A new concept about space energy from the point of view of BSM – Supergravitation Unified Theory

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- The classical electrodynamics developed by James Clerk Maxwell is based on the assumption of existence of material Ether. Original equations - in quaternions.

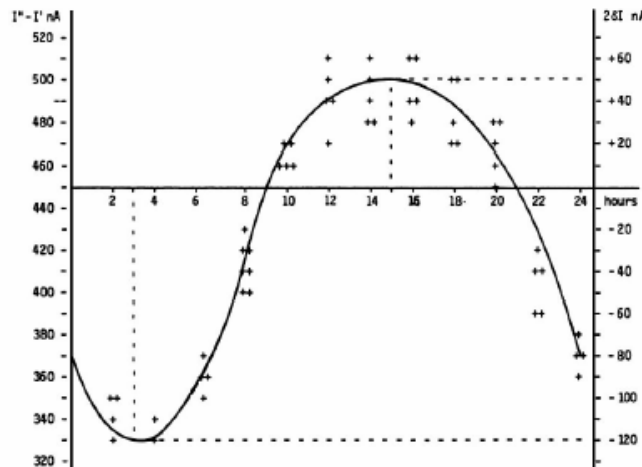- In 1920 Einstein reversed his opinion about the Ether, but admits non-material Ether.

  (Einstein, *Sidelights of Relativity* (1922))

- Michelson-Morley experiment does not refute the Ether and they suggested an alternative experiment - not funded.

- Experiments proving the existance of Ether by detecting an absolute motion:

  - Rotating frame – Sagnac effect (detecting rotation motion)

  - non-rotating frame experiment – Stefan Marinov measured the velocity direction of our absolute absolute motion)

Stefan Marinov's Coupled Shutters Experiment based on differential non-Doppler method

reversible motor

D₁

emmiter

chopped light

chopped light

emitter

D₂

perforated disks
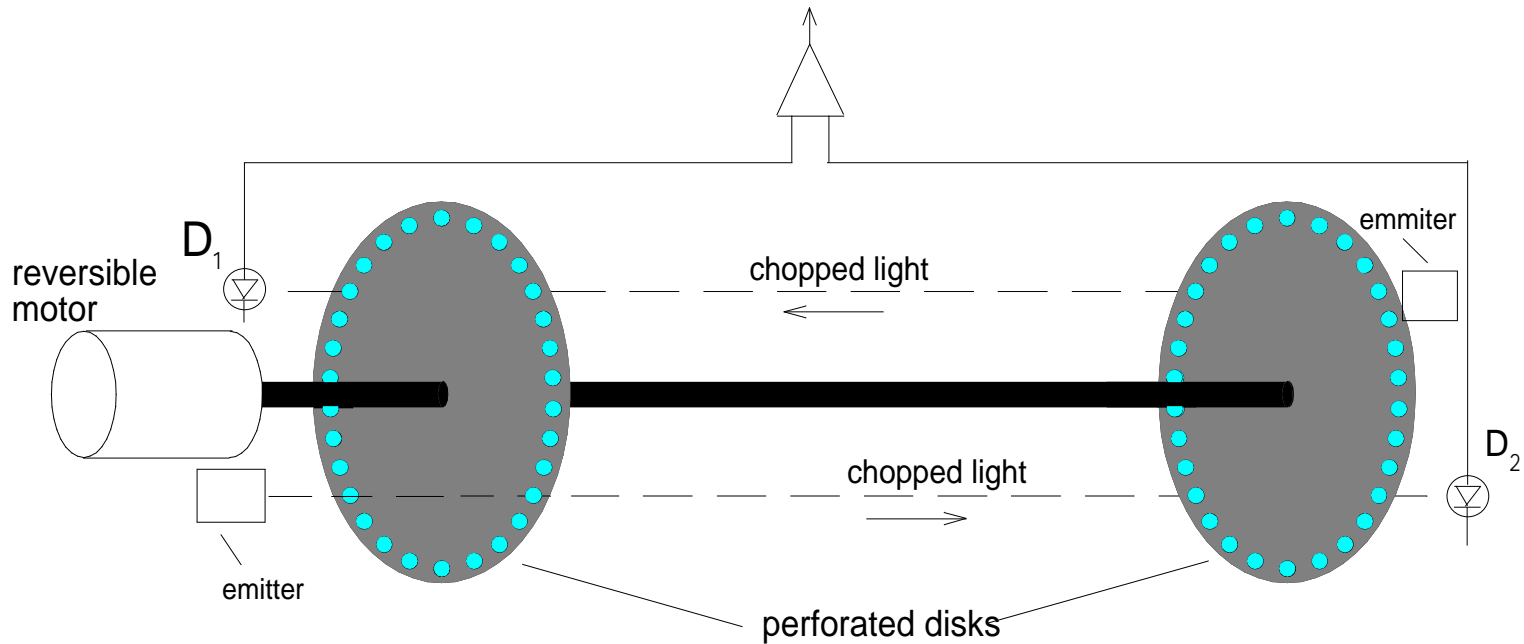
First publication in Russian Journal Physical Thoughts, 1984

S. Marinov, Progress in Physics, v.1, 31-37, (2007)

- Plot of measured signal for 24 hours

Framework of BSM-SG Unified Theory

-**Empty Euclidean space** - no physical properties
- **Two superdense elastic Fundamental Particles (FPs)**
    - radius ratio of the two FPs: 2/3
    - vibration proper frequencies with average value equal to Planck's frequency 1.855×10^{43} Hz
    - **A fundamental law of Super Gravitation (SG):** the forces between FPs are inverse proportional to the cube of the distance

$$F_{SG} = G_o \frac{m_{01} m_{02}}{r^3}$$

where: G_0 – SG constant, m_{01}, m_{02} – SG masses, r - distance

• **Energy** is inseparable feature of FPs and their formations with interactions governed by the SG law.

Properties of FPs distinguishable from elementary particle

- **large vibrational energy**, but **low intrinsic inertia**
- **Congregation of FPs into 3D formations** held by SG law
- **3D material formations** in hierarchical **levels of matter organization**
- **Mixture of 3D formations from both FPs.**
- **New properties of 3D material formations**
  - **Vibration modes** with frequency lower than the
    Planck's one but greater than the Compton's frequency
- 3D formations can absorb a finite vibration energy – **energy well per unit time**
    - **Origin of the SG forces**: vibrational interaction between structures until the involved energy saturates the energy well.
    - SG forces beyond the energy well limit will **change their magnitude and even their sign** (a feature of SG constant G_0)
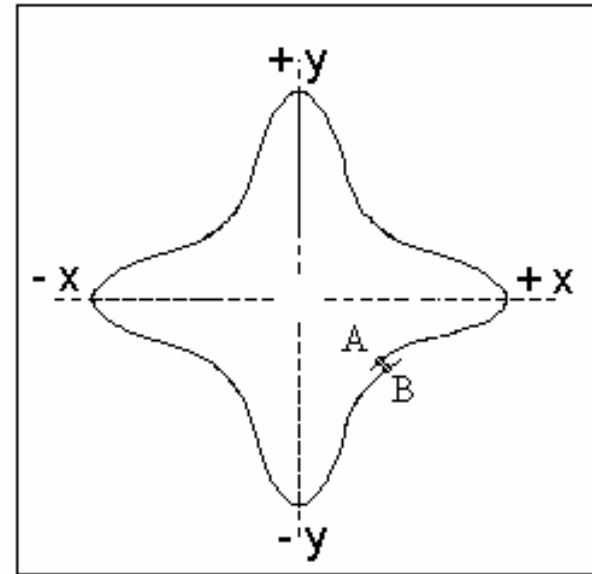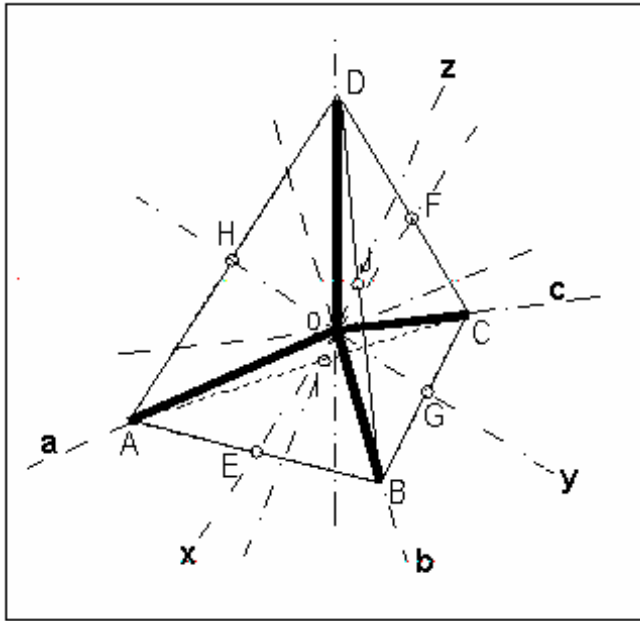
Structural formations of FPs of the same type at the lowest level of matter organization

(TH)

Primary Tetrahedron

Quasi Pentagon (QP)

external view   internal view

Quasi Ball (QB)
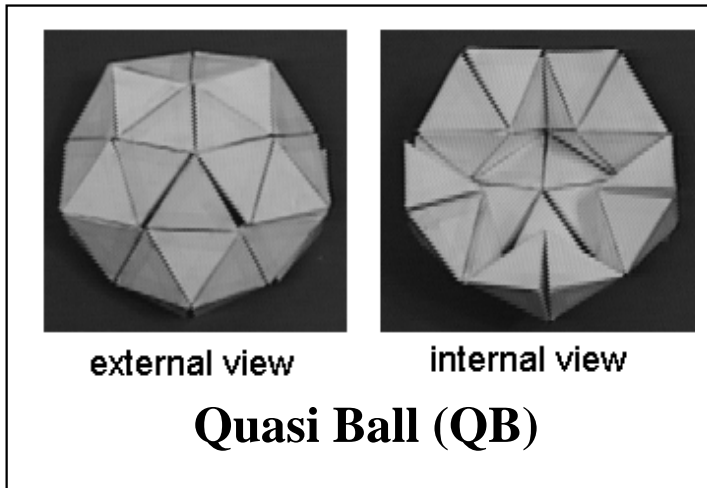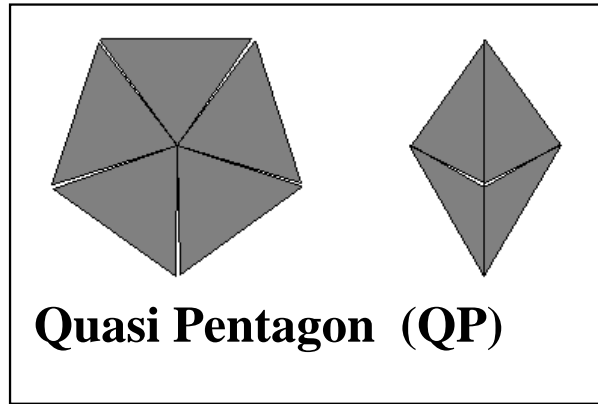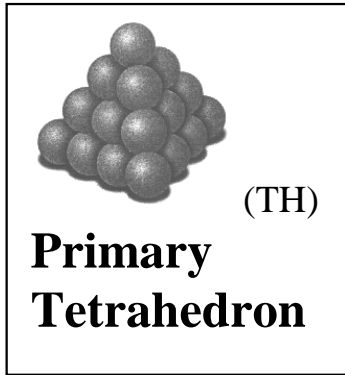
The QP angular gaps combine in one gap of 7.355^0, so QB can be left or right-hand twisted - lowest level 2-bit memory carrying the chirality.

1 QB = 12 QP = 60 TH

Tetrahedron common mode oscillations

Theoretical equation for the fine structure constant as a signature of the common mode oscillations in the primary Tetrahedron (Chapter 12)

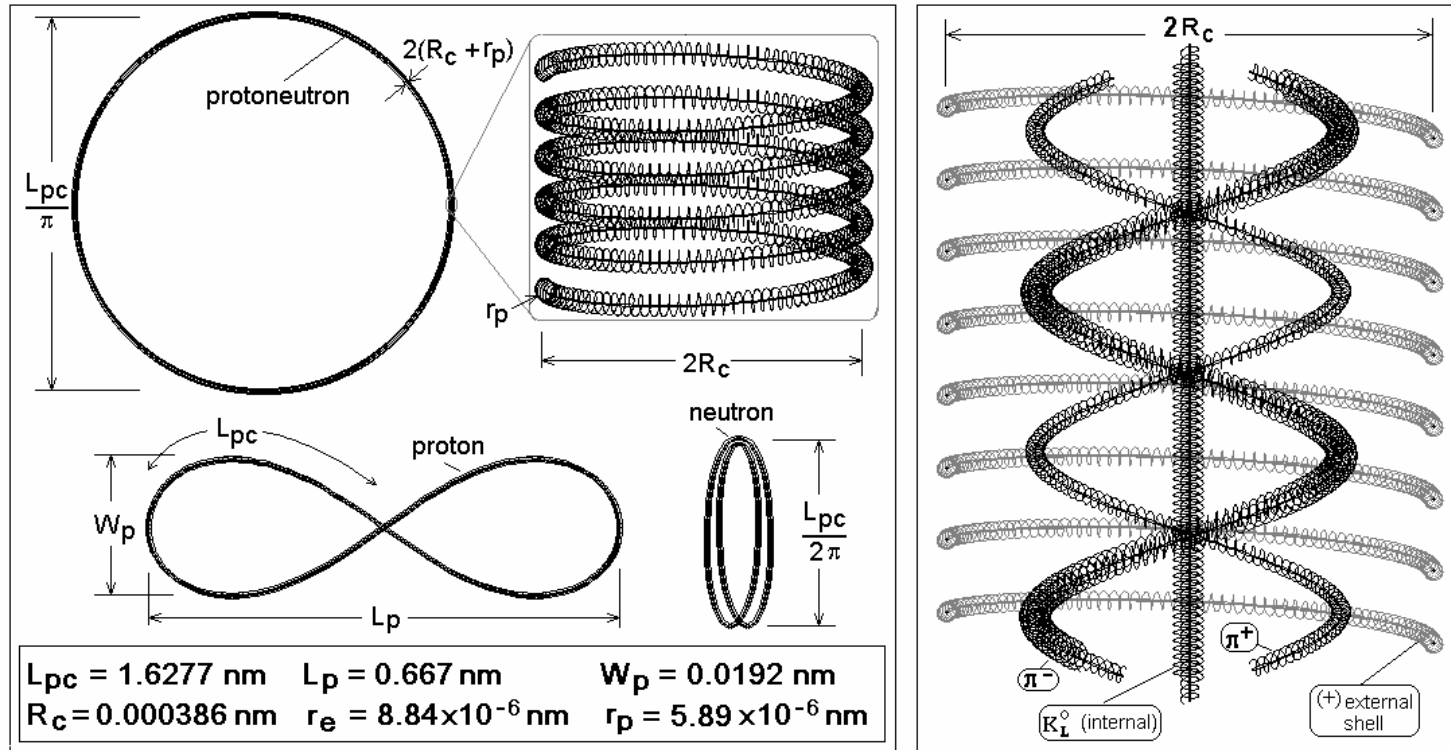$$\alpha = 2 \big/ [(n^2 + 2\pi^2)^{1/2} + n] = 7.29735194 \times 10^{-3} \quad -\ derived$$

$$\alpha = 7.2973525 \times 10^{-3} \quad (CODATA\ 98)$$

Space and elementary particles possess superfine and dens material structure

• Structural formations at low level of matter organization - a unique crystallization process in a Protogalactic Egg preceding the birth of a individual galaxy.

• Prisms – like rods (twisted prisms) with internal twisting structure and SG anizotropy- fundamental building blocks

• Prisms are building blocks of both: the superfine structure of Physical Vacuum and the helical structures of stable elementary particles: protons, newtrons, electrons, positrons

• Explosion of the Protogalactic Egg - birth of a new galaxy.

• The free prisms build the superfine structure of Physical Vacuum called a Cosmic Lattice (CL space)
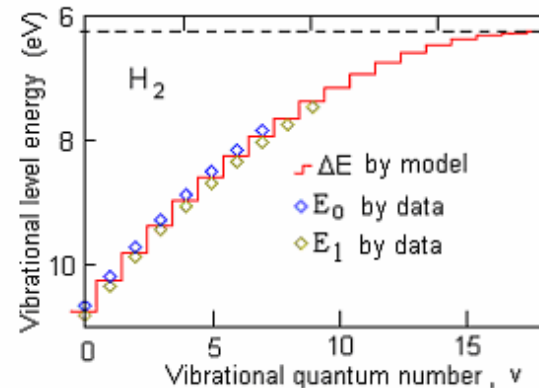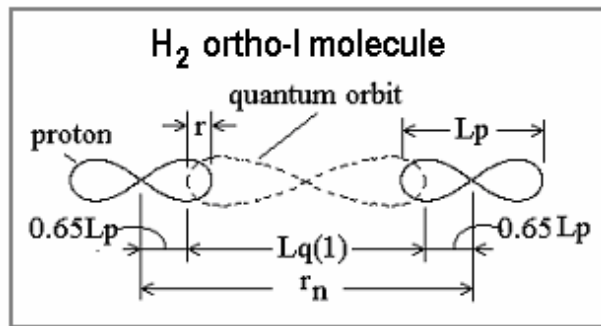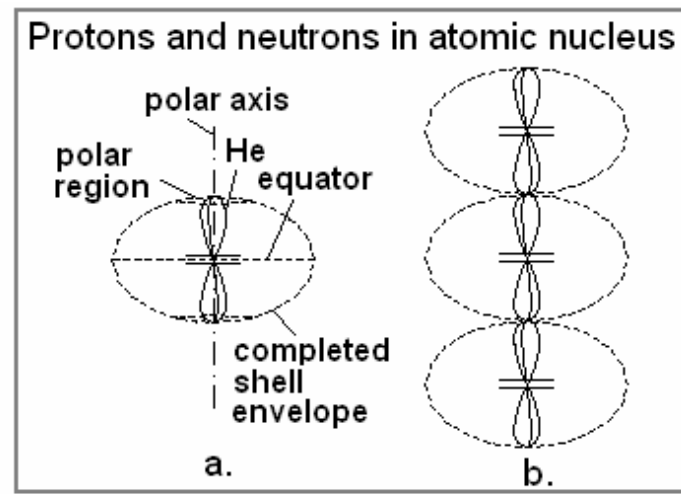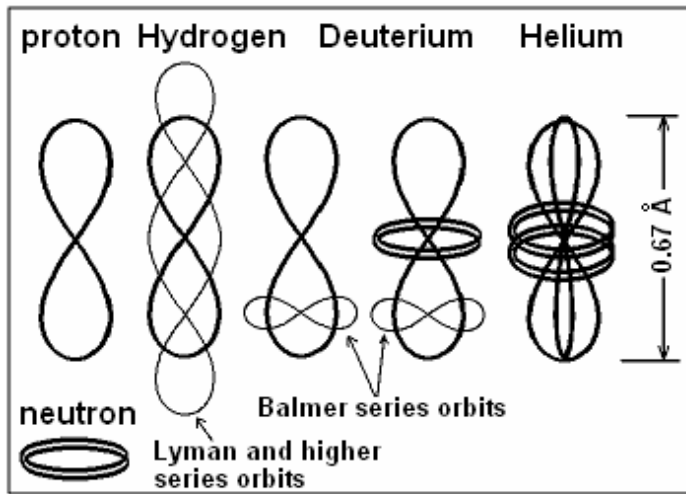
Proton and neutron and their internal structure
(all elementary particles are built of helical structures)

Proton and neutron shapes
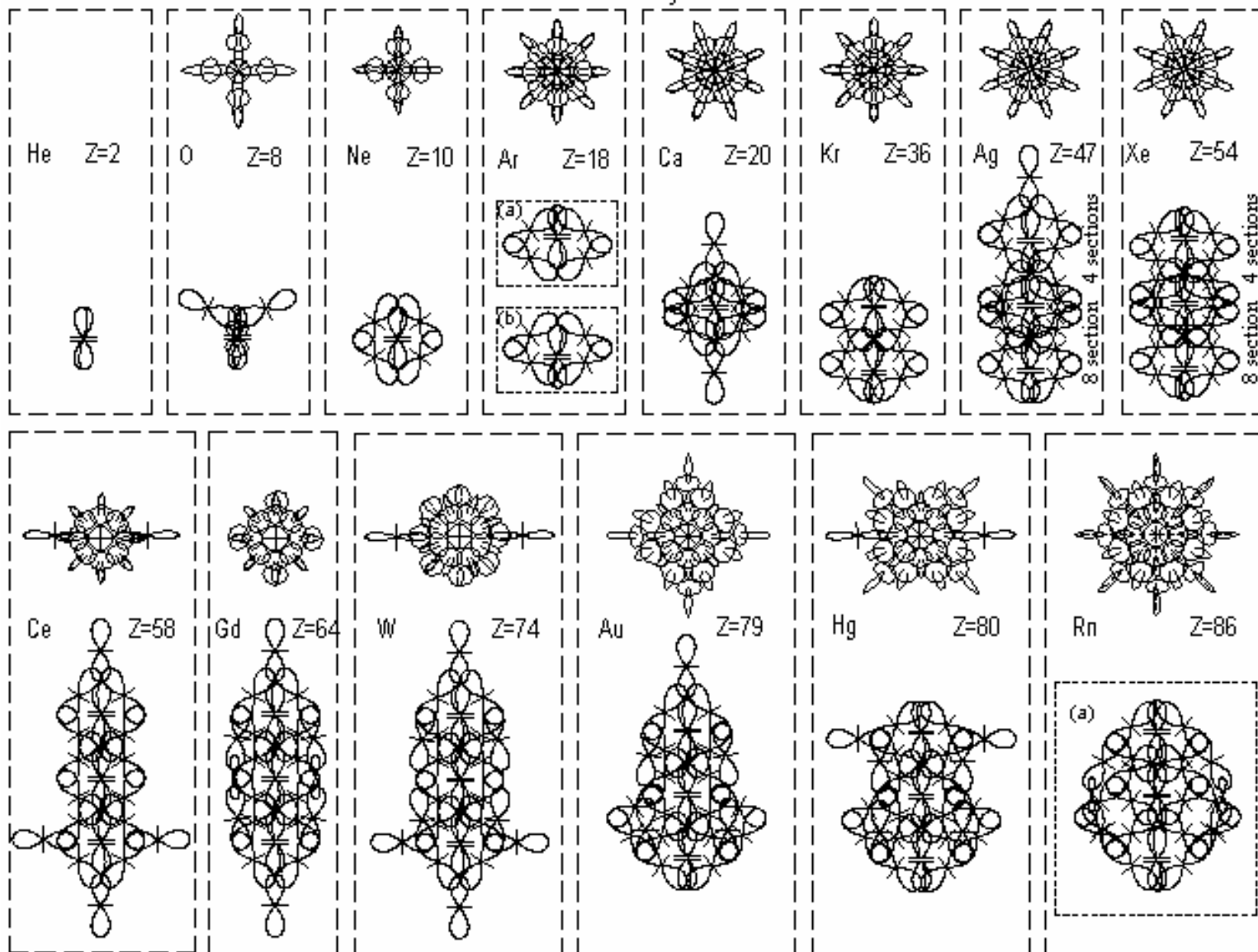
Internal proton /neutron structure

proton Hydrogen Deuterium Helium

0.67 Å

neutron

Balmer series orbits

Lyman and higher series orbits

Protons and neutrons in atomic nucleus

polar axis

polar region

He

equator

polar

completed shell envelope

a.

b.

H₂ ortho-I molecule

quantum orbit

proton

r

Lp

0.65 Lp

0.65 Lp

Lq(1)

rₙ

Vibrational level energy (eV)

H₂

ΔE by model
E_0 by data
E_1 by data

Vibrational quantum number, v

$$E_V = \frac{C_{SG}}{q[[[L_q(1)(1-\alpha^4\pi\Delta^2)]]+0.6455L_p} - \frac{2E_q}{q} - \frac{2E_k}{q}$$ - Vibrational energy levels

$$C_{SG} = G_0 m_0^{\ 2} = (2h\nu_c + h\nu_c\alpha^2)(L_q(1) + 06455L_p + 5.2651\times10^{-33}$$

$$C_{SG}/Gm_p^{\ 2} = 2.82\times10^{31}$$ - Density ratio between SG and atomic matter

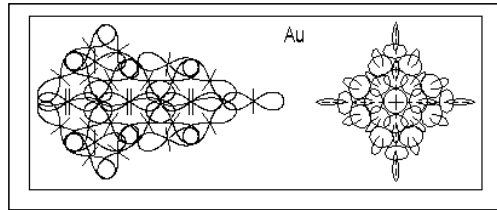BSM   Atlas of atomic nuclear structures   Projection views of selected elements

He   Z=2   O   Z=8   Ne   Z=10   Ar   Z=18   Ca   Z=20   Kr   Z=36   Ag   Z=47   Xe   Z=54

(a)   (b)   8 section   4 sections   8 section   4 sections

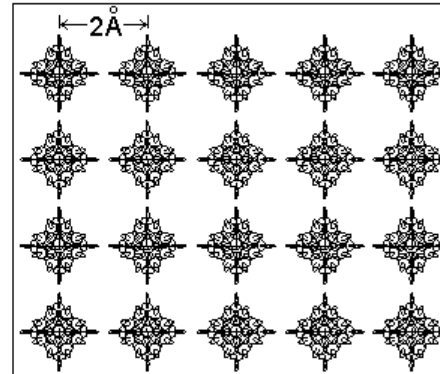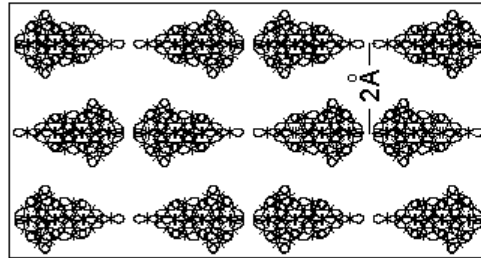Ce   Z=58   Gd   Z=64   W   Z=74   Au   Z=79   Hg   Z=80   Rn   Z=86   (a)

Note: (a) and (b) are polar sections of the nucleus with two selected planes. The angle between them is 22.5⁰

Atoms in metal lattice

Single atom of gold

Synthetic images of a single layer of gold in two different metallic lattice planes. The internuclear distance is obtained from the BSM atomic models.
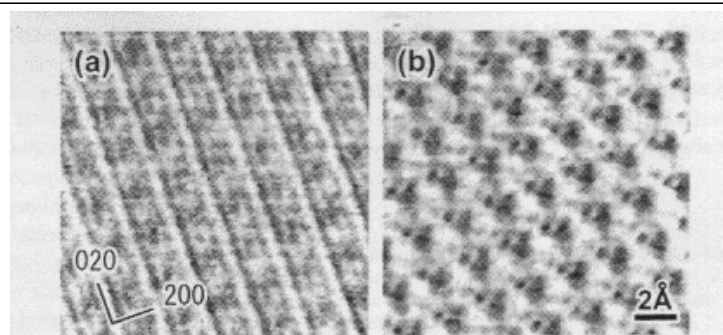

FIG. 2. (200) lattice fringe ($d = 2.04$ Å) images of a Au(001) thin film: (a) 1/3 spacing fringes formed from ($\bar{2}$00) and (400) reflections; and (b) fringes formed from many high-order reflections. The Fourier transform of the micrograph extends to ~0.5 Å

Images of two crystal planes of gold layer. Courtesy of T. Kawasaki et al., Applied Physics Letters, v. 76, No 10, p. 1342-1344 (2000)

Courtesy of Kawasaki et al, App.Phys. Lett, v.76, No 1, 1342-1344 (2000)

Mockup for illustration of Cosmic Lattice node arrangement
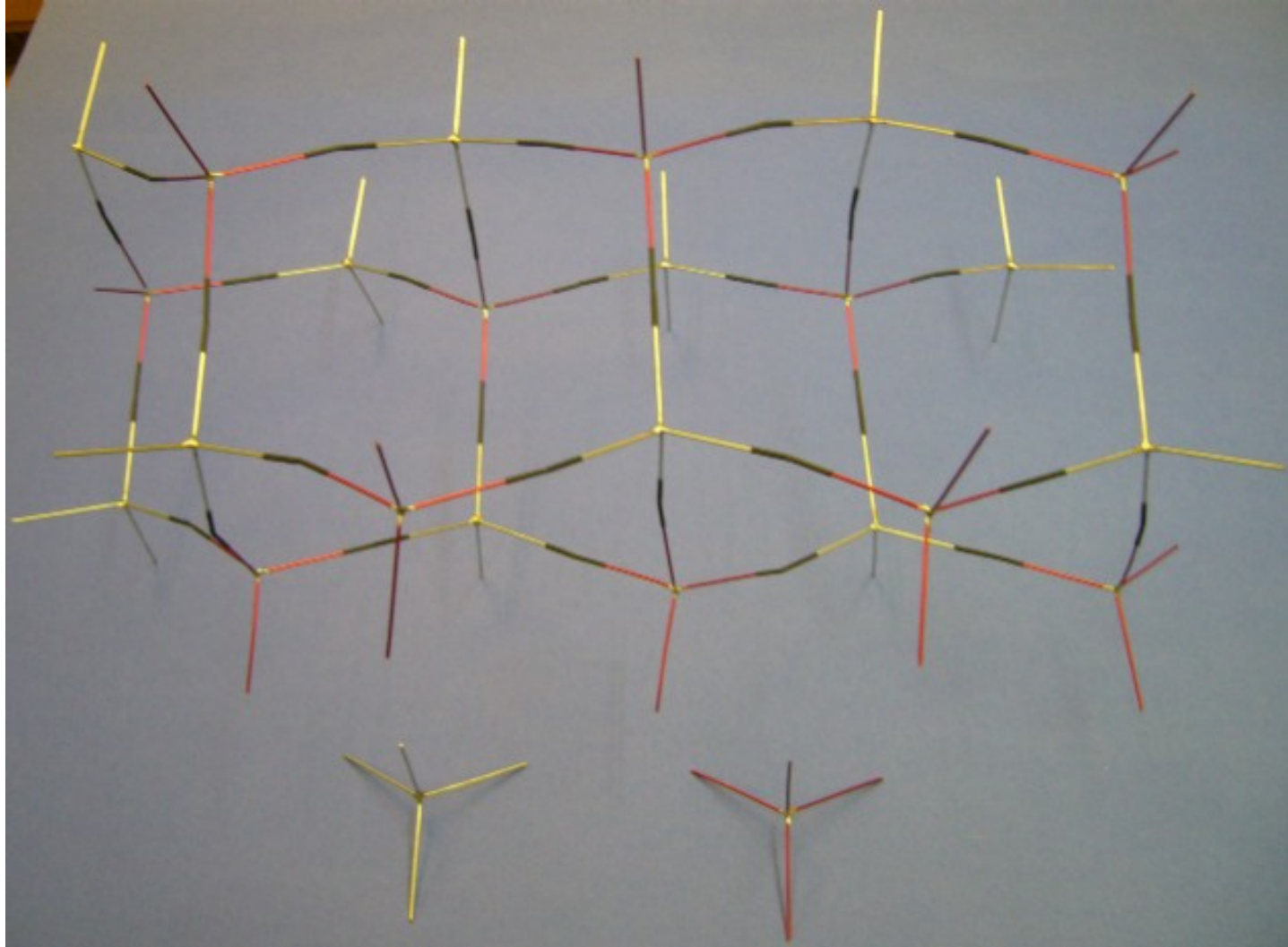
# Cosmic Lattice (CL) – defines the properties of the Physical Vacuum

- **Right and left-handed flexible CL nodes** – formed by 4 twisted prisms
- **Gaps between the CL nodes:** permits spatial oscillations (SPM vector)

   Dynamics of CL nodes under SG law: 2 sets of axes: *xyz* and *abcd*
- **Return forces: - symmetrical along *xyz* and asymmetrical along *abcd* axes**.

   Result: Complex CL node oscillations **(NRM and SPM vectors)**

   - two identified frequencies : $n_R = 1.09 \times 10^{29}$ Hz – defines light velocity
and $n_c = 1.236 \times 10^{20}$ Hz – SPM vector (Compton) frequency – involved in
QM interactions and constancy of light velocity
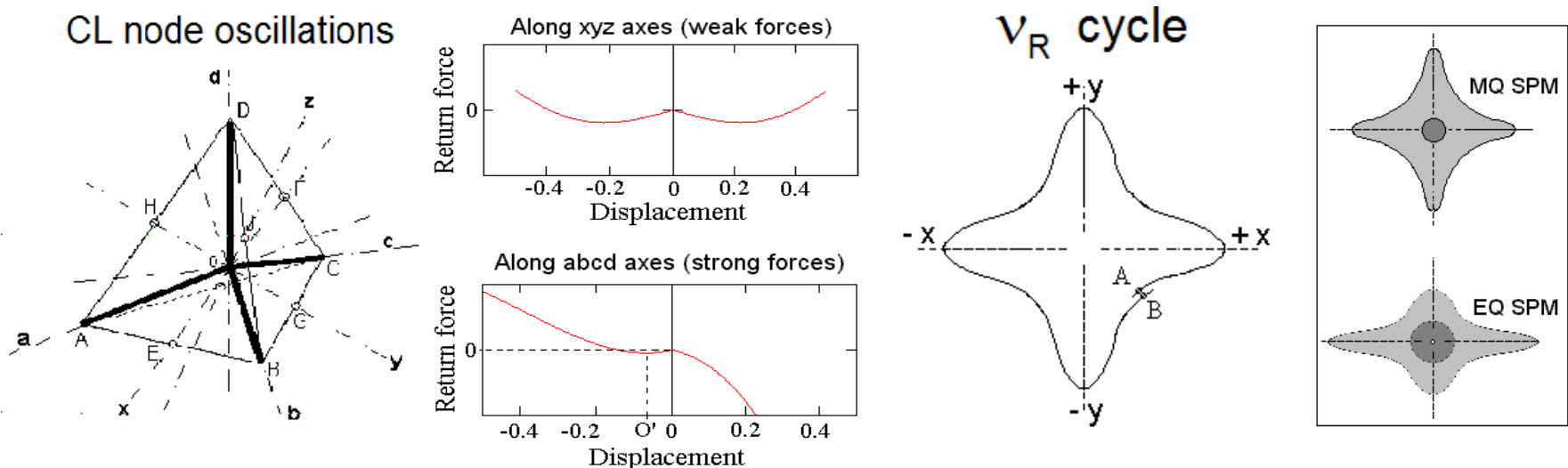
- **Electron** – an oscillating 3-body system of helical structures with two proper frequencies. The first one is the Compton frequency equal to the SPM frequency of the CL node.

oscillating electron

motion of 1

1

r_e

3

2 r_p

s_e

motion of 2

R_c

$R_c = 3.86 \times 10^{-13}$ (m)

FOHS with internal RL lattice

untwisted cell   twisted cell

d_1

d_2

a. $d_1 > d_2$ b.

untwisted and twisted FOHS

CL space

RL

E-field lines
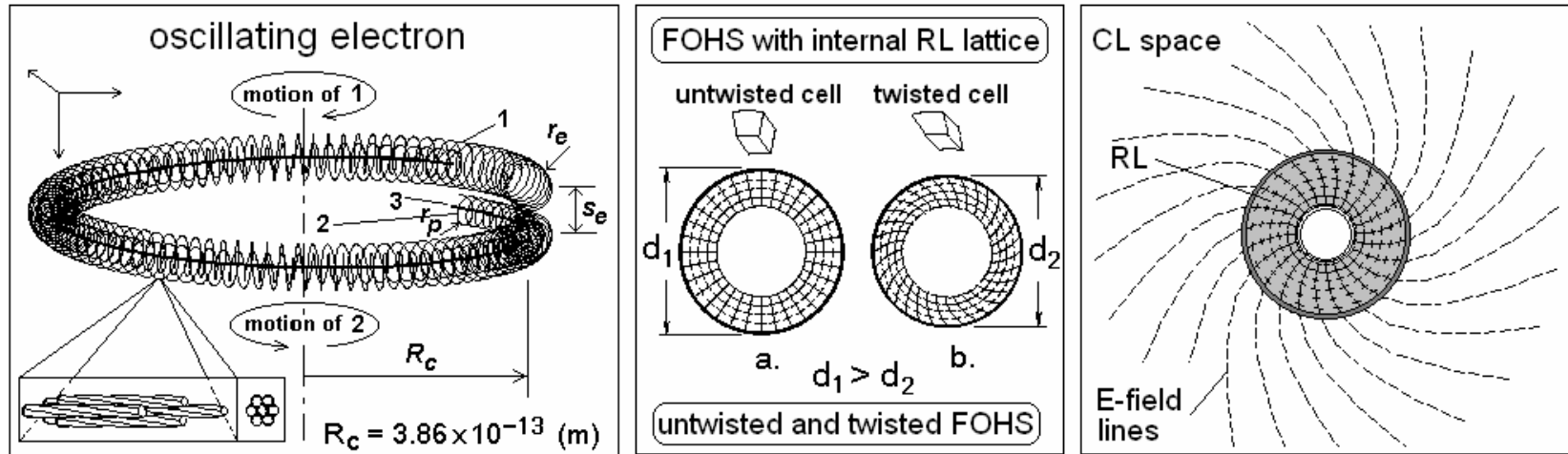
- **Confined motion:** A screw-like motion of rotating and oscillating electron interacting with the oscillating CL nodes.
- **Main features:** Preferred Quantum velocities (13.6/n) eV, QM spin, anomalous magnetic moment, embedded fine structure constant, α
- The **denser internal RL lattice** modulates the CL node dynamics: electrical and magnetic lines

- Fine structure constant –
embede in electron's structure

$$\frac{R_C}{s_e} = \frac{\sqrt{1-\alpha^2}}{2\pi\alpha}; \qquad s_e = g_e r_e$$

Main CL space parameters expressed by the BSM electron model

- **Static CL pressure, P_S**: <u>defines the Newtonian mass of elementary particle</u> as a pressure exercised on its denser internal lattice

$$P_S = \frac{m_e}{V_e} c^2 = \frac{g_e h v_c^4 (1-\alpha^2)}{\pi \alpha^2 c^3} = 1.3735 \times 10^{26} \qquad (\text{N/m}^2) \tag{4}$$

$$m = (P_S / c^2) V_H \quad (\text{kg}) \text{ - \textbf{Newtonian mass equation of elementary particle}} \tag{5}$$

- **Partial CL pressure, P_P**: - Inertial properties of a particles at confined motion

$$P_P = P_S \alpha v / c \quad (\text{N/m}^2) \quad \text{where: } v \text{ - is a confined motion velocity} \tag{6}$$

- **Dynamical CL pressure, P_D**: - Pressure exercised on FOHSs of atoms and molecules by ZPE waves that equalize the CL space background energy.

$$P_D = \frac{h v_c}{c S_e} = \frac{g_e h v_c^3 (1-\alpha^2)}{\pi \alpha c^3} = 2.0258 \times 10^3 \quad (\frac{N}{m^2 Hz}) \tag{7}$$

Signature of P_D - the observed Cosmic Microwave Background (CMB). Therefore, **the estimated temperature of 2.72K** (by fitting of CMB to a blackbody curve) **in fact is a CL space background parameter.** The derived theoretical expression is:

$$T = \frac{N_A^2}{S_W} \frac{h v_c (R_C + r_p)^3 L_{PC}^2}{2 c R_C r_e R_{ig}} \frac{\mu_e}{\mu_n} = 2.6758 K \tag{8}$$

- **Other estimated CL space parameters**
  CL node distance (at xyz axes) ~ 1.0975×10^{-20} (m),
  NRM (resonance) frequency: 1.0926×10^{29} (Hz)
  SPM frequency = Compton's frequency (known): 1.2356×10^{20} (Hz)

Distributed space energy envisioned by analysis of the CL node dynamics under SG law

- Two types of ZERO Point Energy: Static and Dynamic

    Dynamic ZPE: responsible for EM field – envisioned by QM

- Static ZPE: not of EM type and not envisioned by QM

- Static ZPE estimated by the static pressure on the Electron

$$E_e = P_S V_e = 8.187 \times 10^{-14} (J) \equiv 511 (KeV) \quad e^- \, mass \, equiv. \, energy$$

$$E_S = 1.3736 \times 10^{26} \, (J) \quad hidden \, space \, energy \, in \, (m^3)$$

- Conclusion: The Static ZPE is a primary source of the nuclear energy and defines also the Newtonian mass by the Einstein equation $E = mc^2$

Accessing the hidden space energy – a primary source of all types of energy

• **By nuclear reaction**: a microeffect of General Relativity (a slight change of CL node distance releases huge energy)

• **Alternative method** predicted by BSM-SG theory

  - accessing one of the CL node oscillating frequencies equal to the Compton frequency (1.235×10^{20} Hz) by using the oscillating properties of the electron

  - Heterodyne Resonance Mechanism predicted by BSM-SG: invoking the Compton's proper frequency of the electron by frequency in the accessible RF range.

  - Heterodyne Mechanism allows access to hidden large space energy (Static ZPE) through the Dynamic ZPE.

Heterodyne Resonance Mechanism (HRM)
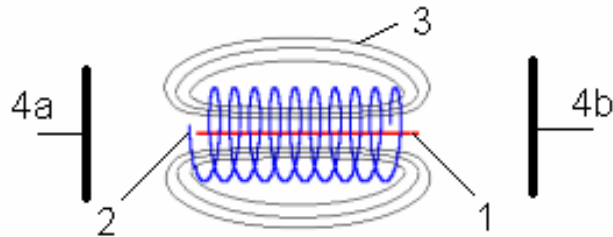
Reversible trace motion of ion-electron pair: 1 – positive ion trace, 2 - electron trace, 3 – electron's magnetic field
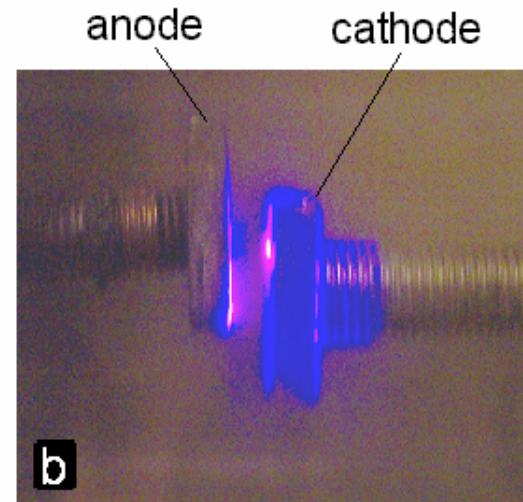
• Electron spin flipping at the point of reversal causes interaction with the CL node oscillating frequency – accessing the Dynamic CL node energy

• Example of technical realization

  - Ionization for obtaining a neutral plasma

  - Invoking of ion-electron pair oscillation in a proper selected gas at proper pressure and proper EM field.

• Signatures of HRM are identified in many processes of EM activated plasma and also in atmospheric lightning
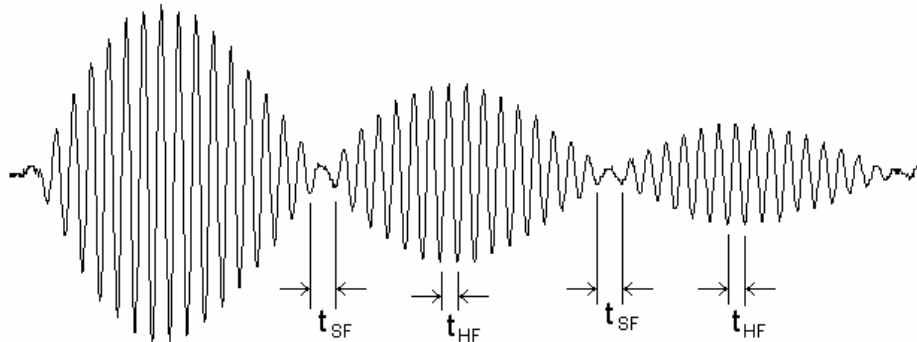
Heterodyne Resonance Mechanism Research
Glow discharge of neutral plasma in partial vacuum
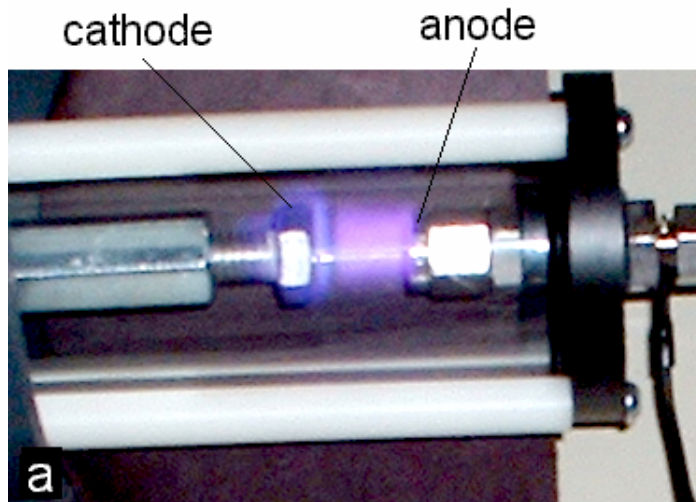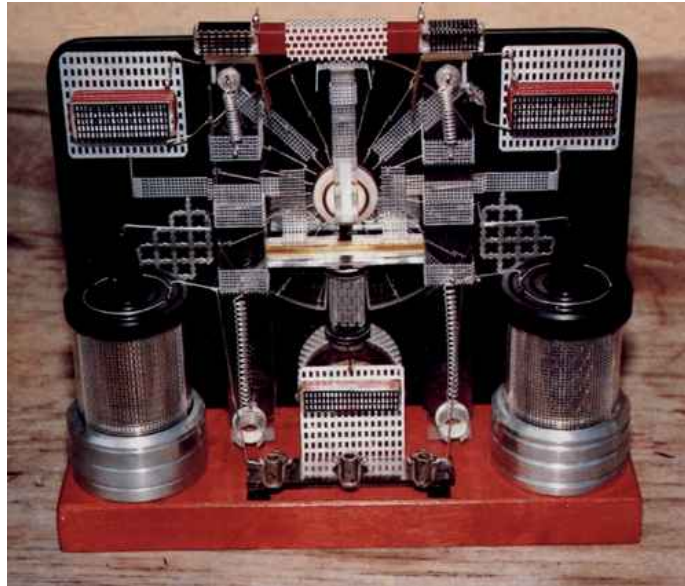

a. Axially aligned electrodes   **b. displaced electrodes**

Electron spin flipping

at $\quad t_{SF} > t_{HF}$

Testatica Machine in Meternitha community Switzerland (a proven ZPE device)
Inventor: Paul Boumann (1928-2001)
(videoclip)

- The glowing air around the device is a signature of the Heterodyne Resonance Effect

- Requires a dry air environment

BSM-SG publications

- First publication in: **www.helical-structures.org** (regularly updated web)
- First and second electronic editions archived in National Library of Canada, (2002 and 2005)
- Article about the electron in **Physics Essays** (2003) and other articles in the on-line **Journal of Theoretics**.
- A poster report in Physics of the IIIrd Millennium Conference, 3-5 Apr 2005, Huntsville, AL, USA
- Report in IX International conference *Space, Time, Gravitation* 7-11 Aug 2006, St. Petersburg, Russia
- Book *Beyond the Visible Universe*, 2005 (popular presentation)
- Book *Basic Structures of Matter–Supergravitation Unified Theory*, 2006 Trafford Publishing, Canada – full theory (paper back & electronic book)

- Books review in **Physics in Canada**, v. 62, No 4, 206-207, (2006)

- Presentations in other conferences and seminars