Dark Matter with Supermaterials

Superconducting aluminum or superfluid helium could be used to detect superlight dark matter particles. [14]

Technological advances are ushering in a new era of understanding in the search for fundamental physical particles - including dark matter - scientists will tell a public event. [13]

The Large Underground Xenon (LUX) dark matter experiment, which operates nearly a mile underground at the Sanford Underground Research Facility (SURF) in the Black Hills of South Dakota, has already proven itself to be the most sensitive detector in the hunt for dark matter, the unseen stuff believed to account for most of the matter in the universe. Now, a new set of calibration techniques employed by LUX scientists has again dramatically improved the detector's sensitivity. [12]

The gravitational force attracting the matter, causing concentration of the matter in a small space and leaving much space with low matter concentration: dark matter and energy.

There is an asymmetry between the mass of the electric charges, for example proton and electron, can understood by the asymmetrical Planck Distribution Law. This temperature dependent energy distribution is asymmetric around the maximum intensity, where the annihilation of matter and antimatter is a high probability event. The asymmetric sides are creating different frequencies of electromagnetic radiations being in the same intensity level and compensating each other. One of these compensating ratios is the electron – proton mass ratio. The lower energy side has no compensating intensity level, it is the dark energy and the corresponding matter is the dark matter.

In particle physics and astrophysics, weakly interacting massive particles, or WIMPs, are among the leading hypothetical particle physics candidates for dark matter.

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Spotting Dark Matter with Supermaterials

Dark matter searches repeatedly draw a blank. One possible reason for the failure may be dark matter's mass: Despite increased sensitivity, current detectors cannot spot the particles that make up this elusive matter if the particles are extremely light. Now Kathryn Zurek from the Lawrence Berkeley National Laboratory, California, and colleagues have come up with two new ideas for making detectors that should be capable of spotting such superlight particles.

In broad strokes, dark matter detectors are designed to operate as follows: Incoming dark matter particles strike the detector, gently nudging nearby atomic nuclei or electrons in the material from which the detector is made. These rare nudges generate small amounts of energy in the form of light or heat, which the detector registers. But the ability to detect particles of a certain mass depends on the properties of the detector material, such as the mass of its nuclei. Current detectors, made from semiconducting materials or liquid xenon, are sensitive only to particles heavier than about 10 million electronvolts.

Zurek and colleagues propose making detectors from superconducting aluminum or from superfluid helium instead. In the first case, the dark matter particles would interact with electron pairs in the superconductor and split the electrons apart. In the second, the particles would scatter from superfluid-helium nuclei and the nuclei would undergo multiple kicks. Both processes should produce an observable signal for particles as light as approximately 1 keV.

This research is published in Physical Review Letters. [14]

Dark matter scientists on brink of discovering elusive particles

Researchers are using analysis of deep space observations together with experiments far underground to hunt for dark matter - an elusive material which, together with dark energy, is thought to account for about 95 per cent of the universe.

Scientists will tell a public symposium in Washington, DC how current theories and experiment point to the existence of dark matter, but how it is little understood by scientists. Its discovery would be a fundamental development in understanding the physical universe, a meeting of the American Association for the Advancement of Science (AAAS) will hear.

Professor Alex Murphy, of the University of Edinburgh's School of Physics and Astronomy, will describe ongoing global collaborations by scientists around the world to detect and define the nature of dark matter. These include astronomy studies to examine its effect on galaxies and light in space, and experiments deep underground that seek to detect it by minimising interference from other particles.

The most sensitive of these experiments is Large Underground Xenon, or LUX, detector - which is located a mile underground in South Dakota, US. Recent improvements have increased the device's chances of identifying sub-atomic particles called WIMPs - weakly interacting massive particles - which are believed to be the main component of dark matter.

Professor Murphy said: "Technology has enabled us to ramp up our search for this fundamental material, and its place in the physical realm."

Professor Murphy will explain the research at a symposium entitled Astroparticle Physics: Understanding Mysteries of the Universe on 3pm, Saturday 13 February at the Marriot Wardman Park, Washington DC. He will be joined by Professor Angela Olinto of the University of Chicago and Professor Eun-Suk Seo of the University of Maryland. [13]

New results from world's most sensitive dark matter detector

Researchers with LUX are looking for WIMPs, or weakly interacting massive particles, which are among the leading candidates for dark matter. "We have improved the sensitivity of LUX by more than a factor of 20 for low-mass dark matter particles, significantly enhancing our ability to look for WIMPs," said Rick Gaitskell, professor of physics at Brown University and co-spokesperson for the

LUX experiment. "It is vital that we continue to push the capabilities of our detector in the search for the elusive dark matter particles," Gaitskell said.

LUX improvements, coupled to advanced computer simulations at the U.S. Department of Energy's Lawrence Berkeley National Laboratory's (Berkeley Lab) National Energy Research Scientific Computing Center (NERSC) and Brown University's Center for Computation and Visualization (CCV), have allowed scientists to test additional particle models of dark matter that now can be excluded from the search. NERSC also stores large volumes of LUX data—measured in trillions of bytes, or terabytes—and Berkeley Lab has a growing role in the LUX collaboration.

Scientists are confident that dark matter exists because the effects of its gravity can be seen in the rotation of galaxies and in the way light bends as it travels through the universe. Because WIMPs are thought to interact with other matter only on very rare occasions, they have yet to be detected directly.

"We have looked for dark matter particles during the experiment's first three-month run, but are exploiting new calibration techniques better pinning down how they would appear to our detector," said Alastair Currie of Imperial College London, a LUX researcher. "These calibrations have deepened our understanding of the response of xenon to dark matter, and to backgrounds. This allows us to search, with improved confidence, for particles that we hadn't previously known would be visible to LUX."

The new research is described in a paper submitted to Physical Review Letters. The work reexamines data collected during LUX's first three-month run in 2013 and helps to rule out the possibility of dark matter detections at low-mass ranges where other experiments had previously reported potential detections.

LUX consists of one-third ton of liquid xenon surrounded with sensitive light detectors. It is designed to identify the very rare occasions when a dark matter particle collides with a xenon atom inside the detector. When a collision happens, a xenon atom will recoil and emit a tiny flash of light, which is detected by LUX's light sensors. The detector's location at Sanford Lab beneath a mile of rock helps to shield it from cosmic rays and other radiation that would interfere with a dark matter signal.

So far LUX hasn't detected a dark matter signal, but its exquisite sensitivity has allowed scientists to all but rule out vast mass ranges where dark matter particles might exist. These new calibrations increase that sensitivity even further.

One calibration technique used neutrons as stand-ins for dark matter particles. Bouncing neutrons off the xenon atoms allows scientists to quantify how the LUX detector responds to the recoiling process.

"It is like a giant game of pool with a neutron as the cue ball and the xenon atoms as the stripes and solids," Gaitskell said. "We can track the neutron to deduce the details of the xenon recoil, and calibrate the response of LUX better than anything previously possible."

The nature of the interaction between neutrons and xenon atoms is thought to be very similar to the interaction between dark matter and xenon. "It's just that dark matter particles interact very much more weakly—about a million-million-million-million times more weakly," Gaitskell said.

The neutron experiments help to calibrate the detector for interactions with the xenon nucleus. But LUX scientists have also calibrated the detector's response to the deposition of small amounts of energy by struck atomic electrons. That's done by injecting tritiated methane—a radioactive gas—into the detector.

"In a typical science run, most of what LUX sees are background electron recoil events," said Carter Hall a University of Maryland professor. "Tritiated methane is a convenient source of similar events, and we've now studied hundreds of thousands of its decays in LUX. This gives us confidence that we won't mistake these garden-variety events for dark matter."

Another radioactive gas, krypton, was injected to help scientists distinguish between signals produced by ambient radioactivity and a potential dark matter signal.

"The krypton mixes uniformly in the liquid xenon and emits radiation with a known, specific energy, but then quickly decays away to a stable, non-radioactive form," said Dan McKinsey, a UC Berkeley physics professor and co-spokesperson for LUX who is also an affiliate with Berkeley Lab. By precisely measuring the light and charge produced by this interaction, researchers can effectively filter out background events from their search.

"And so the search continues," McKinsey said. "LUX is once again in dark matter detection mode at Sanford Lab. The latest run began in late 2014 and is expected to continue until June 2016. This run will represent an increase in exposure of more than four times compared to our previous 2013 run. We will be very excited to see if any dark matter particles have shown themselves in the new data."

McKinsey, formerly at Yale University, joined UC Berkeley and Berkeley Lab in July, accompanied by members of his research team.

The Sanford Lab is a South Dakota-owned facility. Homestake Mining Co. donated its gold mine in Lead to the South Dakota Science and Technology Authority (SDSTA), which reopened the facility in 2007 with $40 million in funding from the South Dakota State Legislature and a $70 million donation from philanthropist T. Denny Sanford. The U.S. Department of Energy (DOE) supports Sanford Lab's operations.

Kevin Lesko, who oversees SURF operations and leads the Dark Matter Research Group at Berkeley Lab, said, "It's good to see that the experiments installed in SURF continue to produce world-leading results."

The LUX scientific collaboration, which is supported by the DOE and National Science Foundation (NSF), includes 19 research universities and national laboratories in the United States, the United Kingdom and Portugal.

"The global search for dark matter aims to answer one of the biggest questions about the makeup of our universe. We're proud to support the LUX collaboration and congratulate them on achieving an even greater level of sensitivity," said Mike Headley, Executive Director of the SDSTA.

Planning for the next-generation dark matter experiment at Sanford Lab is already under way. In late 2016 LUX will be decommissioned to make way for a new, much larger xenon detector, known as the LUX-ZEPLIN (LZ) experiment. LZ would have a 10-ton liquid xenon target, which will fit inside the same 72,000-gallon tank of pure water used by LUX. Berkeley Lab scientists will have major leadership roles in the LZ collaboration.

"The innovations of the LUX experiment form the foundation for the LZ experiment, which is planned to achieve over 100 times the sensitivity of LUX. The LZ experiment is so sensitive that it should begin to detect a type of neutrino originating in the Sun that even Ray Davis' Nobel Prize-winning experiment at the Homestake mine was unable to detect," according to Harry Nelson of UC Santa Barbara, spokesperson for LZ. [12]

The Big Bang

The Big Bang caused acceleration created radial currents of the matter, and since the matter is composed of negative and positive charges, these currents are creating magnetic field and attracting forces between the parallel moving electric currents. This is the gravitational force experienced by the matter, and also the mass is result of the electromagnetic forces between the charged particles. The positive and negative charged currents attracts each other or by the magnetic forces or by the much stronger electrostatic forces!?

The gravitational force attracting the matter, causing concentration of the matter in a small space and leaving much space with low matter concentration: dark matter and energy.

There is an asymmetry between the mass of the electric charges, for example proton and electron, can understood by the asymmetrical Planck Distribution Law. This temperature dependent energy distribution is asymmetric around the maximum intensity, where the annihilation of matter and antimatter is a high probability event. The asymmetric sides are creating different frequencies of electromagnetic radiations being in the same intensity level and compensating each other. One of these compensating ratios is the electron – proton mass ratio. The lower energy side has no compensating intensity level, it is the dark energy and the corresponding matter is the dark matter.

Dark matter composition research - WIMP

The WIMP (Weakly interactive massive particles) form a class of heavy particles, interacting slightly with matter, and constitute excellent candidates with the nonbaryonic dark matter. The neutralino postulated by the supersymetric extensions of the standard model of particle physics. The idea of supersymmetry is to associate each boson to a fermion and vice versa. Each particle is then given a super-partner, having identical properties (mass, load), but with a spin which differes by 1/2. Thus, the number of particles is doubled. For example, the photon is accompanied by a photino, the graviton by a gravitino, the electron of a selectron, etc. Following the impossibility to detect a 511 keV boson (the electron partner), the physicists had to re-examine the idea of an exact symmetry. Symmetry is 'broken' and superpartners have a very important mass. One of these superparticules called LSP (Lightest Supersymmetric Particle) is the lightest of all. In most of the supersymmetric theories (without violation of the R-parity) the LSP is a stable particle because it cannot disintegrate in a lighter element. It is of neutral color and electric charge and is then only sensitive to weak interaction (weak nuclear force). It is then an excellent candidate for the not-baryonic dark matter. [11]

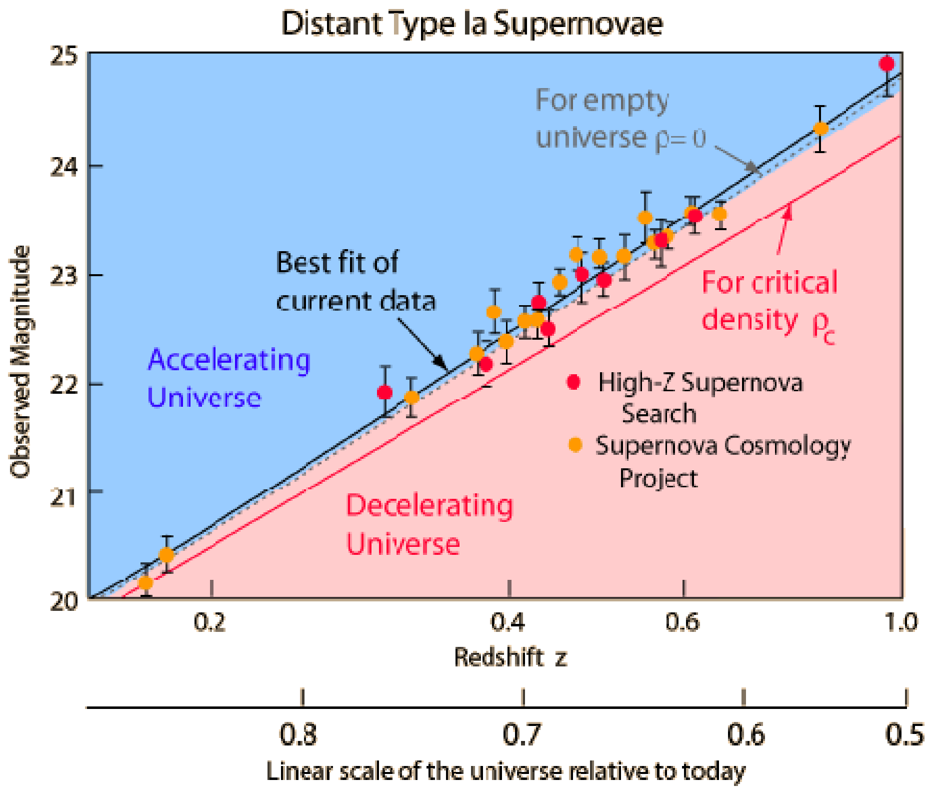
Weakly interacting massive particles

In particle physics and astrophysics, weakly interacting massive particles, or WIMPs, are among the leading hypothetical particle physics candidates for dark matter. The term “WIMP” is given to a dark matter particle that was produced by falling out of thermal equilibrium with the hot dense plasma of the early universe, although it is often used to refer to any dark matter candidate that interacts with standard particles via a force similar in strength to the weak nuclear force. Its name comes from the fact that obtaining the correct abundance of dark matter today via thermal production requires a self-annihilation cross section, which is roughly what is expected for a new particle in the 100 GeV mass range that interacts via the electroweak force. This apparent coincidence is known as the “WIMP miracle”. Because supersymmetric extensions of the standard model of particle physics readily predict a new particle with these properties, a stable supersymmetric partner has long been a prime WIMP candidate. However, recent null results from direct detection experiments including LUX and SuperCDMS, along with the failure to produce evidence of supersymmetry in the Large Hadron Collider (LHC) experiment has cast doubt on the simplest WIMP hypothesis. Experimental efforts to detect WIMPs include the search for products of WIMP annihilation, including gamma rays, neutrinos and cosmic rays in nearby galaxies and galaxy clusters; direct detection experiments designed to measure the collision of WIMPs with nuclei in the laboratory, as well as attempts to directly produce WIMPs in colliders such as the LHC. [10]

Evidence for an accelerating universe

One of the observational foundations for the big bang model of cosmology was the observed expansion of the universe. [9] Measurement of the expansion rate is a critical part of the study, and it has been found that the expansion rate is very nearly "flat". That is, the universe is very close to the critical density, above which it would slow down and collapse inward toward a future "big crunch". One of the great challenges of astronomy and astrophysics is distance measurement over the vast distances of the universe. Since the 1990s it has become apparent that type Ia supernovae offer a unique opportunity for the consistent measurement of distance out to perhaps 1000 Mpc. Measurement at these great distances provided the first data to suggest that the expansion rate of the universe is actually accelerating. That acceleration implies an energy density that acts in opposition to gravity which would cause the expansion to accelerate. This is an energy density which we have not directly detected observationally and it has been given the name "dark energy".

The type Ia supernova evidence for an accelerated universe has been discussed by Perlmutter and the diagram below follows his illustration in Physics Today.



The data summarized in the illustration above involve the measurement of the redshifts of the distant supernovae. The observed magnitudes are plotted against the redshift parameter z. Note that there are a number of Type 1a supernovae around z=.6, which with a Hubble constant of 71 km/s/mpc is a distance of about 5 billion light years.

Equation

The cosmological constant Λ appears in Einstein's field equation [5] in the form of

$$R_{\mu\nu} - \frac{1}{2} R\, g_{\mu\nu} + \Lambda\, g_{\mu\nu} = \frac{8\pi G}{c^4} T_{\mu\nu}\,,$$

where *R* and *g* describe the structure of spacetime, *T* pertains to matter and energy affecting that structure, and *G* and *c* are conversion factors that arise from using traditional units of measurement. When Λ is zero, this reduces to the original field equation of general relativity. When *T* is zero, the field equation describes empty space (the vacuum).

The cosmological constant has the same effect as an intrinsic energy density of the vacuum, ρ_{vac} (and an associated pressure). In this context it is commonly moved onto the right-hand side of the equation, and defined with a proportionality factor of 8π: $\Lambda = 8\pi\rho_{vac}$, where unit conventions of general relativity are used (otherwise factors of *G* and *c* would also appear). It is common to quote values of energy density directly, though still using the name "cosmological constant".

A positive vacuum energy density resulting from a cosmological constant implies a negative pressure, and vice versa. If the energy density is positive, the associated negative pressure will drive an accelerated expansion of the universe, as observed. (See dark energy and cosmic inflation for details.)

Explanatory models

Models attempting to explain accelerating expansion include some form of dark energy, dark fluid or phantom energy. The most important property of dark energy is that it has negative pressure which is distributed relatively homogeneously in space. The simplest explanation for dark energy is that it is a cosmological constant or vacuum energy; this leads to the Lambda-CDM model, which is generally known as the Standard Model of Cosmology as of 2003-2013, since it is the simplest model in good agreement with a variety of recent observations.

Dark Matter and Energy

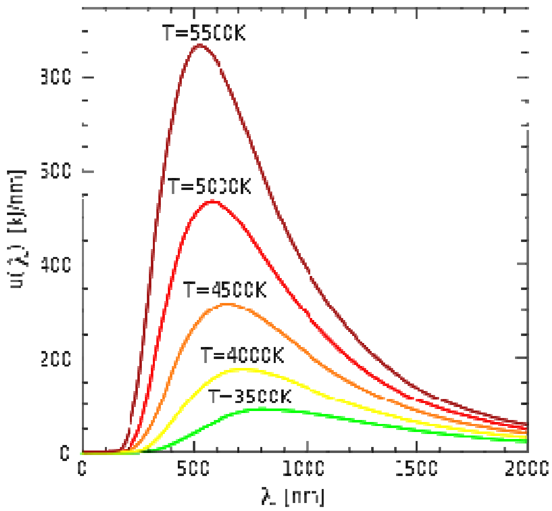
Dark matter is a type of matter hypothesized in astronomy and cosmology to account for a large part of the mass that appears to be missing from the universe. Dark matter cannot be seen directly with telescopes; evidently it neither emits nor absorbs light or other electromagnetic radiation at any significant level. It is otherwise hypothesized to simply be matter that is not reactant to light. Instead, the existence and properties of dark matter are inferred from its gravitational effects on visible matter, radiation, and the large-scale structure of the universe. According to the Planck mission team, and based on the standard model of cosmology, the total mass–energy of the known universe contains 4.9% ordinary matter, 26.8% dark matter and 68.3% dark energy. Thus, dark matter is estimated to constitute 84.5% of the total matter in the universe, while dark energy plus dark matter constitute 95.1% of the total content of the universe. [6]

Cosmic microwave background

The cosmic microwave background (CMB) is the thermal radiation assumed to be left over from the "Big Bang" of cosmology. When the universe cooled enough, protons and electrons combined to form neutral atoms. These atoms could no longer absorb the thermal radiation, and so the universe became transparent instead of being an opaque fog. [7]

Thermal radiation

Thermal radiation is electromagnetic radiation generated by the thermal motion of charged particles in matter. All matter with a temperature greater than absolute zero emits thermal radiation. When the temperature of the body is greater than absolute zero, interatomic collisions cause the kinetic energy of the atoms or molecules to change. This results in charge-acceleration and/or dipole oscillation which produces electromagnetic radiation, and the wide spectrum of radiation reflects the wide spectrum of energies and accelerations that occur even at a single temperature. [8]



Electromagnetic Field and Quantum Theory

Needless to say that the accelerating electrons of the steady stationary current are a simple demystification of the magnetic field, by creating a decreasing charge distribution along the wire, maintaining the decreasing U potential and creating the **A** vector potential experienced by the electrons moving by **v** velocity relative to the wire. This way it is easier to understand also the time dependent changes of the electric current and the electromagnetic waves as the resulting fields moving by c velocity.

It could be possible something very important law of the nature behind the self maintaining **E** accelerating force by the accelerated electrons. The accelerated electrons created electromagnetic fields are so natural that they occur as electromagnetic waves traveling with velocity c. It shows that the electric charges are the result of the electromagnetic waves diffraction.

One of the most important conclusions is that the electric charges are moving in an accelerated way and even if their velocity is constant, they have an intrinsic acceleration anyway, the so called spin, since they need at least an intrinsic acceleration to make possible they movement .

The bridge between the classical and quantum theory is based on this intrinsic acceleration of the spin, explaining also the Heisenberg Uncertainty Principle. The particle – wave duality of the electric charges and the photon makes certain that they are both sides of the same thing. Basing the gravitational force on the accelerating Universe caused magnetic force and the Planck Distribution Law of the electromagnetic waves caused diffraction gives us the basis to build a Unified Theory of the physical interactions. [4]

Lorentz transformation of the Special Relativity

In the referential frame of the accelerating electrons the charge density lowering linearly because of the linearly growing way they takes every next time period. From the referential frame of the wire there is a parabolic charge density lowering.

The difference between these two referential frames, namely the referential frame of the wire and the referential frame of the moving electrons gives the relativistic effect. Important to say that the moving electrons presenting the time coordinate, since the electrons are taking linearly increasing way every next time period, and the wire presenting the geometric coordinate. The Lorentz transformations are based on moving light sources of the Michelson - Morley experiment giving a practical method to transform time and geometric coordinates without explaining the source of this mystery.

The real mystery is that the accelerating charges are maintaining the accelerating force with their charge distribution locally. The resolution of this mystery that the charges are simply the results of the diffraction patterns, that is the charges and the electric field are two sides of the same thing. Otherwise the charges could exceed the velocity of the electromagnetic field.

The increasing mass of the electric charges the result of the increasing inductive electric force acting against the accelerating force. The decreasing mass of the decreasing acceleration is the result of the inductive electric force acting against the decreasing force. This is the relativistic mass change explanation, especially importantly explaining the mass reduction in case of velocity decrease.

The Classical Relativistic effect

The moving charges are self maintain the electromagnetic field locally, causing their movement and this is the result of their acceleration under the force of this field.
In the classical physics the charges will distributed along the electric current so that the electric potential lowering along the current, by linearly increasing the way they take every next time period because this accelerated motion.

Electromagnetic inertia and Gravitational attraction

Since the magnetic induction creates a negative electric field as a result of the changing acceleration, it works as an electromagnetic inertia, causing an electromagnetic mass.

It looks clear that the growing acceleration results the relativistic growing mass - limited also with the velocity of the electromagnetic wave.

Since $E = h\nu$ and $E = mc^2$, $m = h\nu / c^2$ that is the m depends only on the ν frequency. It means that the mass of the proton and electron are electromagnetic and the result of the electromagnetic induction, caused by the changing acceleration of the spinning and moving charge! It could be that the m_o inertial mass is the result of the spin, since this is the only accelerating motion of the electric charge. Since the accelerating motion has different frequency for the electron in the atom and the proton, they masses are different, also as the wavelengths on both sides of the diffraction pattern, giving equal intensity of radiation.

If the mass is electromagnetic, then the gravitation is also electromagnetic effect caused by the accelerating Universe! The same charges would attract each other if they are moving parallel by the magnetic effect.

The Planck distribution law explains the different frequencies of the proton and electron, giving equal intensity to different lambda wavelengths! Also since the particles are diffraction patterns they have some closeness to each other – can be seen as a gravitational force.

Electromagnetic inertia and mass

Electromagnetic Induction

Since the magnetic induction creates a negative electric field as a result of the changing acceleration, it works as an electromagnetic inertia, causing an electromagnetic mass. [1]

Relativistic change of mass

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The frequency dependence of mass

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Electron – Proton mass rate

The Planck distribution law explains the different frequencies of the proton and electron, giving equal intensity to different lambda wavelengths! Also since the particles are diffraction patterns they have some closeness to each other – can be seen as a gravitational force. [1]

There is an asymmetry between the mass of the electric charges, for example proton and electron, can understood by the asymmetrical Planck Distribution Law. This temperature dependent energy distribution is asymmetric around the maximum intensity, where the annihilation of matter and antimatter is a high probability event. The asymmetric sides are creating different frequencies of electromagnetic radiations being in the same intensity level and compensating each other. One of these compensating ratios is the electron – proton mass ratio. The lower energy side has no compensating intensity level, it is the dark energy and the corresponding matter is the dark matter.

Gravity from the point of view of quantum physics

The Gravitational force

The gravitational attractive force is basically a magnetic force.

The same electric charges can attract one another by the magnetic force if they are moving parallel in the same direction. Since the electrically neutral matter is composed of negative and positive charges they need 2 photons to mediate this attractive force, one per charges. The Bing Bang caused parallel moving of the matter gives this magnetic force, experienced as gravitational force.

Since graviton is a tensor field, it has spin = 2, could be 2 photons with spin = 1 together.

You can think about photons as virtual electron – positron pairs, obtaining the necessary virtual mass for gravity.

The mass as seen before a result of the diffraction, for example the proton – electron mass rate Mp=1840 Me. In order to move one of these diffraction maximum (electron or proton) we need to intervene into the diffraction pattern with a force appropriate to the intensity of this diffraction maximum, means its intensity or mass.

The Big Bang caused acceleration created radial currents of the matter, and since the matter is composed of negative and positive charges, these currents are creating magnetic field and attracting forces between the parallel moving electric currents. This is the gravitational force experienced by the matter, and also the mass is result of the electromagnetic forces between the charged particles. The positive and negative charged currents attracts each other or by the magnetic forces or by the much stronger electrostatic forces!?

The Graviton

In physics, the graviton is a hypothetical elementary particle that mediates the force of gravitation in the framework of quantum field theory. If it exists, the graviton is expected to be massless (because the gravitational force appears to have unlimited range) and must be a spin-2 boson. The spin follows from the fact that the source of gravitation is the stress-energy tensor, a second-rank tensor (compared to electromagnetism's spin-1 photon, the source of which is the four-current, a first-rank tensor). Additionally, it can be shown that any massless spin-2 field would give rise to a force indistinguishable from gravitation, because a massless spin-2 field must couple to (interact with) the stress-energy tensor in the same way that the gravitational field does. This result suggests that, if a massless spin-2 particle is discovered, it must be the graviton, so that the only experimental verification needed for the graviton may simply be the discovery of a massless spin-2 particle. [2]

Conclusions

In particle physics and astrophysics, weakly interacting massive particles, or WIMPs, are among the leading hypothetical particle physics candidates for dark matter.
The gravitational force attracting the matter, causing concentration of the matter in a small space and leaving much space with low matter concentration: dark matter and energy.
There is an asymmetry between the mass of the electric charges, for example proton and electron, can understood by the asymmetrical Planck Distribution Law. This temperature dependent energy distribution is asymmetric around the maximum intensity, where the annihilation of matter and antimatter is a high probability event. The asymmetric sides are creating different frequencies of electromagnetic radiations being in the same intensity level and compensating each other. One of these compensating ratios is the electron – proton mass ratio. The lower energy side has no compensating intensity level, it is the dark energy and the corresponding matter is the dark matter.
The electric currents causing self maintaining electric potential is the source of the special and general relativistic effects. The Higgs Field is the result of the electromagnetic induction. The Graviton is two photons together. [3]

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