Title –
Gravitational lensing and the proton-proton reaction

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Abstract –
This article is a longer and more complete version of a comment I posted on Nature journal's website. Go to the article "Supernova 'kaleidoscope' seen for first time" by Maggie McKee (http://www.nature.com/news/supernova-kaleidoscope-seen-for-first-time-1.17062) and scroll way down the page to read it. So the best abstract I can think of is to reproduce that comment here.

Is gravitational lensing a process that occurs on every level - from the cosmic to the quantum? Could it be that photons and gravitons are ultimately composed of the binary digits of 1 and 0 encoding pi, e, √2 etc.; and matter particles [and even bosons like the Higgs, W and Z particles] are given mass by photons/gravitons interacting in matter particles' "wave packets"? Stars the size of the Sun, or smaller, gain their energy by fusing hydrogen (H) into helium (He) in a process called the proton-proton chain reaction. The first step involves the fusion of two H nuclei (protons), releasing detectable particles called a positron and a neutrino as one proton changes into a neutron. The mass of the proton is 938.27 MeV (mega electron volts) while the neutron is 939.57 MeV. How does a proton transform into a more massive neutron by radiating detectable particles? Since it is known that absorption of particles doesn't take place, there must also be radiation of undetected entities. Scientists call these undetecteds quantum fluctuations or virtual particles. A virtual particle is not a particle at all - it refers precisely to a disturbance in a field. Therefore, the "virtual particles" could be bits (binary digits). When the second proton in the proton-proton fusion reaction absorbs the virtual particles, the sequences of bits (0's and 1's) could become that of gravitons and photons. These would interact to produce extra mass and the proton transforms into a neutron. Gravitational lensing is a prediction of General Relativity that massive galaxies can bend the light from more distant objects and focus that light. It's been observed. The mass of the second proton might use quantum-scale

gravitational lensing to focus radiated 0's and 1's into photons and gravitons.

Content –
Is gravitational lensing (the process of matter between a distant source and an observer bending the light from the source as it travels towards the observer) [1] a process that occurs on every level - from the cosmic to the quantum? Could it be that photons and gravitons are ultimately composed of the binary digits of 1 and 0 encoding pi, e, $\sqrt{2}$ etc.(because the universe appears to be fundamentally mathematical); and matter particles [and even bosons like the Higgs, W and Z particles] are given mass by photons/gravitons interacting in matter particles' "wave packets"? Stars the size of the Sun, or smaller, gain their energy by fusing hydrogen (H) into helium (He) in a process called the proton-proton chain reaction.

c^2 and the atom

When Einstein penned E=mc^2, he used c (c^2) to convert between energy units and mass units. The conversion number is 90,000,000,000 (light's velocity of 300,000 km/s x 300,000 km/s) which approx. equals 10^11. Gravity (and gravitation) can produce electromagnetic force, though there are other methods. An example of another method: X-rays can be emitted by matter swirling around a black hole when the atoms jostle and compress, and are heated to millions of degrees. Gravity waves with a strength of 10^1 are, via gravitational lensing, concentrated 10^24 times after they're focused to form matter (to 10^25, weak nuclear force's strength* - giving the illusion that a weak nuclear force that is not the product of gravitation exists). (If binary digits form space-time and gravitation, and all particles are composed of those digits, the sequence of 1's and 0's composing gravitons can become the sequence making up the W+, W- and Z^0 particles of the weak force; the gluons of the nuclear strong force; or of electromagnetism's photons.) Waves are magnified by the matter's density to achieve electromagnetism's strength (10^36 times gravity's strength) i.e. 10^25 is multiplied by Einstein's conversion factor [10^11] and gives 10^36 (this gives the illusion of the existence of electric and magnetic fields that are not a product of gravitation). After absorption by atoms, the depleted remnant of the gravity waves is re-radiated from stars, interstellar gas and dust, etc.

as electromagnetic waves - possibly a microwave or infrared background - and as gravitational waves (a Gravity Wave Background) which have lost most of their energy or strength during formation of forces (returning to a strength of 10^1.)

* Remember, this is only one example: the so-called weak force's "strength isn't constant" and varies with distances [2].

If a star only received the input of gravitational waves from deep space entering it, there would be no limit to its potential growth. Since it also radiates mass-forming gravitational waves, there is a limit to the growth. More than 99% of the solar system's mass / gravity / gravitational waves are associated with our star, so the gravitational push on Earth from its sphere may be slightly greater than the push resulting from the waves originating in deep space (these originate from a far greater volume but are far less concentrated). In the end, our planet's orbit would be growing slowly larger. According to [3]; the distance between Sun and Earth – the Astronomical Unit (AU) - is growing by approx. 15 centimetres per century.

The first paragraph states, "photons and gravitons are ultimately composed of the binary digits of 1 and 0". Referring to gravitons, gravity and gravitational waves (and space-time, whose warps are gravity according to General Relativity [4]) are also ultimately composed of the binary digits of 1 and 0. Since space-time is composed of gravitons, gravity does not need to travel – the gravitational field already exists everywhere. Nevertheless, any disturbance (from the waving of your hand to explosion of a supernova) will send ripples called gravitational waves through the universe. Since gravity makes electromagnetism, the universe is also a giant electromagnetic field. Electromagnetism is ubiquitous and doesn't need to travel, but any disturbance sends out electromagnetic waves.

Microwave background without a big bang, and alternative to inflation

Electromagnetism's property of existing everywhere naturally means things like microwaves must be everywhere (infrared radiation would exceed the output of stars), and there would be a Cosmic Microwave

Background whether the Big Bang and Inflation occurred or not. The electromagnetic field's superposition on the gravity field also means gravitational imprints would be found in the microwave background by experiments like the Background Imaging of Cosmic Extragalactic Polarization experiment (BICEP2) [5]. However, such detection does not necessarily confirm either the Big Bang or inflation (or the multiverse belief that has grown from them). The universe would not be unified to near-uniform temperature and curvature by the whole cosmos having once been small enough for everything to be in contact, then undergoing extremely rapid expansion from a big bang during a period called inflation. It would be quantum entangled (unified) by everything having the same origin of binary digits. The digits unite everything in time and space in the same way that 1's and 0's form an image. Even if that image contains many seemingly separate elements, it's actually a single image.

Superposed electromagnetism and gravity, quantum superposed photon and graviton

It could logically be argued that the graviton has not been discovered by experiments, so every proposal here involving gravitons is building on quicksand. This is why discovery of gravitons is 100% inevitable –

Mathematician Benoit Mandelbrot coined the word fractal in 1975 (a fractal is a shape such that, if you look at a small piece of the shape, then it looks the same as the original, just on a smaller scale – it is used to describe coastlines, mountain ranges, etc). The fractal versions of superposed electromagnetism and gravitation are, respectively, the quantum superposed photon and graviton. Photons have been discovered and the existence of gravitons is just as certain.

Electric charges and magnetic poles from gravity

Particles of matter in space-time radiate gravitational waves. Since the article states that gravitational waves form particles, particles of matter form when the gravitons interact with photons (particles formed possibly include the solar wind's electrons and protons). Uniting electromagnetism with gravity has consequences for electricity and magnetism (used, for example, in electronics).

Gravitational waves move in two directions (the example was used of waves from deep space reaching the Sun, and waves from the Sun pushing Earth to increase the AU). The dualism naturally extends to the electromagnetism of particles, resulting in electric charges that are positive or negative (combination of these two produces neutrality) and magnetic polarities being either north or south.

Proton-proton reaction

The first step in the proton-proton reaction involves the fusion of two H nuclei (protons), releasing detectable particles called a positron and an electron neutrino as one proton changes into a neutron. The mass of the proton is 938.27 MeV/c^2 while the neutron is 939.57 MeV/c^2. How does a proton transform into a more massive neutron by radiating detectable particles? Since it is known that absorption of particles doesn't take place, there must also be radiation of undetected entities. Scientists call these undetecteds quantum fluctuations or virtual particles. A virtual particle is not a particle at all - it refers precisely to a disturbance in a field. Therefore, the "virtual particles" could be bits (binary digits).

When the second proton in the proton-proton fusion reaction absorbs the virtual particles, the sequences of bits (0's and 1's) could become that of gravitons and photons. These would interact to produce extra mass and the proton transforms into a neutron. Gravitational lensing is a prediction of General Relativity that massive galaxies can bend the light from more distant objects and focus that light. It's been observed. The mass of the second proton might use quantum-scale gravitational lensing to focus radiated 0's and 1's into photons and gravitons.

Since space-time is ultimately composed of 1's and 0's, neutrons can absorb these virtual particles directly from their environment without a proton being present. This absorption destabilizes the balance between forces in the atomic nucleus and can lead to an atom of radioactive uranium-235 which possesses 92 protons and 143 neutrons. Detailed models of decay normally point to transformation of quarks within nucleons (protons and neutrons). But it's always good to have alternatives to choose from. As a well-known book [6] puts it, "It is certainly possible that some alien beings with seventeen

arms, infrared eyes and a habit of blowing clotted cream out their ears would make the same experimental observations that we do, but describe them without quarks." So I'm going to turn into that book's alien being and describe observations without quarks, but with a more basic quantum process that says all particles are comprised of bits (including quarks, if they exist).

Does neutrino oscillation totally solve the solar neutrino problem?

The deuteron (neutron plus proton) formed above are, in the second step of the proton-proton reaction, fuses with another proton to form helium-3 (emitting a gamma ray). At least, this was the 1938 proposal of Hans Albrecht Bethe and Charles L. Critchfield. The next year, Bethe showed that this process is a key link in the proton-proton chain reaction and the CNO (carbon-nitrogen-oxygen) cycle, which are the major ways that nuclear energy is released in (respectively) the solar core and in massive stars. In 1967, Bethe was awarded the Nobel Prize for this work on stellar nucleosynthesis [7].

It was shown above how a proton can transform into a neutron. If this happens again at the second stage of the Sun's reaction, the result would not be two protons plus one neutron. It would be one proton plus two neutrons i.e. tritium aka hydrogen-3. Once more, an electron neutrino is emitted (because of the instability caused by introducing bit-absorbing neutrons). Starting in the late 1960s, several experiments found that the number of electron neutrinos arriving from the Sun was between one third and one half the number predicted by the Standard Solar Model. This discrepancy, which became known as the solar neutrino problem, may be largely or completely resolved by emission of twice as many electron neutrinos during the proton-proton reaction. If not "completely" but "largely", the remainder of the solution is attributed to the currently accepted resolution of the solar neutrino problem viz. neutrino oscillation (electron neutrinos, muon neutrinos and tau neutrinos converting into each other).

There are a number of nuclear as well as non-nuclear processes that produce gamma rays. Thus we aren't limited to emitted positrons producing them when the positrons almost instantly collide with electrons and mutually annihilate. The tritium (which introduced two

neutrons and double instability which continues its radioactivity) decays into helium-3 by beta minus decay (a type of radioactive decay in which a neutron is transformed into a proton) and it releases a gamma ray in addition to the extra electron neutrino and positron, which equals 18.6 keV of energy. Finally, two helium-3 atoms fuse, forming an atom of helium-4 and emitting two protons that allow the proton-proton reaction to begin anew.

REFERENCES

[1] Overbye, Dennis - "Astronomers Observe Supernova and Find They're Watching Reruns" - New York Times (March 5, 2015)

[2] M. Strassler - "The Strengths of the Known Forces" [May 31, 2013] - http://profmattstrassler.com/articles-and-posts/particle-physics-basics/the-known-forces-of-nature/the-strength-of-the-known-forces/

[3] G. A. Krasinsky, V. A. Brumberg - "Secular Increase of Astronomical Unit from Analysis of the Major Planet Motions, and Its Interpretation" in "Celestial Mechanics & Dynamical Astronomy", Volume 90, Issue 3-4, 2004, pp. 267-288

[4] O'Connor, J.J. and E.F. Robertson - "General relativity" - Mathematical Physics index, School of Mathematics and Statistics, University of St. Andrews, Scotland - May, 1996

[5] "BICEP: Robinson Gravitational Wave Background Telescope" by Caltech Observational Cosmology Group (http://bicep.caltech.edu/public/)

[6] Stephen Hawking, Leonard Mlodinow – "The Grand Design" – Bantam Press, 2010, p.49

[7] Bethe, H. A. (September 7, 1938). "Energy Production in Stars". Physical Review 55 (5): 434–456 - doi:10.1103/PhysRev.55.434