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GENERATION OF THE ELECTROMAGNETIC WAVE BY ELECTRON PERMANENT MOVEMENTS AND ITS PARTICLE ASPECT IN THE EVTD^2 THEORY

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Abstract: *The paper shows that in the entire quantified space-time, the bodies' continuous emission of electromagnetic radiation is produced by the orbital movements and by the rotations of electron. The photon is the result of choc impulsions and adapted frictions on quantic electromagnetic entities EVTD^2 of the particle electron's negative charge. The photons generations is produced at the speed of orbital displacement of the electron but further, their propagation from electronic orbit has the light speed in the whole space EVTD^2. It follows considerations on vitreous and resinous electrification.*

Key words: *Photon, electron, EVTD^2 entities, atomic space-time, electron's orbital and rotation movements.*

1. INTRODUCTION

In the EVTD^2 entities theory [1-5], the entities are like little quantic, energetic volumes participating together with the electron to the emergence of electromagnetic effect EE or of photon.

It is possible to take into account two own electron skills to cause shocks-impulsions on EVTD^2 entities, permanent components of matter and the vacuum of condensed matter through this theory.

The first option consist in taking into account only the electron rotation (spin) in the EVTD^2 environment. *The second option is the consideration of the shocks-impulsions on the EVTD^2 entities in the orbital motion of the electron around the nucleus. The third one, unifies the two simultaneous movements: shocks-impulsions in the orbital movement and at the same time, rotation on itself which gives friction on the facets of the EVTD2 of universal space.*

In refining this study, it must return more in details on the generation of light couple wave corpuscle. Thus, it will be possible, by the EVTD^2 entities, to propose subsequently relatives explanations, among others, to the phenomena of vitreous and resinous electrification until this misunderstood.

2. ELECTROMAGNETIC WAVE MECHANISM OF PROPAGATION IN CONVENTIONAL PHYSICS

In order to represent, in a schematic way, the propagation of the electromagnetic field, let's consider (Fig. 1, a) a plan capacitor C that is in a circuit with a continuous generator S and a switch I.

When the switch is closed, the capacitor charge and a time increasing field $\boldsymbol{E}$, on the direction *Oz* with the indicated orientation, appears in the empty space between the frames.

A displacement current of a certain density corresponds to it and current lines are confused with the electric field lines. These lines are surrounded by closed magnetic field lines. Their plan *xOy* is normal to ***E*** and the field ***H*** satisfies the equation of Maxwell [1]:

$$\vec{rot}\, H = \varepsilon_0 \frac{\partial E}{\partial t}\,,\; \vec{rot}\, E = -\frac{\partial B}{\partial t} = -\mu_0 \frac{\partial H}{\partial t}\,, \quad (1)$$

$$\frac{E}{H} = \sqrt{\frac{\mu_0}{\varepsilon_0}}\,. \quad (2)$$

If a point A is considered on the axe *Ox* (Fig. 1, b), ***H*** has the orientation given by the Ampère law. This field, initially inexistent, increased in time. In accord with Faraday law on electromagnetic induction, its variation will create an electromotor field described by the second equation of Maxwell [1].

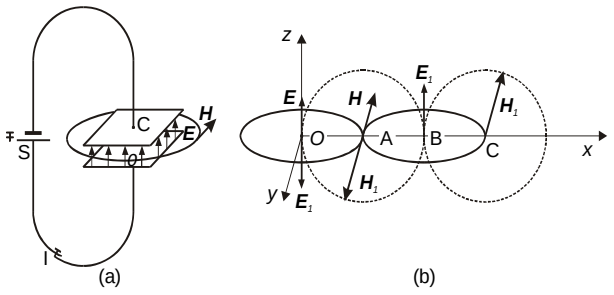

Figure 1. Propagation mechanism of an electromagnetic field

This new field $\boldsymbol{E_1}$ is represented by a force line that is a circumference with the center A, contained in the plan *xOz* and it is drawn with interrupted line in figure 1, b. In point O, $\boldsymbol{E_1}$ is opposite to ***E*** and has the same orientation in the point B. By its variation, it creates a magnetic field $\boldsymbol{H_1}$ opposite to ***H*** in the point A and parallel to it in the point C.

This reciprocal generation of ***H*** and ***E*** leads, therefore, to a simultaneous propagation of these two fields.

If the simplified case of a plane wave is took into account, this means that at every moment the fields are the same in all points of the plane parallels to the wave plan. The field ***H,*** opposite oriented to *Oy* is in phase with ***E***. the two fields are proportional and their ratio is given by the equation (2).

It is known that the electron is animated by two types of movements: respectively, he described around the atomic nucleus an elliptical orbit and, in the same time it has movements of rotation on itself (order spin 1/2). Each of these types of movements will be successively studied to describe, by the EVTD^2 theory, the phenomena to be considered to represent the best the electromagnetic effect EE, as we can observe experimentally.

3. ELECTRIC WAVE GENERATED ONLY BY THE ELECTRON ROTATION ON ITSELF IN EVTD^2 ENVIRONMENT

The schema of figure 2 represents the electron animated only by his rotation (spin) movement in the system of the concerned EVTD^2. Considering the dimensions excessively reduced of electron and more those of EVTD^2 entities (10^{-32} à 10^{-34} m in conformity with [1-5]), it seems to be true that electron charge it is not point but uniformly distributed on the periphery of the particles as for all electrical conductor.

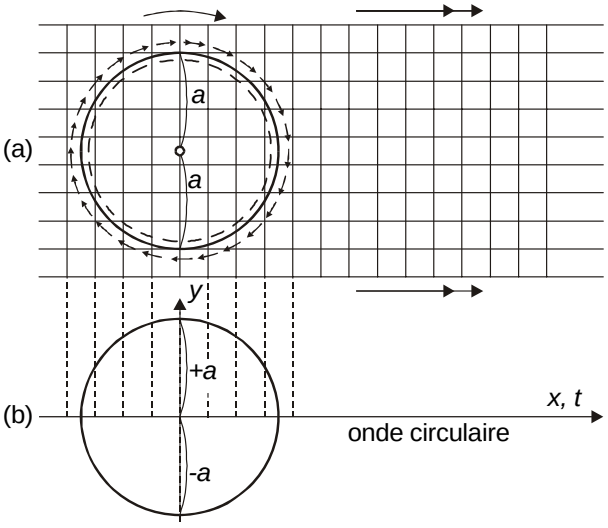

Figure 2. Electron in spin movement in EVTD^2 environment (a); circular electric wave generation (b) with r_e=*a*=2,82 10^{-15} m

If a particular propagation direction is considered, for example *Ox,* (the others are equivalents because the symmetry) it is possible to observe that the EE well established sinusoidal wave character may not be correctly generated by this representation. It is actually the generation of two amplitudes of the positive and negative wave (this is illustrated by shocks-impulsions respectively "pushed" and "fired" on the EVTD2) in the direction *Ox*.

Unfortunately, for the consideration of this phenomenon, it is to note that the two amplitudes "positive ≈ pushed" and "negative ≈ fired" are generated at the same time, while the two real passages by the zero amplitude are actually gaped in time during the phenomenon of EE transmission. The time of gap which would then appear, in this hypothesis, is excessively short and always the same as that brings light to cross the diameter of the electron (i.e. the distance equal to $2r_e = 5{,}6410^{-15}$ m).

Evidently, this EE generation process is not a convenient representation of light sinusoidal wave. Contrarily, the answer as suitable to the other aspect (energy speckle) of light due tu EVTD^2 systems. They generate and transmit correctly the electromagnetic radiation in the form in which a number of EVTD^2 are involved constituting the electromagnetic beam diameter and, this in all directions.

4. ELECTRIQUE WAVE GENERATED BY ELECTRON IMPULSES ON EVTD^2 DURING ITS ORBITAL DISPLACEMENT

Following a certain analogy to previous recall on the generation and propagation of electromagnetic waves, a consequence of electron shocks-impulsions on EVTD^2 , during its orbital movement around the nucleus (positively charged), induces an electric field between these two electric charges, positive and negative, directed towards the other (+ to –). The duo electron and atomic nucleus can be assimilated with a capacitor forming a couple of variable electric and magnetic fields because of the variation of the distance between them (dielectric thickness) as the orbit is, mostly, an ellipse than a circle with the nucleus placed in a focus. It will follow that there will be generation of induced electric and magnetic fields which obey, in their spatial orientations, the positioning of the electron along the way on its orbit which can schematically represent in circular representation (Fig. 3).

If, in initial moment $t = 0$, the position of electron is considered to be in B, for example, with the coordinate $y = 0$ (Fig.3, a) in this orbital movement, oriented as the arrow shows, the sinusoidal electric wave is described in figure 3, b. This is possible because the electron speed is less than the light speed through EVTD^2 system.

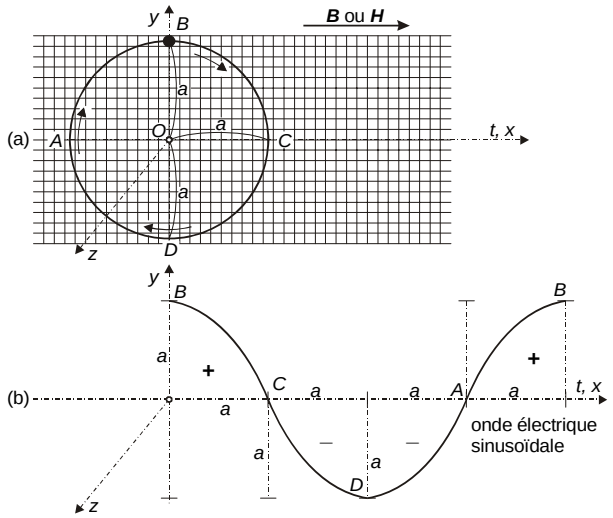

Fig. 3. Electron in orbital movement in its EVTD^2 environment (a); electric wave generation on the direction *Ox* (b)

Therefore, from this representation, the creation, following a given direction, of the particle beam of the EVTD^2 affected by shocks-impulsions of the electron has a global width of dimension 2*a*, that of the diameter of the orbit of the electron.

It is obvious that this repartition of shocks-impulsions describes in time a sinusoidal electric wave evolution of EE.

There is, therefore, duality (wave - corpuscle) found by multiple experiences and thus explained in a phenomenological manner, in

material infinitesimally reduced dimensions of the so-called "vacuum" intersidereal.
To fully describe the phenomenon of EA, it remains to give a coherent representation, following the same EVTD^2 entities and the electron, for the creation of magnetic wave, always in phase and on normal direction to the electric wave.
Currently, the magnetization and, therefore, the magnetic field are interpreted as linked to electron rotation movements as the equivalent to molecular currents, following, for example Fleury and Mathieu: (Magnétisme, Physique générale et expérimentale) [6].

5. ELECTROMAGNETIQUE WAVE GENERATED BY ELECTRON IMPULSIONS ON EVTD^2 DURING ITS DISPLACEMENTS: ORBITAL AND ROTATIONAL (SPIN)

The third approach of EE creation can also be represented in the figure 3 that shows the electron circular orbit around the nucleus in the EVTD^2 environment.
Let be *a* the ray of orbit and let's consider in time *t* effects of shocks-impulsions on the direction *Ox*. On the axe *Oy* will be distributed the variations between $+a$ and $-a$ of electric wave amplitude.
Magnetic wave must be generated in a different manner: perpendicularly in the electric wave plan and thus, its amplitude variations will be on the direction *Oz*.
It is known that the induction magnetic field is created by an current-carrying of a certain length. If, for example, an electric current is passing through a wire in form of spire, a magnetic field appears and it will be oriented in a perpendicular direction on the wire plan. Thus, the electron on its circular orbit produces a magnetic field with constant amplitude, perpendicular on the orbital plan.
To represent the sinusoidal evolution of the magnetic wave in an orbital rotation of electron, it is necessary to overlay another movement, characteristic of electron, that it can also induce this sinusoidal evolution of magnetic field. Just, let's consider *the movement of rotation on itself (spin) as this other movement simultaneous electron orbital movement.*
Studying these two movements (spin and orbital) in the system of EVTD^2 surrounding the electron, the components of shocks-impulsion on concerned directions for two movements must be taken into account. The result will be an impulsion with an inclined direction to the hit surface of EVTD^2, as shown in the figure 4. The inclined impulsion could be split in two components: one normal to the hit surface *S* of the concerned EVTD^2 and the other one, tangential.
Normal impulsion energy (observation direction *Ox*) will give the electric wave sinusoidal variation when electron in orbital moment will hit the entities placed on the trajectory of orbit.

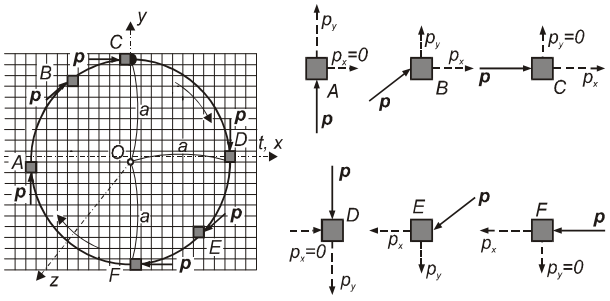

Fig. 4. Variable direction shock-impulsion on the surface of an EVTD^2 split on two orthogonal impulsions

The electron, in its orbital displacement hit the entities in the orbital path and creates and electric wave that could be observed on multiple directions included in the plan of orbit. For any other plan and direction the effects are equivalent because EVTD^2 are entities mechanically elastic and they can be considered, from this point of view, as isotropic. More, this EVTD^2 volumes are originally submitted to quantic electric and magnetic fields thus allowing the transmission in whole space-time these specific fields generated by the electron's hits on entities.
If two perpendicular direction of observation are chosen, for example, *Ox* and *Oy*, we see that the two representations of the electric wave along the axis *Ox* positive and along the axis *Oy* positive are out of step with a value

$\pi/4$. It is also visible that the electric wave (the same for the magnetic wave), for two observers placed – one in positive orientation and the other in the negative orientation along the same axis *x'Ox*, for example, the observed electromagnetic waves of the same electron are, reciprocally in opposition of phase.

The explanation is, indeed, the representation of the electric wave generated by electron on hitting the $EVTD^2$ located on its orbit around the atomic nucleus and performing either impulsions on an elastic material and, either changing of the electric charge states of shocked entities, by its *–e* charge. With regard to the *later spread of electronegative wave, it is done, as it must here, at the light speed c due to the universal support* $EVTD^2$. [7]

It is obvious that the velocity gradient of EE generation with electron orbital speed, on one hand and, on the other hand, by wave propagation with the light speed *c*, *will generate expansions (relatively to speed ratio) for wave length* λ *and also, for the amplitude without modifying the frequencies*. [7]

To further understand the transmission of this wave along a *Ox* direction, it must refer to the *Ox* component of shock-impulsion. It propagates for half by compression and traction on entities during a complete orbit performed by the electron.

This effect is immediately far transmitted by successive elastic shocks-impulsion. More, the electric energy as well as the shocks with friction of *–e* charge giving magnetic energy form a wave couple initially generated in $EVTD^2$ that is transmitted by the environmental entities of space-time (entities consisting of diffuse electromagnetic energy) because there is equivalence between the three physical values: **mass ≡ energy ≡ electric charge (**and magnetic) (chapter 7 from [4] and [8]).

From the phenomenological point of view, there is no problem to transfer the electric and magnetic effect through and by $EVTD^2$ that are they self electromagnetic quanta. [9]

In the case of magnetism, it is necessary to refer to the tangential component due to the rotation performed during the shock-impulsion (electron spin) on the same sides of volumes $EVTD^2$ previously studied in compression on a half orbit, or in traction on the other half orbit. This component must be oriented along the *Oz* axis so its effect be synchronized with the orientation of magnetic wave (perpendicular to the electric wave).

This tangential action produces *an effect of friction between* $EVTD^2$ *volumes that, from the mechanic point of view, is equivalent to generation of the shear* between neighbor entities. *Therefore, this phenomenon can be seen as a polarization effect by magnetic poles* (*$EVTD^2$ magnetized*) *that could explain the creation of magnetism in the ultimate intimacy of matter.*

One can observe that the magnetic field vectors deducted from the orbital path of the electron must have, during each half travelled orbit, a respective opposite variation.

It is necessary that the tangential effect be inversed, on the tangential direction, in function of observation orientation, of *Ox* orientation and of the situation when the observer receives a shock-impulsion "pushed" or "fired". It is true that the spin rotation, i.e. shearing effect is for one in positive orientation ad, for the other one, in negative orientation on *Oz* axis.

From these considerations specific to magnetism and magnetic wave of electromagnetic effect (EE), it tries to specify the representation of this magnetic wave coupled with electric wave in $EVTD^2$ system under shocks-impulsions.

Three axes of comprehensive directions to the orbital motion of the electron are to be considered:

- For an electron spin movement, having the rotation axis perpendicular on the orbital plan of electron, is generated a friction which the overriding direction is in the plan *xOy*, where there are already the electric wave. Therefore, this spin movement cannot give a convenient explanation for the creation of a magnetic wave perpendicular on the electric one.
- In the case of study of spin movement with the rotation axis tangential to the orbit (as the rotation of a shell) it is found that the produced friction is effectively perpendicular

on the plan *xOy* but in the infinity on possible directions, without promoting one among others. This means that *Oz* direction, perpendicular to plan *xOy* is not dominant in the context if other properties and characteristics are not took into account.

- The third spin movement to analyze is those who, in a certain manner, would roll the electron (on the plan *xOy*) along the trajectory of its orbit, i.e. with an axis parallel to plan *xOy*, centered on the atomic nucleus, pivoting around and following the orientation of orbital movement of $-e$.

Here the principal friction direction between the EVTD^2, during shocks-impulsions, is perpendicular to the spin rotation axis and has, consequently, a direction perpendicular to *xOy*, i.e. perpendicular to electric wave.

In this third case, concerning the in phase synchronization of the friction effect, (wave) with the compression – traction effect of electric wave, it is enough to analyze the respective effects on the observation initial direction *Ox,* for example.

There are shocks-impulsions direction variations in function of electron position on its orbit on *Ox* direction that will promote the understanding of synchronic and in phase evolutions of electric and magnetic wave by passage of the effect on a half sinusoid corresponding to the half orbit of the electron.

That explanation is representative of the general phenomenon of EE if the magnetic field produce a magnetic wave that pass periodically by $0, H_{max}, 0$ and H_{min}.

It is necessary that EVTD^2 friction orientation (of polarization) is inversed on each half travelled orbit.

At the beginning, let's follow the electron, for example, on his route of the half orbit which globally makes it advancing in the positive sense *Ox*. The "in front" half sphere of electron hits the EVTD^2 in friction "pushed" successively from top to down (for an orbit content in a horizontal plan and for a spin movement of the electron in agreement with its orbital motion - ball rolling following the orbital movement). It will be able to say that friction and, subsequently the polarization of the EVTD^2, is created here from top to down which supposes that the magnetic field and the magnetic wave pass by $0, H_{max}, 0$ from top to down.

Let us consider now the electron during its route on the second half orbit, in negative orientation to *Ox*, the observer still being on the positive side of this axis will perceive the effects of the wave created by the "back" half sphere of electron being gradually away. It follows that the friction on the EVTD^2, in the case "fired" will be, this time, directed from down to top, wherefrom a polarization inverse to the previous case. This will produce the successive pass of magnetic wave through the positions $0, H_{max}, 0$.

It follows from this study that we can give a representation of EE generation and propagation since the environment of the atom, by shock-impulsions considering the electron own movements in the EVTD^2 system existing in matter-energy of whole universe.

To explain the parallel and normal Zeeman effects, [4] the behavior of electromagnetic waves in a perpendicular direction *Oz* to the orbital plane (supposed stable) can be examined.

In the EVTD^2 theory seems unlikely that the orbit of the electron is changing in any random manner around the atomic nucleus.

This follows from the assumptions we have made relatively the primary wave (EMW). It would organize and would be the initiating motor of proton and electron charges and, on the other hand it would initialize and it would maintain different movements (orbital and of spin) of these charged particles (protons and electrons) and of neutral other ones. [7]

We know that in normal or parallel analyze the non decomposed spectrum line, in two Zeeman effects (that means without action of induction) appears in the same way. So, in the EVTD^2 theory, electron shocks-impulsions on entities from the free space inter-particles must be equivalent for any observation direction of EE. In the theory and inside the hypothesis on the electron orbital movement initiation it is also possible to go further in the representation of EE creation.

It seems, a priori, that the direction of propagation of primary electromagnetic wave

(EMW), at the level of the Earth and its environment to be fixed. If this was not the case, there would be permanent fluctuations of the direction of the terrestrial magnetic poles. Therefore, it is reasonable to assume that the directions of sides of the constituent parallelepipeds, the $EVTD^2$, are fixed relatively to electric and magnetic waves and their length at the half-wavelength of EMW. [1-5] This is the immovable base of the Nature arrangement on which must be based all reasoning in the $EVTD^2$ theory.

The question that arises, then, is this: how should be oriented to the electron orbit in rapport with the $EVTD^2$ (formatted by EMW entities) system in fixed directions as the created EE be mostly constant in all directions of observation?

It is all simply, it seems that electron's shocks-impulsions on the $EVTD^2$ would be slanted, optimally on the bisecting plan of the plans where EMW's electric and magnetic waves propagate. Then, the shocks-impulsions components along different observation directions would be approximately equivalents and they would propagate by spread radiation around the electronic orbit, diametrically.

On these considerations and as a result of our conception [7] on the "motor" acting on electron's movements, it seems reasonable that electron would be enabled on a ecliptic plan, bisecting EMW.

5. VITREOUS AND RESIN ELECTRIFICATION

We have therefore, following these considerations, an appropriate, consistent, and also mechanical explanation of the generation and for the transmission of electromagnetic waves which, on the base of $EVTD^2$ theory, does not need to a particular interaction agent named "photon" because the particle aspect is already in established in space-time by simple entity or by agglomerate of entities $EVTD^2$.

Based on more specific considerations on magnetism and magnetic wave creation, it is plausible *to try to make a plausible explanation of electricity called vitreous and resin, not understood till present*.

It is known that if certain materials are scrubbed between them, they will got a certain electrification. Bède le Vénérable (673 - 735) shows that jet "as amber, when it is heated by friction attaches to everything it touches". It commits error, it seems, to confuse friction and heat.

William Gilbert, English physicist (1544-1603) discovered that other substances had the same properties: glass, sulfur, wax and resin. Consequently, it deduct that *electricity was not an intrinsic property of substances themselves but mostly a kind of fluid* produced or transferred when the bodies are rubbed one against the other and which spreads to attract neighboring objects.

We just expressed the hypothesis that magnetism would be consecutive to the friction (friction between $EVTD^2$ entities of energy and condensed matter), would represent a polarization of this energy and would produce magnetic monopoles excessively small, having the dimensions of $EVTD^2$.

Therefore, by friction of certain materials, it is possible to generate an scalable magnetic field in time of rub (by going and coming) and this one must result in a current electric that would migrate electrical charges from a material to another, which would, in the end, represent the appearance of the electrification of these materials.

In summary a *plausible explanation by $EVTD^2$ theory would be that initially, magnetism would be created and would produce vitreous or resin electricity, disappearing at the end of rub*.

6. CONCLUSION

In this approach on the generation of the photon, or rather of EE, is remarkable that from the centre of the atom all propagation directions are equivalent with a slight lag phase.

In fact it is to note that the electron acts, in the same time, by its "front" and "back" sides to orbital displacement, according the inverse characteristics "pushed" and "fired" and in friction, also in inverse orientation - resulting

in opposite phases on electric and magnetic waves couples.
Thus, all diametrically opposite directions, allow propagation of EE with time lag phase, for example on the direction $-x$ and $+x$ with respect to revolution symmetry centered on the atomic nucleus.

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Generarea undei electromagnetice, prin mişcarea permanentă a electronului, şi aspectul său corpuscular în teoria entităţilor EVTD^2

Este demonstrat că, in spaţiul-timp complet cuantificat din teoria EVTD^2, emisia continuă a radiaţiei electromagnetice a corpurilor, este generată de mişcările orbitale si de rotaţie ale electronului. Fotonul este rezultatul şocurilor – impuls şi a frecărilor exercitate asupra entităţilor cuantice electromagnetice EVTD^2 de către sarcina negativă a particulei electron. Generarea fotonilor se face la viteza orbitală a electronului dar, în continuare, de pe orbita electronică, propagarea lor are loc cu viteza luminii în întregul spaţiu-timp EVTD^2. De aici rezultă unele consideraţii asupra electrificării statice a sticlei şi răşinilor.

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