Dark Matter, Dark Energy, the Red Shift that Propels the Expansion of the Universe, and the Physical Meaning of Planck's Constant

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Abstract: The universe is made of a single elementary particle that I have named the N particle. The N particle is in perpetual motion. The quantum of energy the N particle possesses is $2.681338609 \times 10^{-54}$ J. Dividing by c^2 gives the mass of the N particle, $2.983391554 \times 10^{-71}$ kg. I call the physics of the N particle the N particle model. See my **The N Particle Model** paper (viXra:0907.0009), 56 pages, circa July 2009. The N particle model leads directly to a simple theory of dark matter and dark energy. Dark matter and dark energy are made of tiny, extremely thin shell, spherical N particles, that I have named the omicron particle, the plural is omicra, as in omicra foam. The red shifts, that occur at the interface of dark matter with dark energy, generate omicron particles, increasing the wavelength and decreasing the energy of photons, some of the point N particles of which photons are made of transitioning to omicron particles, conserving energy in that transition, increasing the number of dark energy omicron particles over time that gives rise to the expansion of the universe—the dark energy foam is increasing in volume and pushes on the dark matter foam surrounding galaxies, propelling the expansion of the universe. One needs to read **The N Particle Model** paper for this paper to make sense. Prerequisites for being able to understand that paper are two semesters of introductory physics using elementary vector calculus. In that paper, I purposely left out my theory of gravity, leaving that as a challenge for the readers, as I will also do here. Hint: There is a 5th Maxwell Equation for the Gravity Field, and it looks like Gauss's Law for the Electric Field. I provide a brief but dense overview of some of the relevant N particle model. Numerically Planck's constant turns out to be two times the quantum of energy of an N particle times the frequency of a photon with the energy of an electron: $h = 6.62607015 \times 10^{-34}$ J·s $= 2 \times 2.681338609 \times 10^{-54}$ J $\times 1.235589964 \times 10^{20}$ cycles/s $\times s^2$, accurate to nine significant digits, that I consider to be proof of the N particle model.

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Overview of some of the relevant N particle model

Electric fields, magnetic fields, gravity fields, and photons are collections of point N particles traversing space at the speed of light. Electrons and protons are collections of membranous N particles. A proton has 1836.15 times the number of N particles as an electron. The N particles in electrons and protons are extremely thin growing and shrinking membranes, arranged in a stack, kind of like the layers in an onion, but with the layers so thin it is as if they are all at the same radius. A free electron or proton is an extremely thin shell sphere with a radius of 2.645×10^{-11} m, ½ the Bohr radius. A free electron or proton stores 13.6 eV in the surrounding electric field, ½ of that energy, 6.8 eV, between 2.645×10^{-11} m and 5.29×10^{-11} m. Hydrogen in the n = 1 quantum state is a spherical capacitor with the proton at 2.645×10^{-11} m surrounded by the electron at 5.29×10^{-11} m and stores 6.8 eV in the space between the proton and the electron. Dark matter and dark energy are made of tiny, extremely thin shell, spherical N particles, that I have named the omicron particle, the plural is omicra, as in omicra foam. The omicron particles are spinning on an axis, so they have the same energy as point N particles traversing space. In **The N Particle Model** paper, The N Particle Model, viXra.org e-Print archive, viXra:0907.0009, I referred to this critically important omicron particle thirty-three times named only as the foam. That foam is in fact the dark matter that makes electric and magnetic fields capacitive, finite, a steady state, by reflecting the point N particles of which electric and magnetic fields are made back to the source, charges, that are collections of electrons and protons. In the N particle model a neutron is a combination of an electron and proton with the electron on the inside and the proton on the outside, a spherical capacitor with dimensions 1/1836.15 the size of hydrogen. A neutron in the n = 1 quantum state stores 12,485.82 eV = 6.8 eV × 1836.15 in the space between the electron and proton.

The moment of inertia for an electron is mr^2, as if all the mass is on the equator as either a zero volume point or a zero thickness ring. The maximum angular velocity for an electron is with the point or ring on the equator moving at the speed of light, $\omega = c/r_{Bohr}$. For the electron in hydrogen the radius is $5.291772109\times10^{-11}$ m, the Bohr radius, the energy is given by $E = i\omega^2 = m \times (r_{Bohr})^2 \times (c/r_{Bohr})^2 = mc^2$:

$$E_{electron} = 9.109383702\times10^{-31} \text{ kg} \times (2.99792458\times10^8 \text{ m/s})^2 = 8.187105777\times10^{-14} \text{ J}$$

An electron at the Bohr radius with angular velocity $2\pi/137.0359991 = 0.045850618$ radians/s, where $1/137.0359991$ is the fine structure constant, has kinetic energy given by $E = \frac{1}{2} i\omega^2$:

$$E = \frac{1}{2} \times 9.109383702\times10^{-31} \text{ kg} \times (5.291772109\times10^{-11} \text{ m})^2 \times (2\pi/137.0359991)^2 = 2.681338609\times10^{-54} \text{ J}$$

That is the energy of one N particle. The $\frac{1}{2}$ in $E = \frac{1}{2} i\omega^2$ is like the $\frac{1}{2}$ in $E = \frac{1}{2} mv^2$ for the classical energy of a mass moving with velocity v. The $E = i\omega^2 = m \times (r_{Bohr})^2 \times (c/r_{Bohr})^2$ is like $E = mc^2$.

The energy of a photon is given by $E = h\nu$. Planck's constant is 6.62607015×10^{-34} J·s. The number of N particles in a photon is given by dividing the energy of a photon by the energy of the N particle:

$$\text{Number of N particles in a photon} = h\nu/2.681338609\times10^{-54} \text{ J}$$

Consider a photon with the energy of an electron. Two of these are produced in electron/positron annihilation, going off in opposite directions. The frequency of that photon is:

$$\nu = E/h = 8.187105777\times10^{-14} \text{ J}/6.62607015\times10^{-34} \text{ J·s} = 1.235589964\times10^{20} \text{ cycles/s}$$

Notice that numerically to nine significant digits:

$$h = 2 \times 2.681338609\times10^{-54} \times 1.235589964\times10^{20}$$

That is what Planck's constant means. Planck's constant is two times the quantum of energy of an N particle times the frequency of a photon with the energy of an electron. The two arises because there is a front half and a back half in photons. The front half is made of $\frac{1}{2}$ the number of N particles in a photon and the back half is made of $\frac{1}{2}$ the number of N particles in a photon, so a photon with frequency $1/1.235589964\times10^{20}$ cycle/s, the theoretically smallest possible photon, would have two N particles. The physical dimensions for frequency need to have the seconds dimension dropped, so frequency is stated just in cycles, not cycles/s. Then the formula for the energy in a photon is given by:

$$E = h\nu = 2 \times 2.681338609\times10^{-54} \text{ J} \times 1.235589964\times10^{20} \times \nu$$

This is numerical proof of the N particle model. The smallest possible photon has a frequency of $1/1.235589964\times10^{20}$ cycles and has two N particles, and the largest photon produced in electron/positron annihilation has the number of N particles in an electron:

$$3.053365118\times10^{40} = 8.187105777\times10^{-14} \text{ J}/2.681338609\times10^{-54} \text{ J} = 2 \times (1.235589964\times10^{20})^2$$

Then there are $3.0533665118\times10^{40}/2$ energetically distinct possible photons where adjacent photons are separated by two N particles, one in the front half of a photon and one in the back half of a photon, photons are like the even numbers, ranging from two N particles to 3.053365118×10^{40} N particles.

Dark Matter, Dark Energy, and the Red Shift that Propels the Expansion of the Universe

The omicron particle dark matter foam and dark energy foam make up 95% of the mass of the universe. Dark matter are close packed gravitationally bound omicron particles, an omicra foam, that surround the 5% regular matter and reflect gravitons, made of point N particles, back to planets, suns, and black holes, making gravity fields capacitive, finite, a steady state. Dark matter fills all the space outside of the atoms of regular matter, the 5%. Dark energy are close packed non-gravitationally bound omicron particles, an omicra foam, that occupies the space between the galaxies and their surrounding dark matter foam. The mass of the N particle is $2.983391554 \times 10^{-71}$ kg. Using a mass density estimate for both dark matter and dark energy of 2.2×10^{-27} kg/m^3, and a close packing efficiency of 74.05%, the radius of an omicron particle would be 1.34×10^{-15} m. The radius of omicron particles is constant throughout the universe and over time—the omicra foam is incompressible, therefore in my model the mass density of close packed dark matter, net of gravitons, and close packed dark energy must be identical. The omicron particle as a thin shell sphere, as if zero thickness, would have a moment of inertia given by $\frac{2}{3}$ mr^2, where r is the radius. I can't calculate that moment of inertia on my TI scientific calculator because it is smaller than 10^{-99} but doing the exponent in my head yields 5.34×10^{-101} kg m^2. For the energy of a spinning omicron particle to have the same energy as a point N particle, using $\frac{2}{3}$ mr^2 for the moment of inertia, yields an angular velocity of 2.24×10^{23} radians/s. Maybe this number does not have physical meaning because the true N particle **E** and **B** nature both as a point N particle and an omicron particle may be beyond epistemological reach.

The speed of light is the speed of photons relative to the dark matter and dark energy omicra foam. The distance between galaxies is on average increasing, the expansion of the universe, that leads to the red shift of photons, although for some galaxies the distance between galaxies is decreasing, that leads to the blue shift of photons. Then the dark matter that surrounds galaxies is in motion relative to the dark energy between galaxies, and photons must change velocity as they leave the dark matter and enter the dark energy or enter the dark matter and leave the dark energy. In that process the key principle that must be obeyed is the conservation of energy. Since $E = mc^2$ the conservation of energy can also be expressed as the conservation of mass. The red shifts, that occur at the interface of dark matter with dark energy, generate omicron particles, increasing the wavelength and decreasing the energy of photons, some of the point N particles of which photons are made of transitioning to omicron particles, conserving energy in that transition, increasing the number of dark energy omicron particles over time that gives rise to the expansion of the universe—the dark energy foam is increasing in volume and pushes on the dark matter foam surrounding galaxies, propelling the expansion of the universe. I am assuming in the present-day universe the entire space between dark matter foam surrounding galaxies is filled with close packed dark energy foam.

In blue shifts, that like red shifts occur at the interface of dark matter with dark energy, and that analogous to red shifts, only in reverse, we might think omicron to point N particle transitions take place to increase the energy of the blue shifted photons, to conserve energy, but I think instead what we will find is that the blue shifted photons have a decrease in wavelength but have no increase in energy, implying that omicron to point N particle transitions are not possible.

The spinning gravitationally bound dark matter omicra foam particles around planets, suns, black holes, and galaxies, have spherical symmetry, curvature, giving rise to what is called gravitational lensing. In the act of reflecting graviton point N particle back to planets, suns, black holes, I speculate some of the omicron spin axes become aligned with the gravity field—the physical manifestation of curvature. The idea that gravitational lensing is due to curved space is absurd. The massive black holes found at the center of galaxies are the vestigial remnants from the formation of galaxies, probably mostly iron, and are at the temperature of empty space, about 3 degrees Kelvin, ergo "black". The idea that black holes are "black" because their gravity field is so strong that light cannot escape is absurd.