

The Mechanics of Mass Formation from Dark Energy

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ABSTRACT

95 percent of the known Universe constitutes dark energy and dark matter. The physical character of these two events, however, remains a mystery. Einstein proposed long-forgotten approach gravitationally repulsive negative masses, which fuel interstellar expansion and do not coalesce into objects that emit light. Contemporary cosmological observations, though, are derived from the rational premise that only positive masses constitute the Universe. I have developed a toy model by reconsidering this assumption, which implies that all dark phenomena can be unified into a single fluid of negative mass. The model is a modified cosmology of the CDM, which shows that negative masses that are continually produced can mimic the cosmological constant and can flatten galaxy rotation curves. The model leads to a cyclic universe with a Hubble time vector parameter, theoretically providing compatibility with the new tension in cosmological measurements that is emerging. This exotic material spontaneously forms halos around galaxies that stretch too many galactic radii in the first three-dimensional N-body simulations of negative mass matter in scientific literature. There are no cusps for these halos. Therefore, the theoretical cosmological model is capable of modeling from first principles the observed distribution of dark matter in galaxies. The model makes many testable predictions and seems to have the ability to be compatible with distant supernovae, the cosmic microwave background, and galaxy clusters' observational data. Such results may suggest that negative masses are a real and physical aspect of our Universe, or may imply the existence of a superseding theory that can be modeled by effective negative masses at some point. Both cases lead to the surprising conclusion that a simple sign error may have been the reason for the compelling puzzle of the dark Universe.

Keywords- Dark Energy, Energy Particle, Mass Particle, Equilibrium.

I. INTRODUCTION

Black energy, the repulsive force which is the universe's primary portion (69.4%). Ordinary matter and dark matter consist of the remaining part of the universe. Dark energy is relatively uniform in time and space, in comparison to all kinds of matter, and is gravitationally repulsive, not attractive, within the volume it occupies. The meaning of dark energies is not fully known yet.

Albert Einstein first hypothesized a kind of cosmic repulsive force in 1917 and was represented by a term, the "cosmological constant," which Einstein

reluctantly introduced into his theory of general relativity in order to counteract gravity's attractive force and account for a universe that was presumed to be static (neither expanding nor contracting). "Einstein referred to the inclusion of this constant as his" greatest blunder "after the discovery in the 1920s by American astronomer Edwin Hubble that the universe is not stagnant but is instead expanding. Nevertheless, the estimated amount of matter in the universe's mass-energy budget was unlikely to be low, and hence some mysterious" missing variable, "similar to the cosmological constant, was needed. Direct proof was first provided in 1998 for the presence of this component, which was called dark energy.

Dark energy is detected by its effect on the rate of expansion of the universe and its effect on the rate of gravitational instability at which large-scale objects such as galaxies and clusters of galaxies develop. Expansion rate estimation involves the use of telescopes to measure the distance (or light travel time) of objects in the background of the universe observed at various scales of size (or red shifts). Since dark energy acts against gravity, further dark energy accelerates the expansion of the universe and slows large-scale structure creation. The apparent light of objects of known luminosity, such as Type Ia supernovas, is one technique for calculating the expansion rate. Two international teams, including American astronomers Adam Rises (the author of this article) and Saul Perl mutter and Australian astronomer Brian Schmidt, detected dark energy in 1998 using this process.

The two teams, including those from the Keck Observatory and the MMT Observatory, used eight telescopes. Class I supernovae that erupted when the universe was just two-thirds of its present size were smaller than they would have been in a dark-energy-free universe. This meant that the pace of expansion of the universe is higher now than it was in the past, a consequence of dark energy's present supremacy (In the early universe, dark magic was insignificant).

II. WHAT'S DARK ENERGY

One of the great-unsolved mysteries of cosmology is dark energy. It is now known to make up 68% of everything in the world.

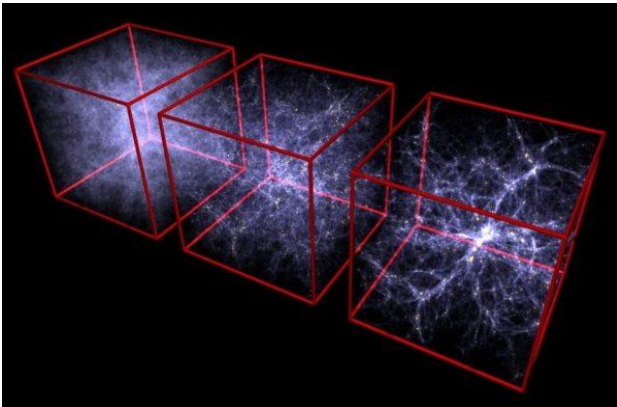


Figure 1: Illustration of simulation snapshots by astrophysicist Volker Spengler from the Max Planck Institute, Germany. It reflects the expansion of the universal system when the universe was 0.9 billion, 3.2 billion, and 13.7 billion (now) years old (galaxies and voids). Via Volker Spengler/ MPE / Kevil Foundation pic.

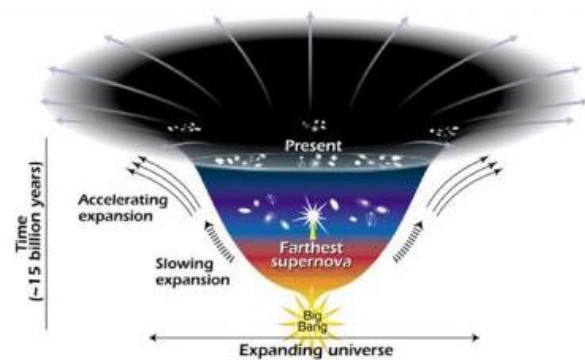
Dark energy is the name assigned to the enigmatic force that causes our universe's rate of expansion to accelerate over time, instead of slowing down. That is contradictory to what would be predicted from the world that originated with the Big Bang. In the 20th century, scientists discovered that the universe was expanding. They assumed the expansion could proceed indefinitely, or finally reverse and cause a Major Crunch if the universe had ample mass and therefore sufficient self-gravity. Today, in the cosmology of the early 21st century, the theory has developed. Today, the universe is seen to be expanding more exponentially than billions of years before. What could cause the expansion rate to rise? Sometimes, astronomers now talk of a repulsive force as a potential means of interpreting it.

Many cosmologists assumed until the late 1990s that the universe did not have enough mass to cause a Major Crunch. Data obtained by the 2dF Galaxy Red shift Survey and the Sloan Digital Sky Survey in particular appeared to suggest that the universe would extend indefinitely, but at an ever-slowing pace as the density and gravity of the universe itself attempted to hold it out. During a study of Type 1A supernovae, the first hint of something groundbreaking about to be found came in 1998. For astronomers, these huge bursts of dying giant stars are particularly valuable because they often emit the same volume of light, and can also be used to measure distances in the universe as so-called 'ordinary candles'. This is a concept, which is quite basic. Dream of fireflies at night: with the same inherent light, they all glow. You can measure their gap by gauging how light they are from where you are.

Two foreign groups of astronomers, including Americans Adam Riess and Saul Perlmutter, and Brian Schmidt, undertook the 1998 survey in Australia. Using eight telescopes worldwide, their objective was to measure the expansion rate of the universe, known as the

Hubble Constant, using the distance of Type 1A supernovae (although in fact, as the rate of expansion of the universe changes with time, it is theoretically not a constant).

The conclusions of the survey were unexpected. The distant supernovae that erupted when the universe was just 2/3 of its present age were much smaller than they were meant to be, and therefore thus much further apart. If new theories were right, the result of this was that the universe had expanded even more than it should have done.



This diagram reveals changes in the rate of expansion since the universe's birth 15 billion years ago. The more shallow the curve, the faster the rate of expansion. The curve changes noticeably about 7.5 billion years ago, when objects in the universe began flying apart at a faster rate. Astronomers theorize that the faster expansion rate is due to a mysterious, dark force that is pushing galaxies apart.

Figure 2: This diagram shows shifts in the expansion rate after the birth of the universe 15 billion years ago. The shallower the gradient, the quicker the expansion rate. Around 7.5 billion years ago, as objects in the cosmos started flying apart at a higher pace, the curve shifted noticeably. Astronomers arise that a mystical, dark power is responsible for the quicker expansion rate: dark magic.

III. PROPERTIES OF AN ENERGY PARTICLE

A branch of physics that explores the origin of the particles that form matter and radiation is particle physics (also known as high-energy physics). While the term particle may refer to different types of extremely small objects (e.g. protons, gas particles, or even household dust), particle physics typically explores the smallest, irreducibly observable particles and the simple interactions required to understand their behavior. These elementary particles are, by our current interpretation, excitations of the quantum fields that often control their interactions. The Standard Model is the latest dominant theory that describes these basic particles and fields, along with their dynamics. The Standard Model and its numerous potential extensions, e.g. to the newest "known" particle, the Higgs boson, or also to the oldest known force field, gravity, are therefore usually explored by current particle physics.

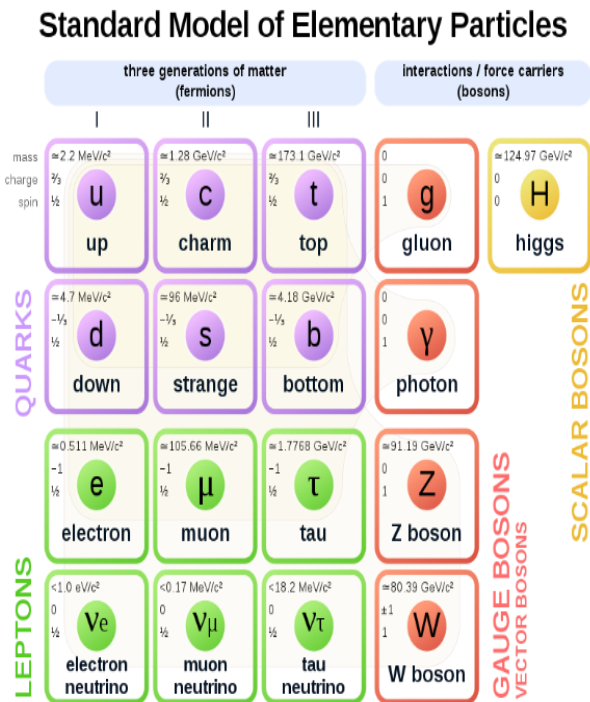


Figure 3: Standard elementary particle model: the 12 simple fermions and the 5 fundamental bosons. Brown loops suggest which bosons (red) are coupled (purple and green) to which fermions. Please note that the masses of such particles are subject to reassessment by the scientific community on a frequent basis. The values presently expressed in this graph are as of 2019 and have since been updated.

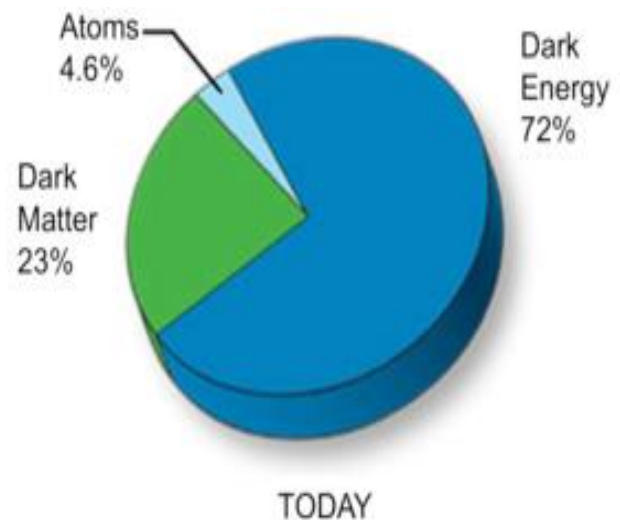
IV. DARK ENERGY SPACE

Dark Energy is a fictional source of energy that behaves as the opposite of gravity, exerting a negative, repulsive pressure. The observational properties of distant type Ia supernovae, which display the universe going through an accelerated expansion time, is hypothesized to be accounted for. Dark Energy, like Dark Matter, is not directly observed, but rather inferred from gravitational impact measurements between celestial objects. Dark energy takes up 72 percent of the universe's overall mass-energy abundance. Black Matter is the other dominant contributor, and a small portion is attributed to atoms or baryonic matter.

Two teams of astronomers reported in 1998 that distant, $z \sim 1$ -type I supernovae were marginally too small to model predictions of an expanding (yet slowing) universe. The supernovae would be further apart to be fainter, and this requires the Universe's expansion in the past to be slower. Both teams decided that a process of exponential expansion is moving into the cosmos. To push this acceleration, Dark Magic was invoked.

Albert Einstein invoked a 'cosmological constant' in the early part of the 20th century (usually

symbolized by the Greek letter lambda, etc.). It was the vacuum energy of empty space that holds the universe, rather than shrinking or expanding, stagnant (predicted by his field equations of the General Theory of Relativity). It offered a means of balancing the matter-induced gravitational contraction Einstein hastily scrapped his cosmological constant after the universe was found to be expanding. However, if dark energy is characterized by anything close to the cosmological constant of Einstein, it not only balances gravity to sustain a stagnant universe, but also has negative pressure to speed up expansion.

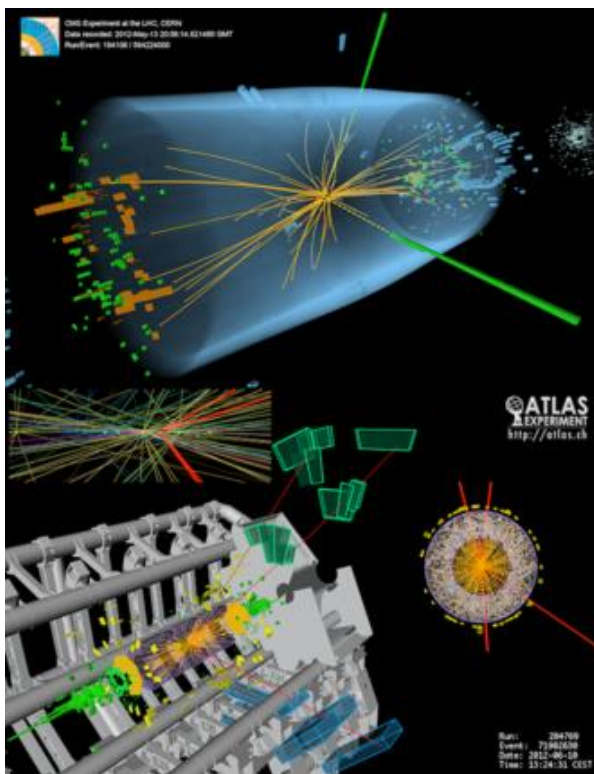


V. MASS PARTICLE

In the Standard Model of particle physics, the Higgs boson is an elementary particle created by the quantum excitation of the Higgs field, one of the fields in the theory of particle physics. It is named after the physicist Peter Higgs, who suggested the Higgs mechanism in 1964, along with five other physicists, to explain why particles have mass. The presence of the Higgs boson suggests this mechanism. ATLAS and CMS collaborations focused on collisions at the LHC at CERN first detected the Higgs boson as a new particle in 2012, and the new particle was eventually verified to meet the predicted properties of the Higgs boson over the following years.

Two of the physicists, Peter Higgs and François Englert, were awarded the obel Prize in Physics on 10 December 2013 for their theoretical forecasts. While the term Higgs has come to be synonymous with this theory (the Higgs mechanism), various parts of it were independently developed by several scholars between around 1960 and 1972.

The Higgs boson has also been referred to in mass media as the "God particle," from a 1993 book on the subject, but many physicists, including Higgs himself, who view it as sensationalism, strongly oppose the nickname.



From collisions between protons in the LHC, candidate Higgs boson cases. Decay into two photons (dashed yellow lines and green towers) is seen by the top case in the CMS experiment. In the ATLAS experiment, the lower event reveals decay into four muons (red tracks).

VI. CONCLUSION

In a recent big revision of cosmological philosophy, the dark energy hypothesis is only one part, focused on discoveries that contradict prior hypotheses. It turns out that the traditional kind we see around us is just 4 per cent of mass-energy. Completely 74% of all mass energy is now understood to be dark energy, while 22% is considered to be "dark matter," a type of matter that has been speculated to account for the galaxies' detected, anomalous orbital behavior.

Dark energy gets the name that it does because, even as a feeble repulsive force that is only noticeable in broad ranges where gravitation can be overpowered, it does not interfere with ordinary matter. Dark matter gets the name it does for almost the same reason; it interacts with ordinary matter gravitationally, but it has no other known features or interactions, and attempts to locate it have failed.

REFERENCES

[1] S.S.M. Wong (1998). *Nucleon Structure. Introductory Nuclear Physics (2nd ed.)*. New York (NY): John Wiley & Sons. pp. 21–56. ISBN0-471-23973-9.

[2] Harvey, Alex (2012). *How Einstein Discovered Dark Energy*. arXiv:1211.6338.

[3] Zimmer, Carl (September 25, 2014). *A Tiny Emissary from the Ancient Past*. New York Times. Retrieved September 26, 2014.

[4] Coffin, John M. (1992). *Structure and Classification of Retroviruses*. In Levy, Jay A. *The Retroviridae. 1 (1st ed.)*. New York: Plenum. p. 20. ISBN 0-306-44074-1.

[5] Kurth, Reinhard; Bannert, Norbert, eds. (2010). *Retroviruses: Molecular Biology, Genomics and Pathogenesis*. Horizon Scientific. ISBN 978-1-904455-55-4.

[6] D. Griffiths (2008). *Introduction to Elementary Particles (2nd ed.)*. Wiley-VCH. ISBN978-3-527-40601-2.

[7] W. E. Burcham, M. Jobes (1995). *Nuclear and Particle Physics (2nd ed.)*. Longman Publishing. ISBN0-582-45088-8.

[8] Garwood RJ (2012). Patterns In Palaeontology: The first 3 billion years of evolution. *Palaeontology Online. 2 (11): 1–14*. Retrieved June 25, 2015.

[9] Cech, T. R. (2012). The RNA Worlds in Context. *Cold Spring Harbor Perspectives in Biology*, 4(7), a006742–a006742.

<https://doi.org/10.1101/cshperspect.a006742>

[10] Robertson, M. P., & Joyce, G. F. (2012). The Origins of the RNA World. *Cold Spring Harbor Perspectives in Biology*, 4(5), a003608–a003608. <https://doi.org/10.1101/cshperspect.a003608>

[11] Rana, A. K., & Ankri, S. (2016). Reviving the RNA World: An Insight into the Appearance of RNA Methyltransferases. *Frontiers in Genetics*, 7. <https://doi.org/10.3389/fgene.2016.00099>

[12] Copley, S. D., Smith, E., & Morowitz, H. J. (2007). The origin of the RNA world: Co-evolution of genes and metabolism. *Bioorganic Chemistry*, 35(6), 430–443. <https://doi.org/10.1016/j.bioorg.2007.08.001>

[13] Robertson, M. P., & Joyce, G. F. (2012). The Origins of the RNA World. *Cold Spring Harbor Perspectives in Biology*, 4(5), a003608–a003608. <https://doi.org/10.1101/cshperspect.a003608>

[14] Neveu, M., Kim, H.-J., & Benner, S. A. (2013). The "Strong" RNA World Hypothesis: Fifty Years Old. *Astrobiology*, 13(4), 391–403. <https://doi.org/10.1089/ast.2012.0868>

[15] Zimmer, Carl (September 12, 2013). *A Far-Flung Possibility for the Origin of Life*. New York Times. Retrieved September 12, 2013.

[16] Webb R (August 29, 2013). *Primordial broth of life was a dry Martian cup-a-soup*. New Scientist. Retrieved September 13, 2013.

[17] Wade, Nicholas (May 4, 2015). *Making Sense of the Chemistry That Led to Life on Earth*. New York Times. Retrieved May 10, 2015.