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Centripetal de Broglie Wave Fields Connected to Particles at Rest Explain Cold Fusion and the Particle-Wave-Duality.

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1. Abstract

The controversy about Cold Fusion "CF" depends on the fact that the phenomena discovered are not in agreement with present physical theories, like QM and QED. The aim of this paper is to show that a. Time-Space-Oscillation `TSO' connected to matter is a physical perspective able to explain CF and the Particle-Wave-Duality, even able to propose technical means for further development. According to this perspective a particle -even at rest- is joined to a real, centripetal TSO, a 'de Broglie oscillation', instead of a mathematical Schrödinger wave function1). This TSO-field propagates with velocity c toward a focus, where the particle is created as a flickering wave vertex, that can push an instrument trigger. Particles and nuclides including their Coulomb barriers, thus become endowed with phase dependency and a centripetal wave field, that can interfere in slits. This explains the Particle-Wave Duality and why the Coulomb barrier can be tunneled under certain phase conditions.. This TSO-perspective further hints at nuclear reactions of a 'centripetal' kind different from those based on 'translational collisions', described by present high energy physics. It is worth consideration because it gives accurate accounts for physical constants, particle masses and charges, while the nuclides appear as focal resonance-shells, able to arrange acc. to Mendelejev.

2. Introduction

Present physics has been successful in accounting for its own mathematical images of matter, as quarks and gluons. But it has failed in accounting for real matter, for the nuclides. Various efforts to solve their wave functions have not given a useful image of matter. Neither has physics explained the riddle at its heart, the Particle Wave Duality nor Cold Fusion. Thus, the search for a more powerful physical perspective is justified in order to unveil the riddles of time-space-matter. The one presented here is not a new whim. It is in fact the very first scientific idea of time-space-matter, expressed by the Pythagoreans (Parmenides and Zenon of Elea) 2500 years ago. They considered time-space-matter as a. unified manifestation, caused by an oscillation between "the spheres" of time and space, that caused matter, including life and mind, to condense at the foci. This idea was not understood outside the Pythagorean esoteric sect, but it was scornfully rejected by Aristotle and finally eradicated as a heinous gnosticism by the Church in the 4th century AD [2)].

3. The Universe - A System of 'De-Broglie' Time-Space-Oscillators.

If this out-cast-idea is considered in the light of present physical knowledge and experiences, a. remarkable, consistent world view appears. It yields causal and accurate accounts; 1) for Relativity and QM, 2) for our physical constants, 3) for all forces as phase shifts between time and space and 4) for an incessant 'gentle fission' of neutrons into protons and electrons with correct masses and charge only by aid of the TSO-arnplitudes plus c and nut simple arithmetic relations [3)]. See Table.

The consideration of particles and nuclides as focal resonance-shells endows them and their Coulomb barriers with a phase dependency ($f=10^{24}$ s^{-1}), due to which barrier-tunneling becomes possible for particles, when close to the phase of 'non-existence'. Huge translational velocities and extreme temperatures may not be Nature's only means to break the Coulomb barrier and cause nuclear fusion. Particles and nuclides can exchange energy and even fuse gently, if their centripetal TSO-waves are close to coincide and they are in the same phase. Then there is no initial translational energy and momentum to be conserved, which results in less active by-products (gamma-photons and neutrons) [4)]. The consideration of nuclides as focal resonance shells enables the elaboration of a Mendelejev Periodic Table for nuclides, based solely on geometric principles. A Pauli exclusion principle is not required. In this way light is shed on present CF-phenomena, and those elements are identified (Pd, Ti, Ni, Be?), which can serve as Coulomb-shields and catalytic templates in CF.

4. Hidden Variables and Geometric Relations Revealed by TSO.

If Reality is described as a multitude of "De Broglie"-TS-oscillators [5], one has to specify the inherent energy of the unit oscillator, its wave length and amplitude components A_L and Aw. Considerations show, that an oscillator energy Eo, identical to the mass energy $Em=mnc^2$ of the neutron, yields the most accurate description. So we can depart from the known equations for mass energy and for harmonic oscillators acc. to (1a) and we then obtain the values given in (1b).

$$\mathbf{E_m}=m_n c^2=hc/\lambda=\mathbf{E_o}=m_n\omega^2 A_L^2/2 \quad (\omega=2\pi c/\lambda) \qquad (1a)$$

$$\lambda=h/mc=13{,}19595\times10^{-16}\text{m} \quad \text{and} \quad A_L=\lambda/\pi\sqrt{2}=h/m(\pi c\sqrt{2})=2{,}970134\times10^{-16}\text{m} \qquad (1b)$$

So the cosmic TS-oscillation toward the focus can be described by X the Compton wave length and by A_L a longitudinal constant amplitude component of 'time' here expressed in meter. But a transversal width or space component Aw is also required, forming a time-space-amplitude A_LAw. Aw has to start at the horizon as a space quantum ($Aq=2{,}226\times10^{-56}$m, Eq. 13) and grows along the path by transfer of time quanta until it at the focus reaches its maximum $Aw\approx A_L$, forming a 'square' $Ao^2=A_L$Aw. Inside the nucleus, Aw is finally transmuted to a time empl. AT, creating the conjugate realm of space - and of QM! The assumption that $Aw\approx A_L\approx2{,}971\times10^{-16}$ is correct only to 3 digits.

In order to endow quantum limitations to the 'classical oscillator' used here, the Planck length LP and time TP are introduced, Eqs 8-9). At first sight the Planck length seems not to have any connection to TSO. However, Eqs 10-11) show, that there exists a, profound not yet uncovered geometric relation between A and the Planck length LP, Also the oscillative force Fo, Eq. 3) appears as a geometrical phase shift it-2. By aid of this numerical relation the value of $Aw=2{,}97148\times10^{-16}$ finally obtained, Eq. 4). These surprising numerical relations are the very key to a physics based on the TS-oscillation. They seem to violate our dimensional rules, but in fact they bring us into a physical system, where only time (inverse space) appears as the fundamental unit and dimension. In Eqs 15-20) some further implications of TSO are displayed, which show that our physical constants are geometrically related by recurrent factors ($\pi c\sqrt{2}$) and ($\pi^2 c$), and that A_L (time) and Aw (space) are differently related to mass, Eqs 1b & 4). It is surprising that the constants we know with least accuracy, G and h plus the size of 'universe' (the TS-oscillator) Y, appear with highest accuracy, Eqs 21-23) because they are determined by π, c and $Ao^2=A_L Aw=8{,}825700\times10^{-32}M^2$ Eq. 6).

5. Centripetal Nuclear Reactions - versus Translational Ones.

The fact that the mass relation $m_n/m_e=1838{,}4$ "without reason" appears in Eq. 12) as a factor $A=10^{24}(\pi\sqrt{c})^{-1}=1838.4$ ($10^{16}L_P$) has special bearing upon CF. At heart, it tells us that protons and electrons can be incessantly formed by centripetal fissions of neutron-oscillators ($n \Rightarrow p^+ + e^-$). But where is the mass difference 0,76 MeV, the neutrino and the gamma-radiation, required by present physics? And what about conservation of angular momentum, spin, parity, etc? Here the problem must be called in question. Do centripetal, catalytic nuclear transmutations incessantly occur at the nuclides without showing the conservation nuts and the reaction signs we are used to observe?

In the TSO-perspective it is plausible, that the phenomena connected with a centripetal neutron fission to proton and electron depend on a reorganization of the time-space-amplitude AwA_L before the Aw-component is transformed to time inside the nucleus. It can in simplified terms be described as follows. First a "strip" 1,4($10^{16}L_P$w) wide and 1838.4 ($10^{16}L_{PL}$) long separates from the space amplitude Aw and adds to the time amplitude A_L, which thereby increases to $A_{LE}=1839{,}8(10^{16}L_{PL})=2{,}97239\times10^{-16}$m, Eq. 14), while Aw decreases to 1837($10^{16}L_P$w), an integer of the quantum. Then a second strip 1($10^{16}L_P$w) wide and 1839,8($10^{16}L_P$w) long separates, forming the electron with charge. As mass depends on Aw, Eq. 5) the neutron mass is based on the unchanged Aw=1838,4($10^{16}L_P$w), Eq. 15-16), the electron on Aw=1($10^{16}L_P$w), Eq. 17), the proton on the residual 1836($10^{16}L_P$w), Eq. 18-19). Thus the first dissociated strip 1,4($10^{16}L_P$w), directly transferred to time A_L, never appears as mass. As charge depends on A_L, Eq. 20), it instead causes an increase of $A_L \Rightarrow A_{LE}$ and causes charges to appear. So in a centripetal TSO-perspective not even $E=mc^2$ seems always to be true!

6. Conclusions

In the TSO-perspective, CF is a centripetal fusion of deuterons or protons, a concentric super-position of their time-space-waves, when they mutually are in the same phase and subject to an intense centripetal pressure, but free from any intense translational momentum. A translational or linear momentum will probably destroy the symmetry, necessary for a centripetal nuclear reaction, while an oscillative centripetal pressure may be of advantage, because it contributes to minor phase adjustments of the reactants. A bold prediction is that centripetal nuclear reactions will be favoured at temperatures close to 0°K, when thermal movements cease. Perhaps the world exists as it does due to en equilibrium between centripetal and translational energies. At low temperatures centripetal nuclear reactions are favoured and at extreme high temperatures translational ones, while in between only the gentle and incessant nuclear reaction occurs around complex nuclides $(n \Rightarrow p^+ + e^-)$

The phase and symmetry conditions thus required for CF, can be achieved by a symmetrical and 'Coulomb shielding' adhesion of two deuterons to a heavy 'template nuclide' having a radius of maximal 4 wave-lengths (the N-shell) and the utmost shell with 4 free positions for adhered deuteron-units. The Mendelejev nucleon matrix indicates that such nuclides are Pd, Ti, Ni and Be?. Then the heavier nuclide can function both as a. Coulomb shield and a catalytic template for fusing two symmetrically adhered deuterons. A requirement is that the two deuterons are exactly in the same TSO-phase and opposite (π) to that of the template-nuclide. Only then they can overcome the phase dependent Coulomb barrier to the template nuclide, only then the template nuclide can shield them from each other, and only then the fusion product (^{4}He) can separate from the template, as it is π out of phase to the template nuclide and can not fuse permanently with it. This phase-accordance will occur occasionally, but will be difficult to reproduce and control technically.

Another way to achieve these phase and symmetry conditions would be to use the sonoluminescence technique, i.e. to apply ultrasonic sound to gas microbubbles in water or heavy water, preferably in a "capillary" equipment. Also here we meet the requirement on phase unanimity, that makes the process occasional. But with an immense amount of bubbles in a limited reactor volume it seems possible to keep the reaction continuous. A test with ultra-sound applied to a capillary reactor continuously supplied with a liquid helium-hydrogen mixture at ≈0°K is proposed.

7. Cosmological and Futurity Aspects.

In CF-articles, the idea of halo-neutrons, virtual- and di-neutrons has frequently appeared [6,7]. As the unit TSO-oscillator is based on the energy of the neutron, a justified question is if TS-oscillations are possible, which are not focused and thus not appear as mass at certain points in space. This seems possible, if two neutrons are 'destructively' superposed on each other with a phase difference of π. But then they do not 'exist' according to present physical teachings!

This is true as far as we can not know of them, they do not emit light, and without energy focused to a point in space, we can not detect them. Nevertheless they and their energy may exist, non-localized and distributed over whole our universe. They are then identical to the missing, dark, matter of the universe and the cause of the zero-point energy. In fact their energy is nowhere and at the same time everywhere. It appears as real however, at every place, where a. centripetal focusing can be arranged. New matter with detectable mass is born once a di-neutron is centripetally focused in space. When a gamma-photon is transmuted to an electron-positron pair at the surface of a heavy nuclide, we observe a similar centripetal focusing of energy to a. point. The energy of the gamma photon is originally translational, not focused, but due to the centripetal action of the heavy nuclide the photon is focused to a point and thus materialized.

The technical path to the energy of the future may be our ability to arrange centripetal focusing of energy and particles, not our ability to achieve huge translational velocities by means of immense accelerators or extreme temperatures. The centripetal fusion of deuteron around Pd-nuclides may thus be e. first step on a new evolutionary path. The discovery of CF by Fleischman and Pons in combination with the pathological scorn showered upon them by the physical establishment may in the long run be of advantage. These events have made the future path more discernible to us.

Units and symbols used.

m = mass. $m_n = 1,67495 \times 10^{-27}$ kg	m_n, m_p, m_e = masses n, p, e
c = $2,997925 \times 10^{8}$ ms^{-1}	A, A_o, A_L, A_w, A_{LE} = amplitude components
G=grav. const.=$6,672 \times 10^{-11}$ Nm^{2}kg^{-2}	$A_L A_w = A_o^2$ = "time-space-amplitude"
h = Planck const. =$6,6262 \times 10^{-34}$ Js	A_w/A_L=k="space-time-elasticity"
λ=Compton wave-length =$13,19595\ 10^{-16}$m	acc=$A\omega^2$=oscill. acceleration ($\omega = 2\pi c/\lambda$)
$L_{Po}^2 = Gh/2\pi c^3 = 261,1378 \times 10^{-72}$m^2	F_o=oscillative (strong) force $F_o = m \times$acc.
$L_{Po} = 16,15977 \times 10^{-36}$m the Planck length	$T_{Po} = L_{Po}/c = 5,3903 \times 10^{-44}$m
$A_q = (L_{Po}/2\pi)^2/A_w$=quantum ampl.of transfer	$D = 10^{16} A_o/L_{Po}$=dissociation. $n \Rightarrow p^+ + e^-$
$Y = A_o^2/(L_{Po}/2\pi)^2$ "size" of oscillator/universe	$e^{\pm}$ = elementary charge

Physical units and relations revealed by the TSO-perspective.

$\mathbf{E_n = mc^2 = hc/\lambda = E_o = m\omega^2 A_L^2/2}$	$\lambda = 13,19595 \times 10^{-16}$ [m]		(1a)
$A_L = h/m_n(\pi c\sqrt{2})$	$A_L = 2,970134 \times 10^{-16}$ [m] $A_T = A_L/c$		(1b)
$\omega^2 = (2\pi c/\lambda) = 2c^2/A^2$	acc=$A\omega^2 = 2c^2A/A^2 = 2c^2/A_w$!		(2)
$\mathbf{F_{osc} = m_n \times acc. = 2m_n c^2/A_w = 0,1013211 \times 10^7}$	$\mathbf{F_{osc} = 10^7/(\pi^2)}$!		(3)
$\mathbf{A_w = 10^{-7} m_n (\pi c\sqrt{2})^2}$	$\mathbf{A_w = 2,971480 \times 10^{-16}}$ [m]		(4)
$F_o A_w/2 = F_o A_w$ (eff.)$= mc^2 = 10^7 A_w/2(\pi^2)$	$m = 10^7 A_w/(\pi c\sqrt{2})^2$		(5)
$A_L A_w = A_o^2 = 10^{-7} h\ (\pi c\sqrt{2})$ [m]	$A_o^2 = 8,825700 \times 10^{-32}$ $A_o = 2,970606 \times 10^{-16}$ [m]		(6)
$k = A_w/A_L = 10^{-7}\ m^2(\pi c\sqrt{2})^3/h = 1,00044$	$\sqrt{k} = A_o/A_L = 1,00022$ ($k_{el} = 1,00050$)		(7)
$L_{Po}^2 = Gh/2\pi c^3 = 261,1378 \times 10^{-72}$[m^2]	$L_{Po} = 16,15976 \times 10^{-36}$[m] ($T_{Po} = L_{Po}/c$)		(8)
$L_{Pw} = \sqrt{k} L_{Po} = 16,1633 \times 10^{-36}$ [m]	$L_{PL} = L_{Po}/\sqrt{k} = 16,1560 \times 10^{-36}$ [m]		(9)
$A_o^2 = 10^{48} L_{Po} T_{Po}/(\pi^2) = 10^{48} L_{Po}^2/(\pi^2 c)$	$L_{PL} = 10^{-24} A_L(\pi\sqrt{c})$		(10)
$A_o^2/L_{Po}^2 = 10^{48}/(\pi^2 C)$	$A_o^2/L_{Po}^2 = \mathbf{0,033797104 \times 10^{40}}$		(11)
$10^{-16} A/L_P = 10^8/(\pi\sqrt{c}) = D$ (n-fission)	$D = 10^8/(\pi\sqrt{c}) = \underline{1838,40} = m_n/m_e$		(12)
$A_q = (L_{PL}/2\pi)^2/A_w$	$A_q = 2,2260 \times 10^{-56}$ [m]		(13)
$A_{LE} = 10^{16} L_{PL} 1839,8 = 10^{32} L_{PL}/1837(\pi^2 c)$	$A_{LB} = 2,97239 \times 10^{-16}$ [m]		(14)
m_n(kg)$= 10^7 A_w/(\pi c\sqrt{2})^2$	$m_n = 1,674952 \times 10^{-27}$kg	(1,674953)	(15)
m_n(MeV)$= 10^{19}\ A_w/\sqrt{10}$ approxim.	m_n=939,65 MeV	(939,56)	(16)
$m_e = 10^{-1}\ A_o(\pi\sqrt{c})/(\pi c\sqrt{2})^2$	$m_e = 0,91090 \times 10^{-30}$ kg	(0,91091)	(17)
$m_p = 10^{-1}\ A_w \underline{1836}(\pi\sqrt{c})/(\pi c\sqrt{2})^2$	$m_p = 1,67275 \times 10^{-27}$ kg	(1,67265)	(18)
m_p=(MeV)$= 10^{19} A_w 1836(\pi\sqrt{c})/\sqrt{10}$	m_p(MeV)=938,4 MeV	(938,28	(19)
$e^{\pm} = 10^{40} A_{LE} T_{Po} = 10^{16} A_{LE} A_o(\pi/\sqrt{c})$	$e^{\pm} = 16,0221 \times 10^{-20}$ As	(16,0219)	(20)
$h = 10^7\ A_L A_w/(\pi c\sqrt{2}) = 10^7 A_o^2/(\pi c\sqrt{2})$	$h = 6,626184 \times 10^{-34}$ Js	(6,6262)	(21)
$G = 10^{-55}(\pi c\sqrt{2})^3(\pi c^2) = 10^{37} A_q c$	$G = 6,671882 \times 10^{-11}$	(6,672)	(22
$Y = A_o^2/(L_P/2\pi)^2 = 10^{48} 4/c$ (= A_L/A_q)	Y=1,334256$\times 10^{40}$ (λ)	1,761$\times 10^{25}$ [m]	(23)

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