Title –

Gravity's Epic Journey from Being Purely Attractive to Newton 350 Years Ago, to Both Attracting and Repelling in This Time of Dark Energy and Dark Matter

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Abstract –
Albert Einstein said gravitation plays a role in the constitution of elementary particles, such as the electrons which help compose cosmic rays and matter (in "Do gravitational fields play an essential role in the structure of elementary particles?" - a 1919 submission to the Prussian Academy of Sciences). In the Epilogue to "How Einstein Discovered Dark Energy" (http://arxiv.org/abs/1211.6338) (*Submitted on 22 Nov 2012)*, Alex Harvey gives this interpretation of "Do gravitational fields play an essential role in the structure of elementary particles?" -

"Recall that in 1918 the only elementary particles known were the electron and the proton. Physicists were attempting to understand why these were stable despite their internal electromagnetic repulsion. Most attempts were based solely on electromagnetic theory. For a review of these efforts see Pauli [12]. Einstein's effort was to construct a model in which stability was achieved through the use of gravitational forces. In particular, he used modified gravitational field equations which included the cosmological constant [13]. The attempt was not successful and this was the last time he mentioned the cosmological constant other than to denounce it"

Let's build on Einstein's paper "Do gravitational fields play an essential role in the structure of elementary particles?" and say gravity (and the warping of space-time, which Relativity informs us is gravity) actually forms mass. From there, this article's main points address repelling and attracting gravity, dark matter's relation to gravity and 5th-dimensional hyperspace, dark energy's relation to gravity and 5th-dimensional hyperspace, imaginary numbers, electronics' binary digits or base-2 mathematics, and the accelerating expansion within the universe.

Content -
Let's build on Einstein's paper "Do gravitational fields play an essential role in the structure of elementary particles?" – a submission to the Prussian Academy of Sciences (Math. Phys., 349-356 [1919] Berlin - and say gravity (and the warping of space-time, which Relativity informs us is gravity) actually forms mass. There could be "currents" of space-time flowing in the "oceans" in and between the galaxies. Space-time (warped into gravity) would form matter by some of the currents of space-time or gravity which pass the solar system's outer boundary being diverted towards the massive Sun's centre (just as some of the ocean waves passing an island are diverted to the shore by being refracted by the island's mass). When the gravity waves which are concentrated to form matter (possibly resulting in the giant molecular cloud whose gravitational collapse formed the solar system) are acting, gravity travels from an external source to the matter i.e. it pushes against the matter and repels. This repulsive gravity may be a component of what we call dark energy (see final paragraph). When succeeding gravity waves are absorbed and re-radiated by matter, the wave emitted from the matter to an external location has the same strength as the repulsive wave and is attractive (see next paragraph), causing falling apples and orbiting

moons.

“Imaginary” time is indistinguishable from directions in space. If one can go north, one can turn around and head south; if one can go forward in imaginary time, one can turn round and go backward (“A Brief History of Time” by Stephen Hawking - Bantam Press 1988, p. 143). Just as the “arrow of time” can be reversed without changing the laws of science, directions in space can be reversed (from the external to an atom; from an atom to the external) without changing the laws of science. Professor Hawking says, on p.134, calculating time using imaginary numbers makes the distinction between time and space disappear. Negative hyperspace is described by imaginary numbers (see next paragraph) and the motions of its negative particles (of matter, and of forces) appear to be what we call time, since time can also be calculated using imaginary numbers. So imaginary numbers should eliminate the distinction between space-time and hyperspace. This allows dark matter to exist as the scaffold on which “ordinary” matter adheres.

The space-time we live in is described by ordinary [or “real”] numbers which, when multiplied by themselves, result in positive numbers e.g. 2x2=4, and -2x-2 also equals 4. Inverted “positive” space-time becomes negative hyperspace which is described by so-called imaginary numbers that give negative results when multiplied by themselves e.g. i multiplied by itself gives -1. Don’t think of cosmic expansion as the stretching of a finite quantity of space. Think of it as the production of “new” space which is added to existing space and pushes that existing space farther and farther away from where it was (simplified, this is similar to manipulation of an image on a computer screen). The Law of Conservation says new space isn’t created from nothing but is converted from something else. Continuing with the computer analogy, it may be hypothesized that new space is converted from the BITS (BInary digiTS) of 1 and 0. If space comes from bits, then so does gravity (warping of space). And if gravity forms matter, it also forms the negative matter in hyperspace. This is called dark matter (the term “dark matter” could be used to describe particles in a 5th-dimensional hyperspace, or travelling through time, that would be invisible but still exert gravitational influence). And since gravity comes from bits, a gravitational link is established between dark matter and gravity, which can be described this way -

The average density of the Milky Way is much less than the solar system – the MacMillan Encyclopedia of Physics says the average density of matter between the stars of the Milky Way is 0.1 neutral hydrogen atoms per cubic centimetre. Since density corresponds to concentration of wave packets – a term from quantum mechanics describing, here, matter’s gravitational building blocks - and magnification of gravitational waves, there would be extremely little magnifying of gravity waves in interstellar space (a process related to gravitational lensing). And there would be insufficient gravitational magnification to push or accelerate the stars near the central core or bulge beyond the orbiting speeds of the galaxy’s outermost stars (the outermost stars were expected to orbit the galaxy’s centre more slowly than stars further in, but have been found to possess very similar orbiting speeds)**.**

Dark energy, like dark matter, would likewise have both gravitational and hyperspatial links. The first paragraph discussed its repulsive gravity component. Its hyperspace component, which includes its gravitational part, is summarized by this sentence above – “If space comes from bits, then so does gravity (warping of space). And if gravity forms matter, it also forms the negative matter in hyperspace.” Feeble gravity might push galaxy clusters apart in the same way that feeble

sunlight propels a solar sail. In the 1970s, Robert Forward proposed two beam-powered propulsion schemes using either lasers or masers to push giant sails to a significant fraction of the speed of light (Forward, R.L. (1984). "Roundtrip Interstellar Travel Using Laser-Pushed Lightsails". J Spacecraft 21 (2): 187–195.)

“If space comes from bits” (specifically, the energy responsible for the bits is converted into space), “then so does gravity (warping of space).” So as more and more energy is invested in bit production, more and more space and repelling gravity result. This causes accelerating expansion within the universe, as discovered in 1998 by Saul Perlmutter, Brian P. Schmidt, and Adam G. Riess.

REFERENCES FROM “HOW EINSTEIN DISCOVERED DARK ENERGY” – TO AVOID CONFUSION, MY ARTICLE’S REFERENCES ARE INCLUDED IN THE TEXT

[12] W. Pauli, Theory of Relativity, Pergamon Press, London (1958). See Part V, p.184 ff.

[13] A. Einstein, “Speilen Gravitationfelder in Aufbau der Elementarteilchen eine Wesentliche Rolle”(Do gravitational fields play an essential role in the structure of elementary particles), Sitzungsberichte der Preussischen Akademie der Wissenschaften, (Math. Phys.), 349-356 (1919) Berlin.
