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The Origin Of Electric Charge And Its Relation To Closed And Open Strings In The Early Universe

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Abstract

The C-Neutralino, a particle of immense significance, is the primary particle that drives the beginning of our universe. The C-Neutralino decays into other particles, including protons and electrons. The C-Neutralino existed before the beginning of time. They were the catalyst for the start of our universe. As the C-Neutralinos start to collide in the early universe, temperatures rise. When temperatures become as hot $10^{100}\ degrees\ celsus$ our universe gets its start. We understand this as the Big Bang that happened at the beginning of our universe. The electric charge starts in the early universe during the first few minutes. The first moments after the Big Bang are called the quark-gluon plasma phase. In this phase, there are two different periods. The first period occurs right after the beginnings of the universe. The temperatures are so hot during the first few minutes that the quarks and gluons are strings. The top quark and the antibottom quark are strings during this time in the early universe. As they collide, they start to spin, oscillate, and rotate, becoming one quark. This heavy quark called the cd-quark, was responsible for developing electric charges in the early universe. This change in mass of the cd-quark is the true origin of electric charges. Electric charge is not mass dependent on mass amount but on mass change in the early universe. Charged particles have finite lifetimes. They are not stable like other particles.

Keywords C-Neutralino, String Creation, Electric Charge, and Quarks.

Modern Cosmology states that the universe is a vast and expanding entity composed of dark energy, which accounts for roughly two-thirds of its total density. Observations from the James Webb Telescope indicate that our Universe is expanding accelerated, a phenomenon increasingly understood through advancements in research tools like advanced Telescopes. This instrument has provided unprecedented insights into previously enigmatic aspects of the cosmos, fueling fresh inquiries into the fundamental principles of its formation. The New James Webb Telescope has given us new views of our universe. These new images allow us to see things that were a mystery in the past. This is an unexpected development in our attempt to understand the beginnings of our universe. This paper focuses on the generation of electric charge in the early Universe, emphasizing the critical role of the C-Neutralino. This supermassive particle existed before the inception of time. The C-Neutralino decays into essential constituents of matter, including protons and electrons, acting as a catalyst for the Universe's formation. As C-Neutralinos collide in the primordial environment, temperature escalates, reaching very high temperatures, marking the onset of the Big Bang. Finally, the paper will discuss strings and how electric charges are generated in the early Universe. As the C-Neutralinos start to collide in the early universe, temperatures rise. When temperatures become as hot $10^{100}\ degrees\ celsus$ our universe gets its start. We have come to understand this as the Big Bang that happened at the beginning of our universe. The electric charge starts in the early universe during the first few minutes. The first moments after the Big Bang are called the quark-gluon plasma phase. In this phase, there are two different periods. The first period occurs right after the beginnings of the universe. The temperatures are so hot during the first few minutes that the quarks and gluons are strings. The top quark and the antibottom quark are strings during this time in the early universe. As they collide, they start to spin, oscillate, and rotate, becoming one quark. This heavy quark called the cd-quark, was responsible for developing electric charges in the early universe. This change in mass of the cd-quark is the true origin of electric charges. Electric charge is not mass dependent on mass amount but on mass change in the early universe. Charged particles have finite lifetimes. They are not stable like other particles. Protons, for example, decay into other particles. During this time of electric charge creation, space and time expand. This is what we call the big bang. Primordial Black Holes are also crucial in the development of our Universe. They connect astrophysical constraints on sources of cosmic rays. Primordial Black Holes play a role in element abundance and the spectrum of the CMB. They are particle and matter creators. Primordial Black Holes can be the creator of any species of particles in our space-time. In the end, they can shed new light on problems in Cosmology. Primordial Black Holes are the solution to inhomogeneous primordial structures in the early Universe. C-neutralinos are the particles that contribute to creation and dark matter in our Universe. It is the primary source of dark matter in our Universe. In the early Universe, the cosmological principle did not exist. The inhomogeneous Universe we see today evolved about 1 billion years after the creation of our Universe. A plasma state was created in the early universe as C-neutralino collided. A superheated soup of quarks and gluons existed in these plasma states. This state lasted only a few minutes after the universe began. In this hot soup, the strong force was unable to bind quarks. Under these conditions, the Quarks and gluons become open springs. Because of the high temperatures, these strings began to rotate, oscillate, and spin. The lifetimes of charged particles are finite; they lack the stability exhibited by other particles, such as protons, which decay into various products over time. During electric charge genesis, the fabric of space and time is dynamically expanding, encapsulated in the Big Bang model. Additionally, primordial black holes play an essential role in the early Universe's evolution. They are instrumental in connecting astrophysical constraints concerning cosmic ray sources, influencing the abundance of primordial elements, and contributing to the cosmic microwave background (CMB) spectrum. Primordial black holes are potential factories for generating diverse particle species, thus illuminating various cosmological enigmas. They address inhomogeneity issues in the Universe's primordial structure, which lacks the cosmological principle observed in later epochs. The Universe began to exhibit a plasma state driven by collisions of C-Neutralinos, resulting in a superheated milieu of quarks and gluons that persisted for just a few minutes after the Universe's inception. In this high-energy regime, the strong force was insufficient to confine quarks, allowing them to behave as open-string-like entities. The elevated temperatures induced rotational and vibrational dynamics among these strings, setting the stage for the complex particle interactions that would follow in the evolving cosmos. The cd-Quarks gain an electric charge because of mass change. In less than a few minutes, they develop an electric field. After a few more seconds, these spinning electric charges create a magnetic field. Once the electric and magnetic fields develop, the Primordial Black Hole propagates them throughout the universe. Primordial Black Holes formed shortly after time began in your universe. The highly dense areas of early fundamental particles, which started as a C-Neutralino, collapsed under their gravity during this inflationary time in the early universe. Many regions with large density fluctuations collapsed to form Primordial Black Holes. Unlike stellar Black Holes, Primordial Black holes have a wide range of masses

[1][2][3][4][5][6][7][8][9][10].

To search for the conditions needed to create an electric charge, we must start before the beginning of time. Of course, there was zero matter present at this time. Without the presence of matter, space is neutral. That means that its constituents equal zero. That also means that space is passive, and its resistances equal zero. Space has the potential to inflate, but only if its contents can exert the necessary internal pressure to overcome any resistance by the space container to expand. The primordial contents of space being neutral must exist as a neutral point, which equals zero. So then, from a mathematical viewpoint, we have,

$$0 = (+1) + (-1) = \text{point} \tag{1}$$

Neutral Constituents of space must exist as equal complements of (+) and (-) qualities. These complements are neutral entities and are the primary singularity of creation and the hidden fabric of our Universe. These complements must be pervasive and exist as an ocean of individual points of unities throughout space, each with the potential to inflate. This neutral point is defined as C-Neutralino. This C-Neutralino has mass and no charge. The C-Neutralino is an elementary particle in supersymmetry. This particle is electrically neutral and unstable in an R-parity. The C-Neutralino only interacts with weak vector bosons. So, this particle is challenging to produce at Hadron colliders. The C-Neutralino has a mass of around 3 TeV/ c^2. This particle decays through neutral Z bosons to lighter neutralino. However, the C-neutralino continues to decay into many other particles. During the collisions and inactions of these particles. A proton and an electron are created. It does have a magnetic dipole moment. A primordial abyss must be the starting point in our developments that give rise to the creation of electric charge, making up the Universe we see today. Space per se is space, or infinite space, that would eventually prove inadequate in explaining the partnership between space, time, and matter since the term space demands a complement to define its limit, just as contents requested by a container. At the same time, the primordial abyss can stand alone. Before the creation of electric charge, the primordial abyss required no correspondence to give the ultimate rise to space formation since an abyss serves as a prerequisite to a space that limits must be defined as in the space that separates two entities. So then, this abyss must be neutral. The abyss is nonactive and has mass but no charge, walls, or momentum. It offers no resistance, contains no space, and is infinite and non-detectable. Also, it includes no heat and no light. Through cyclic progressive transformations, this abysmal void, with an innate desire to be filled, can only have a specific affinity for one quality: a c-neutralino having mass and no net charge. This C-Neutralino has no heat or light, offers no resistance, and is infinite and non-detectable. However, the C-Neutralino has a capacity for movement and momentum. Its form and character as a particle with the potential to give rise to matter can only begin as a point. What follows in form from this point through transformative expansion is a hollowed zero having no content, no beginning, and no end. So, with an infinite capacity of c-neutralinos to become more of themselves without being created by another, the void becomes fulfilled with self-created c-neutralinos. Spinning, vibratory movement becomes mandatory because of their differences in potential entropy and the need for each c-neutralino to occupy its place. Patterns of spinning, vibrating c-neutralinos flow within the abyss as the temperature rises. With increasing rage, collisions occur between the C-Neutralinos in reaction to the crowding of one upon another's space. Temperatures continue to grow in this environment away from absolute zero. Nevertheless, this rise in temperatures does not occur uniformly. With differences in potential at and above zero degrees Kelvin, spinning spheres of vibrating c-neutralinos collide into otherwise stationary masses of other C-Neutralinos of opposing degrees at light speed. These c-neutralinos also spin at speeds greater than light, creating massive force when collating. This scenario produces cosmic changes in temperature over time. This situation led to temperatures of over a centillion degrees Celsius. Under such conditions, zeros are separated into their complementary pairs. At this time, in the early Universe, c-neutralino becomes an open spring. The cd-Quark gained electric charge as these strings began to rotate, oscillate, and spin. In less than a few minutes, they develop an electric charge. After a few more seconds, these spinning electrical charge open strings develop an electric dipole. The c-neutralinos have been transformed into a charged particle. Finally, the c-neutralinos catalyze expanding and spiting open and closed strings. These point particles, called c-neutralinos, can create strings of any dimension. A string is a one-dimensional extended entity. If the strings are open, they form a segment with two endpoints. Closed strings form a loop like a circle. Strings are tiny: they are about 10^35 meters. They are so small that today's particle accelerator cannot find them. Strings vibrate like a harmonic oscillator; these different states are different types of particles. A closed string is topologically equal to a circle. An open string is topologically equal to a line segment. D-branes are essential for open strings. As open strings travel through spacetime, they have endpoints that lie on D-branes. So then, open strings require boundary conditions [11][12] [13][14][15][16][17][18][19][20][21].

In the early universe, the temperatures of the quark-gluon plasma period were around a centillion degrees Celsius. As time went on, the temperatures did fall. These conditions existed for a few minutes. During this period, space-time began to expand. Like in a soup, quarks and gluons can move freely in the quark-gluon plasma period. Quarks and gluons existed as individual particles. In this sea of quarks and antiquarks would be gluons trying to hold them together. The quarks and antiquarks would be going in and out of existence, and generally, the early universe would have been pure chaos. At these temperatures, the classical treatment of general relativity is over. At this time, the universe is creating strings and electric charges. During this period in the early universe, the top quark and the antibottom quark were responsible for the development of the electric charge. Under these conditions, the top and anti-down quarks rotate and spin, creating an electric charge. In the quark-gluon plasma, the electric charge is not positive or negative. The electric charge at this time in the creation of the early universe is neutral. The color change is effectively neutral within the quark-gluon plasma. At a high temperature, the Quarks and gluons become vibrating strings. We need to remember that open strings have endpoints. However, closed strings have no endpoints. An open string can be a C-Neutralino or a gravitino. An open spring moves through spacetime and has its endpoints on a particular object; this is called a D-brane. After the top and antibottom quarks create an electric charge, open springs can then start to carry this electric charge. The open strings behave as charged particles at the string's ends. The open strings wave electric charge in the same way that a point particle has an electric charge. An open string then represents a gauge theory. The open strings, as they propagate through spacetime, also oscillate. In the early universe, these open strings had no degrees of freedom. These n degrees of freedom show the two polarizations of the photon. If open springs have endpoints on a D-brane, they can have endpoints in various ways. The gauge theory used by the D-brane is localized on the D-brane. The D-brane comes about in many dimensionalities. We will be interested in 4-dimensional gauge theories. We are interested in both QCD and QED. If we look at how a string oscillates, one can see how a C-Neutralino is represented. If we look at oscillations on a string, we can see two modes. One mode is to the left and the other to the right. For example, if we look at open springs, the modes mix at the endpoints. However, these modes are different for closed strings. For a closed string, these modes are independent of one another. A C-Neutralino has 4 degrees of freedom. It can oscillate in four directions simultaneously. A gravitino has 2 degrees of freedom. The gravitino can oscillate in two directions at the same time. During Planck's time, the four fundamental forces are one. This occurs only at the universe's beginning and after the Big Bang. SUSY particles are believed to be a couple of matter because of their gravitation interaction. In the early universe, during Planck's time, their couples were not suppressed. This implies that their lifetime is long, however, not as long as previously thought,

$$\tau \sim \frac{M_{pl}^{2}}{M_{\frac{4}{5}}} \tag{2}$$

where $m_{4/5}$ is the mass of the gravitino. Even though the gravitino has a long lifetime, it does not mean its decaying products would destroy light elements. During Planck's time, only quarks and gluons exist as a string. So then, we can let the string worldsheet ∈ be an infinite strip that has coordinates (ϑ, γ). In this situation $\vartheta \in$ Complex and $\gamma \in [0,1]$. If this is the case we can write,

$$S_{Strip} = \frac{1}{4\pi\alpha'} \int d\vartheta d\gamma \left(\partial\vartheta x^{\mu} \partial\vartheta x_{\mu} + \partial\gamma x^{\mu} \partial\gamma x_{\mu}\right)$$

$$+ \frac{\vartheta_{2}}{2} \int d\vartheta F_{\mu\varepsilon} x^{\varepsilon} \partial\vartheta x^{\mu} \text{ if } \gamma = 1$$

$$- \frac{\vartheta_{1}}{2} \int d\vartheta F_{\mu\varepsilon} x^{\varepsilon} \partial\vartheta x^{\mu} \text{ if } \gamma = 0, \tag{3}$$

In this equation, we can let script theta be the coordinate for time. Also, we have γ in this equation as the coordinate for space. We can then use the mixed Neumann-Dirichlet boundary conditions, which are,

$$\left(\partial\gamma x^{\mu} - 2\pi\alpha' \vartheta_{1} F^{\mu}_{\varepsilon} \partial\vartheta x^{\varepsilon}\right) \text{ if } \gamma = 0 \text{ the equation equals } 0, \tag{4}$$

$$\partial\gamma x^{\mu} - 2\pi\alpha' \vartheta_{2} F^{\mu}_{\varepsilon} \partial\vartheta x^{\mu}) \text{ if } \gamma = 1 \text{ the equation equals } 0. \tag{5}$$

We can start to write these conditions in a complex space coordinate,

$$x^{\pm} = \frac{1}{\sqrt{2}}\left(x^{0} \pm i x^{i}\right) \tag{6}$$

After that, we can write the boundary conditions,

$$\left(\partial\gamma x^{t} + 2\pi i\alpha' \vartheta_{1} F \partial\vartheta x^{t}\right) \text{ if } \gamma = 0 \text{ the equation equals } 0, \tag{7}$$

$$\left(\partial\gamma x^{-} + 2\pi i\alpha' \vartheta_{2} F \partial\vartheta x^{-}\right) \text{ if } \gamma = 1 \text{ the equation equals } 0. \tag{8}$$

Both equations (6) and (7) can be a free open string. This open string, along with Neumann boundary conditions, is transverse to the 0-1 plane. We are just interested in electric charge, and after the quarks create an electric charge, some open strings can become charged. Of course, we realize the existence of both charged and neutral strings in the early universe. This paper will not consider the neutral strings because they are not crucial in developing electric charges in the early universe. The open strings have no integer modes. Even the zero mode in this situation can have a charge. In this case, no functions can satisfy the boundary conditions in equations (6) and (7). If $\vartheta_1 - \vartheta_2 \neq 0, \ then$

$$x^{\pm}(\vartheta, \gamma) = y^{\pm} \mp i a_0^{\pm} \frac{e^{\pm} i\alpha\vartheta}{\alpha} \times cos\left(\pi\alpha\gamma - \arctan\ arctan\, 2\pi\alpha' \vartheta_1 F\right)$$

$$+ \mathrm{i} \sum_{n=1}^{\infty} \left[\frac{a_n^t}{n \mp \alpha} e^{-i9n \mp \alpha)\vartheta} \times cos(n \pm \alpha)\pi\gamma \pm \arctan\ arctan\, 2\pi\alpha' \vartheta_1 F \right]$$

$$- \left[\frac{\left(a_n^{\pm}\right)}{n \pm \alpha} e^{i(n \pm \alpha)\vartheta} \times cos(n \pm \alpha)\pi\vartheta \mp \arctan\ arctan\, 2\pi\alpha' \vartheta_1 F \right]. \tag{9}$$

In this equation α is equal to

$$\alpha = \frac{1}{\pi}\left(\arctan\ arctan\, 2\pi\alpha' \vartheta_1 F - \arctan\ arctan\, 2\pi\alpha' \vartheta_2 F\right). \tag{10}$$

If we then consider the situation when $\alpha > 0, \ then\, \theta_1 > , \vartheta_2$, we can then discover the quantum commutators,

$$\left[a_n^{\pm}, \ a_m^{\mp}\right] = (\mathrm{n} + \alpha)\varphi_{nm}, \tag{11}$$

$$\left[y^t, \ y^-\right] = \frac{1}{2\alpha' F} - \frac{1}{\vartheta_1 - \vartheta_2}. \tag{12}$$

Finally, we can write the worldsheet Hamiltonian as,

$$L_0'' = \sum_{n=1}^{\infty} \left(a_n^{+}) - a_n^{-} + \sum_{n=1}^{\infty} \left(a_n^{-}\right) a_n^t + \frac{1}{2}\alpha(1 - \alpha) \right). \tag{13}$$

In equation (12) if $\vartheta_1 \neq \vartheta_2$, then the zero mode operators $y^{\pm}$ commutes with the Hamiltonian L_0''. Even in the situation where $\vartheta_1 = \vartheta_2$, we can say that $\left[y^+, y^-\right] = \frac{1}{2\alpha' F}$, so that L_0'' does have some interplay on the $y^{\pm}$ operators. Returning to our previous work, we can write F= iE and $\alpha = i\vartheta$. These two ideas are related to Wick rotations of the worldsheet and the target spacetime coordinate. The vacuum energy can then be computed using the conformal field theory σ-model, where

$$L_0 = L_0^{\rightarrow} + L_0'' + L_0^{Ghosts}, \tag{14}$$

where this is the total Hamiltonian that includes all the contributions from all the plane of the electric charge. This Hamiltonian is parallel to the 0-1 plane, and finally includes ghost planes. The Amplitude is given by

$$-\mathrm{i}V_d \zeta(\vartheta_1, \vartheta_2) = \frac{1}{2}\, tr\left(\vartheta_1, \vartheta_2\right) \ln ln \left(L_0 - 1\right), \tag{15}$$

in this equation V_d is the spacetime volume. Also, the $tr(\vartheta_1, \vartheta_2)$is the trace over all string states in the charged area. The total amplitude is the sum of all endpoint charges. We can evaluate the trace using proper time representation,

$$\ln \mathrm{A} = -\int_0^{\infty} \frac{dt}{t} e^{-\pi t A}, \tag{16}$$

and for any set of oscillators a_n, we can write the formula as,

$$\mathrm{tr}e^{-\pi t} \sum_{n\geq 1}^{\infty} a_n^t a_n = \prod_{n=1}^{\infty} e^{-\pi t a_n^t a_n}. \tag{17}$$

Equation (16) can be written in this form as well,

$$\prod_{n=1}^{\infty} \sum_{m=0}^{\infty} e^{-\pi t m n} = \prod_{n=1}^{\infty} (1 - e^{-\pi t n)-1}, \tag{18}$$

where we have included all of the multiparticle states. For the fields along the 0-1 plane, one can start with equation (17) and integrate over the zero mode $y^{\pm}$ from equation (11). By collecting all of these ideas we have,

$$\eta\left(\vartheta_{1,} \vartheta_{2}\right) = \frac{1}{2} \int_0^{\infty} \frac{dt}{t} (44\pi^2 \alpha' t)\, \gamma(\frac{it}{2})^{-24} c_a(t, \varepsilon), \tag{19}$$

where,

$$c_a(t, \varepsilon) = \alpha'(\vartheta_{1,} \vartheta_2) \varepsilon t e^{-\pi t \vartheta^{2/2}} \frac{\xi'(\gamma)}{\xi(\frac{\vartheta t}{2,})}. \tag{20}$$

Equation (19) is just a correction factor in this situation. An essential outcome of equation (19) is that the vacuum energy is imaginary. The theta-function has in it a trigonometric function, and that leads $c_{a(t,\varepsilon)}$ to have simple poles on the positive t-axis. The amplitude then, has an imaginary part that is the sum of the residues at each pole times the factor of π. If we use the Feynman propagator, then integrating in the complex plane passes to the right of the of all poles. At the Quantum level, this instability leads to the creation of charged strings. The total rate of pair production is given by,

$$\zeta_{string} = - 2\, IMF, \tag{21}$$

$$\zeta_{string} = \frac{1}{(2\pi)^d} \sum_{\vartheta_{1,\vartheta_2}} \sum_{s} \frac{\alpha'(\vartheta_1 - \vartheta_{2)}}{\varepsilon} \sum_{h=1}^{\infty} (-1)^{h+1} \left(\frac{\vartheta}{j}^{d/2}\right) e^{\frac{-2\pi j}{\vartheta}(m_s + \left(\vartheta^2\right) + \frac{\vartheta^2}{2})}. \tag{22}$$

The generating function can be written as,

$$\frac{e^{\left(1-\frac{\vartheta^2}{2}\right)l}}{\sin\frac{\vartheta l}{2}} \prod_{n=1}^{\infty} \frac{(1-e^{-nl})^{-(d-4)}}{(1-e^{-(n+i\vartheta)l})(1-e^{-ni\vartheta)l}}. \tag{23}$$

The equation (21) represents the classical Schwinger probability Amplitude. This probability amplitude represents charged strings and also charged C-Neutralinos in a uniform electric field E. For this situation, we have,

$$\omega_0 = \frac{2S+1}{2\pi^2} \sum_{j=1}^{\infty} (-1)^{(2S+1)(k+1)} \frac{QE^2}{k^2} e^{-2\pi k M^2/QE}. \tag{24}$$

S, Q, and M are the charged strings' spin, charge, and mass and C-Neutralinos. If we look at the Quantum Field Theory calculation the imaginary part comes from $\det(D_a^{2)})^{-1/2}$. This result goes along with Q $=2\alpha'(\vartheta_1 - \vartheta_2)$ in the weak-field limit. If ε→∞, the pair production can diverge at the critical electric field. This can also happen at the quantum level. Open strings can look like a long, thin rod in this situation. It is proportional to Eq, as the Quark-gluon plasma phase ends; at this time, open strings can create an electric dipole. In the early universe, an electric dipole was a fundamental particle. It has a slight separation of positive and negative charges. The electric dipole would not be symmetrical. The electric dipole is responsible for a positive and negative charge as the early universe cools after a few minutes. It is associated with the electromagnetic force. As temperatures fall at the beginnings of our universe, the electric dipole moment gives the electron a negative charge and the proton a positive charge. During this period, the electron's electric dipole moment violates both parity and time-reversal symmetry. This means that the electron's negative charge is not uniformly distributed around the electron in the early universe. The value of the electron's electric dipole moment is $\left|d_e\right| = 10^{-25} e\cdot cm$[22][23][24][25].

In conclusion, we have examined the genesis of electric charge from the very inception of our Universe. C-Neutralinos predated the Universe's formation, engaging in high-energy collisions, oscillations, and rotations at velocities surpassing the speed of light, which led to a substantial escalation in temperatures during the early Universe. After several thousand years post-inception, temperatures peaked at approximately 10^{100} degrees Celsius. This period culminated in the Big Bang, heralding the Universe as we currently observe. Electric charge originated within the first few minutes following the Big Bang, characterized by the formation of a quark-gluon plasma, which can be delineated into two phases. The initial phase occurs directly after the Universe's creation, marked by extreme temperatures where quarks and gluons exhibit string-like behaviors. During this epoch, top and antibottom quarks manifest as strings. As these entities collide, they exhibit dynamic interactions, ultimately amalgamating into a single heavy quark—the cd-quark—which played a crucial role in the emergence of electric charge. The change in mass of the cd-quark signifies the fundamental origin of electric charges. Importantly, electric charge does not correlate with a specific mass quantity but rather with the fluctuations in mass observed during the Universe's formative stages. Charged particles, in contrast to their stable counterparts, possess finite lifetimes and exhibit instability; for instance, protons are subject to decay into other particles. Throughout this nascent phase of electric charge formation, the expansion of spacetime facilitated the conditions necessary for the Universe we observe today. [22][23][24][25][26][27][28][29][30][31][32][33][34].

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