

Breakdown of Local Energy Conservation Principle in Electrodynamics and the Entire New Possibilities of the Energy Future

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ABSTRACT

The presence of the repulsive force among the same charges in capacitors has never been raised as a valid issue in consideration of the stored energy in the conventional electronic circuit theory. This energy was considered already included in the conventional calculation of the stored capacitor energy. However, when the charges in the two shells of the spherical capacitor are designated as Q_1 and $-Q_2$ of slight difference in magnitude, it becomes obvious that the conventional stored energy is only given by the term depending on $Q_1 \times Q_2$ and the stored energy represented by the repulsive potential energy that depends on Q_1^2 and Q_2^2 are not included. Not surprisingly, Nikola Tesla, Thomas Henry Moray and Stanley Meyer have patented and demonstrated energy devices in public that produces much more energy than put in in their devices. In case of Tesla and Moray, the secret was using spark gap or cold cathode tube that allows the repulsive potential energy to be materialized as additional electrical current. The excess repulsive potential energy can be as large as 8000 times the input energy in case of water cell electrolysis case according to the theoretical calculation, which allowed Meyer's excess energy device possible. However, their inventions were buried in oblivion because the energy conservation law in physics which was borrowed from thermodynamics in early days of scientific development doesn't allow such physical event since the principle was adapted as the absolute and unbreakable law in physics of electromagnetism. The other compelling argument against the result of thermodynamics is that magnetic field carries energy but no material can block the passage of the magnetic field which means the adiabaticity required for the strict isolation of the local energy is inherently impossible in electrodynamics. This observation opens the vast number of possibilities of acquiring energy by using various shaped permanent magnets and in combination of the repulsive potential energy utilization.

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The early development of thermodynamics in modern science concluded that energy cannot be created out of nothing [1]. It is not difficult to imagine that this principle has become the corner stone of the fundamental scientific principle of the modern physics. It makes perfect sense because burning coal makes steam and the steam runs locomotive machines. If energy could be created out of nothing, it means there would be no need to burn coal to move heavy train which would simply be an outrageous wishful thinking in the early thought process of humanity. Also, time translation invariance in the universe turned out to be directly related to energy conservation according to Emmy Noether in quantum field theoretical study. These studies have solidified the credibility of the energy conservation principle in scientific community without any possibility of contemplating a serious doubt on it [2].

However, it was noticed by the author in 1999 from a simple gedanken experiment that the repulsive electrostatic potential energy from the same charges was not included in the stored energy calculation in charged capacitors. This fact can easily be verified by considering a spherical capacitor where two metallic spheres are positioned concentrically where the inner and outer sphere are oppositely charged. The conventionally known stored energy in charged capacitors only takes into account the energy stored in between the two spheres which is the attractive part of the stored

energy. However, a little bit of thought experiment shows that there are repulsive electrostatic forces among the same charges both in inner and outer spheres [3]. Repulsive electrostatic force also develops potential energy and the same charges will try to escape the confined area of the conducting sphere. However this is prevented by the work function potential which is needed to detach electrons by photons from the metallic surface. This effect was the basis of Einstein's photoelectric effect which turned out to be a valid physical effect. It takes energy to detach electrons from the metallic surface [4]. The kinetic energy of the detached electron is given by $KE = h\nu - W$. What this means is that the electrons are trapped in the metallic surface accumulating repulsive electrostatic potential energy in addition to the attractive potential energy stored in between the two spheres by positive and negative charges. This is possible due to the Drude-Sommerfeld theory of free electrons in conducting metals [5]. In fact, this mechanism of charges confined on the surface of the metal despite the repulsive electrostatic forces among themselves is the reason that capacitors work as storage device for electric charges in the first place.

By coincidence, the discharge of the capacitor through a resistor recovers the attractive part of the electrostatic energy stored in the capacitor however the repulsive part of the energy is lost because of the charge recombination before the manifestation of the

repulsive potential energy into kinetic energy. Unfortunately, this was a convenient and superficial proof to convince the scientists that the energy is indeed conserved in charged capacitors. But the truth in science has a way to show its face in one way or another. Energy anomalies started popping up in the early 20 century from Tesla's radiant energy devices that produces much more energy than the conventional energy conservation principle predicts to Thomas Henry Moray's mysterious excess energy device using the same type of circuit configuration except that Moray used cold cathode tube instead of spark gap which was used by Tesla [6]. Tesla explained that the extra energy is coming from the Sun, day and night and he named his device Radiant Energy Device in his patents. Scientists knew that there is not enough verifiable energy coming from the Sun day and night and as such his patented invention was thrown in the dark. However the uniqueness of his device was that there is spark gap that continuously discharges the capacitor after it accumulates the atmospheric charge from the antenna and the ground. In fact the antenna and ground works as atmospheric charge accumulation source for the capacitor in the device before the device starts producing energy.

In 1910s, Thomas Henry Moray also developed a device that produces energy far exceeding the expectation [7]. The antenna connected to his device was 200 feet long and 8 feet above the ground, and the wire was a copper cable approximately a fourth inch in diameter, according to the record. Before starting the device, it took 10-20 minutes to charge the capacitor from the antenna. It had capacitors and inductor but the most glaring coincidence with Tesla device is that Thomas Henry Moray device had cold cathode tube to make his device to work. The details of the cold cathode tube was carefully kept secret by Moray which indicates that the cold cathode tube is the key for the workings of the device. However, his device did not see the light of the day because Moray could not explain where the excess energy was coming from to the physicists who questioned the origin of the energy he was producing.

What these two cases indicate is that the repulsive energy stored in the capacitor can only be materialized when the charges are released into the space and be allowed to move following the repulsive electrostatic force lines before charge recombination. This confirms the law of mechanics that potential energy can only become kinetic energy when the particles are allowed to move following the force lines created by the potential. Electrical current is defined by $i=nev$, the number of electrons n times the single electronic charge e times the speed v . The speed v here is created by the repulsive electrostatic potential among the same charges.

After the detailed calculation, it turns out that the repulsive electrostatic energy is always larger than the attractive potential energy in all capacitors. The reason this energy could not be utilized was because the presence of this energy was not recognized by the scientific community and second the closed loop electronic circuit does not manifest this energy in the electronic circuit unless they are given the chance to travel following the repulsive force lines on purpose which means the electrons have to come out of the closed looped circuit. And this opportunity was provided by accident in the case of Tesla's radiant energy device and Thomas Henry Moray's device.

Depending on the dielectric constant of the material in between the two metallic plates that consist the capacitor, the stored repulsive potential energy can be as large as several hundred thousand times the attractive potential energy depending on the configuration of the capacitor. The ratio of the attractive and repulsive potential

energy is given, in case of the concentric spherical capacitor, by,

$$\frac{E_{repulsive}}{E_{attractive}} = \frac{\epsilon(a+b)}{\epsilon_0(b-a)}$$

where the inner radius of the spherical capacitor is a and b the outer shell radius. The sample dielectric constant of high dielectric constant material is shown below.

Material	Dielectric Constant, $k = \epsilon/\epsilon_0$
PbMgNbO ₃ +PbTiO ₃	22600
PbLaZrTiO ₃	1000
BaSrTiO ₃	300
H ₂ O	80

Samples of the High Dielectric Constant Materials

The gap distance ($b-a$) between the two capacitor plates is much smaller than the square root of the areas of the plates in most case of capacitors which represents the radius of the sphere. If this ratio is 100 for example for the particular capacitor, the stored repulsive potential energy is 8000 times larger than the attractive potential energy required to charge the capacitor where water is used as a dielectric material. This is a huge amount of energy gain that cannot be simply overlooked.

The difficulty Tesla and Moray faced for their devices to work continuously was the maintenance of the discharge element either spark gap or cold cathode tube that tends to degrade over time. The exposure of the sparking electrodes to air oxidizes the surface of the metallic surface of the discharge elements and they stop working after a certain period of time.

This can be improved in modern technology since we know exactly what their electronic function is. For example, there is a device known as Sidac in electronic component catalog that has the negative resistance effect in its I-V curve similar to cold cathode tube. The negative slope in I-V curves in both cold cathode tube and Sidac was a mystery because it indicates that the device works as if they amplify the electrical current which is forbidden by current conservation law in electronic circuit theory which is essentially the same as the law of energy conservation. The fundamental reason for this is because the DC power supply used in the lab to test the I-V curve has capacitors in their output stage to regulate the rectified AC current which needs high capacitance to regulate the voltage into DC as closely as possible. It means the DC power supply already has high repulsive potential energy in its current output. And the discharge electronic device like cold cathode tube and Sidac performs exactly what they are supposed to do that is to convert the repulsive electrostatic potential energy into usable electrical current.

There is other method of manifestations that this repulsive potential energy was converted and collected in the output. It was done by Stanley Meyer in 1990s [8]. By using a special device of water electrolysis to produce HHO gas that he invented, he was able to drive his car thousands of miles without gasoline. He succeeded in patenting his device and test drove his car demonstrating his device in front of many witnesses. So there is no doubt that he succeeded what he claimed to have achieved. The problem was that the doctrine of modern science says such device is not possible because the fundamental energy conservation principle does not allow it and as such he must be committing fraud. He was brought to the Ohio court for trial and convicted of committing

fraud. And eventually his patent was buried in oblivion. It must be noted at this point that due to the symmetry of electric and magnetic phenomenon in the theory of electromagnetism, the over-unity energy effect can manifest in magnetic circuit that does not involve electric charges also due to the fact that magnetic field doesn't not obey adiabaticity condition required to test local energy conservation.

The author was astounded by the number of videos posted by amateur inventors in YouTube on unlikely energy devices that no physicist would be interested to look at. Some of them could be fakes but many of them have identical physical characteristics that is noticeable from the viewpoint of the repulsive potential energy in charged capacitors. It is about time to communicate among these amateur inventors, electrical engineers and physicists gathered around and discuss the subject matter together.

Considering the severe energy crisis our world is facing at the very moment in 2024, it is imperative that this technology has to be brought to life and utilized for all humanity. This energy is clean, produces no pollution, and has no radioactivity, unlimited and free. It is essentially one of the most sacred God's gifts for all sentient beings in the universe in addition to air and water.

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