing this and is acting from each atom to all adjacent atoms, and further that these forces combine to distort the nominally spherical outer peripheries.

The attractive force can only be gravity as a function of the mass of each atom, and the only possible repulsive force is that of pressure, which can only be the result of a resistance to the integrity of each atom’s matter field to incursion by the fields of adjacent atoms.

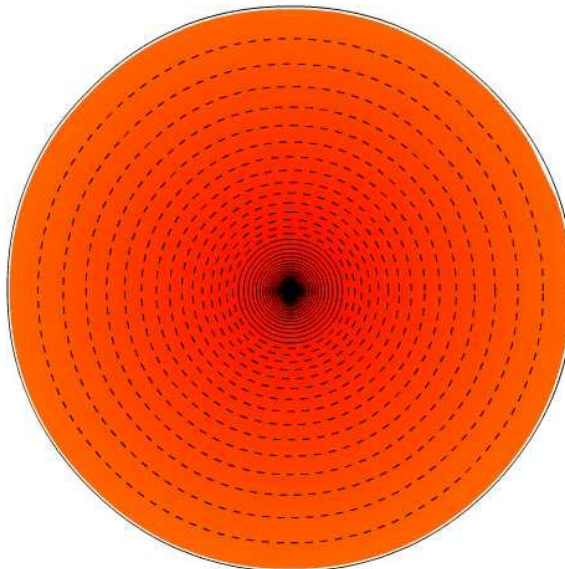
In the diagrams below the green arrows represent repulsive forces acting at the atom’s outer surface, while the blue arrows the attractive forces acting towards the central focus of the atom’s mass, and obviously these forces are in balance in this particular instance.



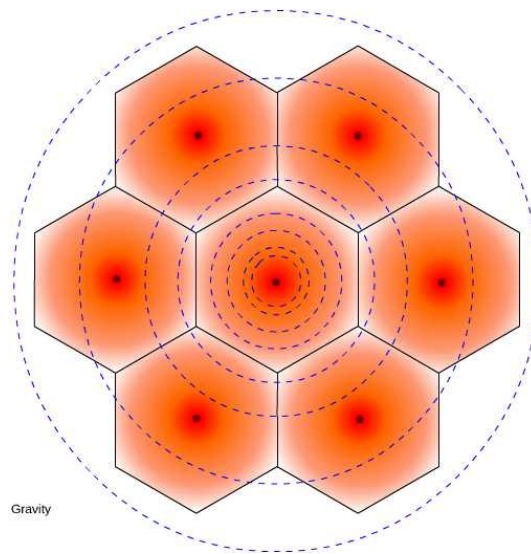
But, again obviously, these forces cannot act in a “*perfect vacuum*”, and so the only possible alternative that can support the transmission of these attractive and repulsive forces is that the atom is composed entirely of matter and that the mass density of this sub-atomic matter increases progressively and exponentially towards the centre.

This would mean that the repulsive and attractive forces increase in intensity in conjunction with the progressive increase in density to the core and in the diagram below the circles are indicative of this, and while the centre of this (hypothetically isolated) atom appears to be a particle, it is not one in the sense of being a distinct and separate entity from the rest of the atom.

It is the atom itself that is the ultimate natural particle, but that is not to say that it is an indivisible particle or that its dimensions are limited in extent.



While the repulsive forces of inter-atomic pressure are short range, those of the gravitational forces of each atom extend far beyond its immediate borders, **see diagram below**, and it is these combined atomic forces that result in the rigidity experienced at macroscopic level for most metals.



Clearly such an arrangement is a perfect conduit for the transfer of forces through the macroscopic structure of any solid, while the alternative of a ‘vacuum’ atom separated by a zero-inertia empty space of any description either cannot supply an answer to this question, or is a hypothetical, ‘space filling’ construct of such extreme, mathematical complexity that, quite apart from the fact that it defies comprehension, it has absolutely no definitive evidential basis.

As Newton said “***the answer lies in simplicity***” and this is a simple solution, but no doubt theoretical physicists would assert that the vacuum ‘exists’ and that instead “***the answer lies in the multiplicity and confusion of things***”.

We can apply this model of macroscopic matter firstly to the transmission of light, and then to forces such as gravity and see the outcome.

The Propagation of Light

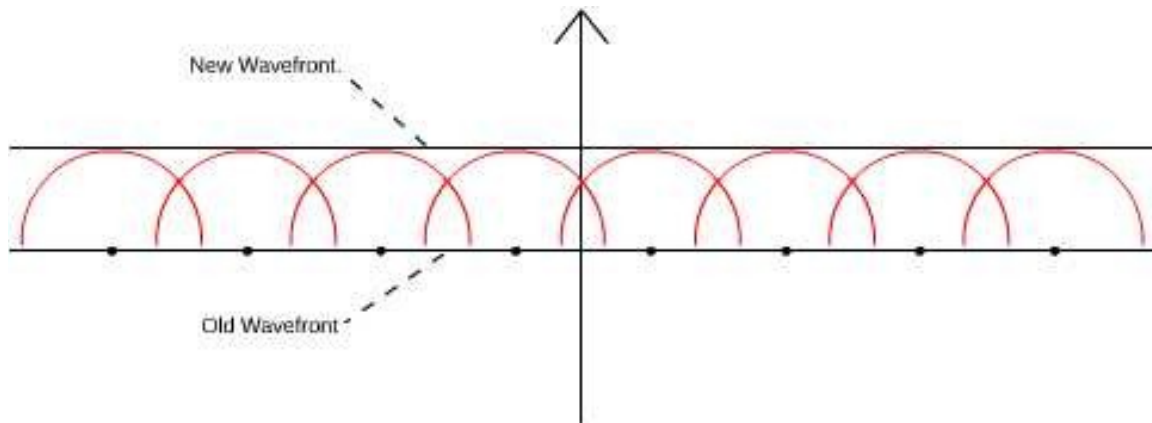
Analysis of the propagation of light today still uses Huygens’ principle, first published in 1678, which states that that all points of a wave front of light in a vacuum or transparent medium may be regarded as new sources of wavelets that expand in every direction at a rate depending on their velocities. “ *Every point on a wave-front may be considered a source of secondary spherical wavelets which spread out in the forward direction at the speed of light. The new wave-front is the tangential surface to all of these secondary wavelets.*”

And later in 1816, Fresnel showed that Huygens’ principle, together with his own principle of interference could explain both the rectilinear propagation of light and also diffraction effects. To obtain agreement with experimental results, he had to include additional arbitrary assumptions about the phase and amplitude of the secondary waves, and also an obliquity factor. These assumptions have no obvious physical foundation but led to predictions that agreed with many experimental observations. (Wikipedia)

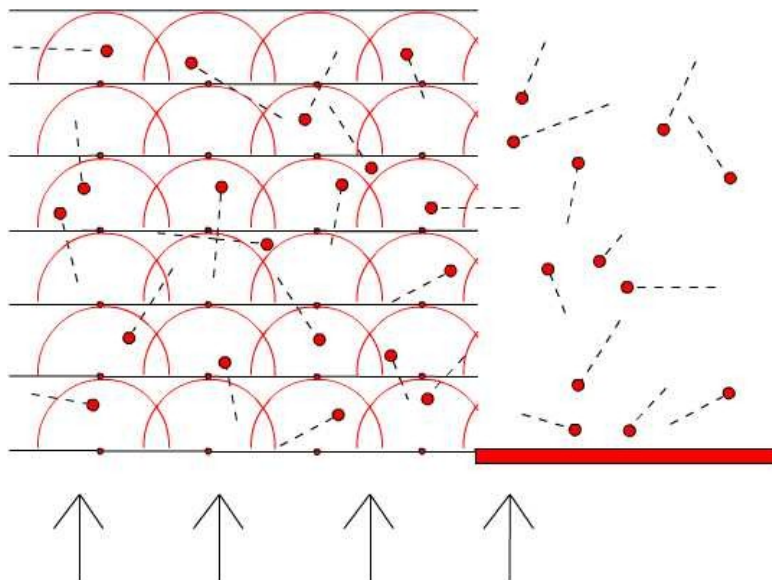
There are two important points here as highlighted, firstly “*These assumptions have no obvious physical foundation*” in other words it is assumed that there is no material or physical medium that can be a vehicle for the propagation of such wavelets, and secondly “*in a vacuum*”, which accordingly has to assume that such wavelets of light can actually propagate in a vacuum.

“Every point on a wave-front may be considered a source of secondary spherical wavelets” in effect this means that these are points on a wave front in a vacuum that are the origin of secondary wavelets.

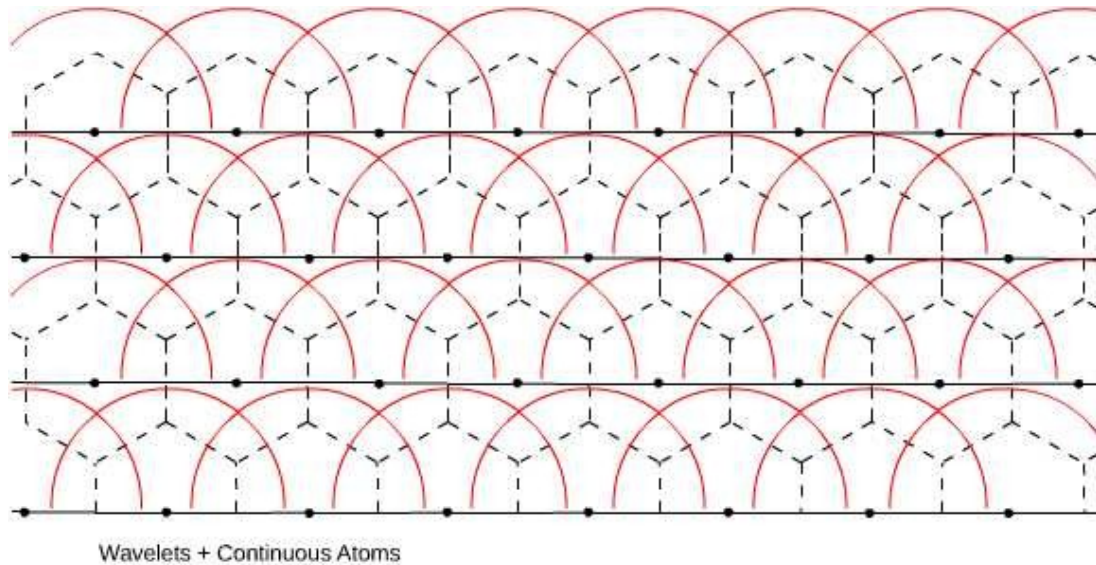
But if Huygens’ principle agrees “with many experimental observations” then there must be a “physical foundation” for the propagation of these wavelets, but in terms of current atomic theory there can be no such foundations. Below is a copy of a textbook diagram of Huygens’ principle.



This diagram below depicts Huygens wavelets propagating through a ‘kinetic’ gas, and it is clear that there can be no interaction with such atoms to facilitate the transmission of light in these terms, in other words there is no possible physical origin for the wavelets, and of course the propagation of waves through the inter-atomic vacuum/empty space is not possible.



However if the images of atoms at the surfaces of solid matter (as discussed earlier) demonstrate that atoms are continuous, and this continuity extends to the gaseous state, as in the diagram below, then it is quite clear that such an arrangement can sustain the transmission of waves of light fully in accordance with Huygens’ principle.

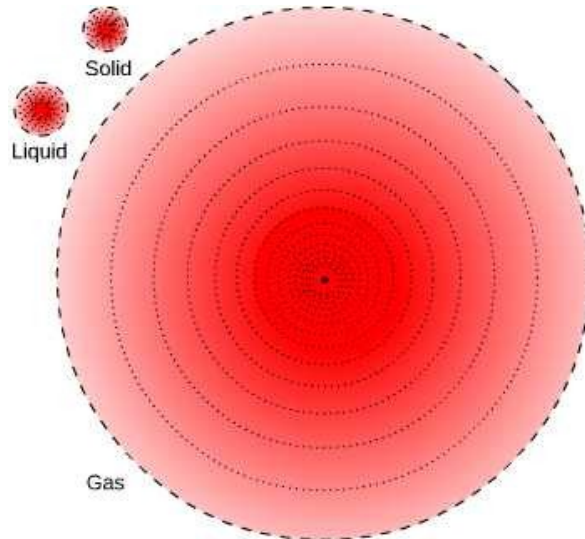


The outlines of atoms in this diagram, as depicted by the hexagonal outlines, are of course idealised as in reality a plane cross section of atoms would not form such a regular geometric arrangement, but it is quite clear that such a continuum of atomic matter could transmit spherical wavelets of light directly from atom to atom.

- (1) 'The Void' Frank Close, OUP, 2007
- (2) 'The Big Bang Never Happened', Eric J Lerner, P 358
- (3) 'Taming the Atom', Hans Christiaan von Baeyer, Random House, 1992
- (4) <http://www.seas.upenn.edu/~chem101/sschem/metallicsolids.html>

The expansion of macroscopic matter from the solid to the liquid through to the gaseous state is observed to result from the continued application of energy, and these expansions are a result of the collective expansion of the matter/energy fields of component atoms.

As these fields decrease progressively in density from the centre of the atom then gas atoms with expansion ratios of well over 1000 times the liquid states have significantly lower densities at their outer perimeters, and the attractive forces acting between adjacent atoms are also reduced significantly. The images below indicate these relationships.



As the images of platinum atoms indicate, the outer limits of an atom are flexible even at these high densities, **which deformations of nominally spherical atoms must accordingly apply to atoms in the liquid and the gas states.**

And this means that in circumstances where the densities at the outer levels are significantly lower these outer perimeters or surfaces have a much greater flexibility, creating conditions that would allow for the motion of massive bodies within and through such a structure.

I suggest the following principles apply:-

- 1) The atom is the ultimate natural, material entity.
- 2) The atom is composed entirely of matter/energy.
- 3) The atom's matter/energy field increases in density exponentially to its central core.
- 4) Atoms are continuous - no extra-atomic, non-material 'empty-space' exists.
- 5) The hypothetical, extreme states, the vacuum and singularity, do not and cannot 'exist'.
- 6) Atoms exert an attractive force on surrounding atoms – gravity.
- 7) Atoms exert a repulsive force on surrounding atoms – pressure.
- 8) Atoms individually expand and contract with absorption and emission of matter/energy.
- 9) At stable, external energy levels the atoms within any defined volume of matter are in a state of structural equilibrium.
- 10) A continued application of heat energy to any volume of matter that is at a lower energy level results in an expansion of atoms at the surface, which in turn creates a structural imbalance with adjacent atoms below the surface.
- 11) This imbalance, or pressure differential, generates a progressive transfer of energy atom to atom through the whole structure, until a state of equilibrium (or partial equilibrium) occurs.
- 12) The strengths of inter-atomic forces, and accordingly the observed malleabilities and fluidities of macroscopic matter, are dependent on and relative to the matter/energy densities of atoms at their mutual borders.