Atlas of Atomic Nuclear Structures - a major contribution of the BSM - Supergravitation Unified Theory

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SAVE THE EARTH'S CIVILIZATION

What A Wonderful World

SAVE OUR PLANET

Analysis of nuclear tests reveals a dangerous effect that might cause a loss of Earth's atmosphere in case of nuclear war.

Etheric concept of space predicted by Aristotle and Plato, and considered by Newton, Faraday, Maxwell, Mendeleev, Lord Thomson and Nikola Tesla.

Problems and questions that were waiting for an answer

- What is the primary standard for length and time defining the speed of light?

  Speed of light in vacuum: 2.99792458 x 10^8 (m/s) Accuracy: 2.66x10^{-8}

  Mathematical expression: $c = \dfrac{1}{\sqrt{\varepsilon_0 \mu_0}}$ (m/s)

- What is the relationship between gravity, electric field and magnetic field?
- A logical explanation of quantum processes and relativistic effects
- What is the primary source of all known energies?

Decisions of a fundamental nature

- **Cosmic Lattice** – an ethereal model of space unexplored in the history of physics. It gives a clear classical answer to the above questions and an understandable connection between the microcosm and the universe

- **Atlas of elementary particles and Atomic Nuclei (ANS).** Potential opportunity for computer modeling in the fields of: structural chemistry; simple and complex molecules, biomolecules, nanomaterials and thin films, cold nuclear fusion.

- A physical understanding of the phenomenon of antigravity. A potential opportunity for a new method of space travel.

Quantum models of atoms are mathematical only.
They work only with energy levels. They serve to identify the atomic elements by spectral characteristics, but not the sizes and shapes of atoms. Wave functions are only energy models and their visualization does not give the real 3D configuration of atoms.

- **A 100-year-old problem about the relationship between quantum mechanics and classical mechanics**
- **The quantum-mechanical model of atoms is based on a planetary model proposed by Rutherford and Bohr.**

Elementary particles: It is assumed that they are spherical, including the atomic nucleus. Its size was determined by the scattering experiment interpreted by Rutherford. However, for a non-spherical shape such as a twisted or folded toroid, with much larger dimensions but the same thickness, the experimental data will be the same. Furthermore, at higher scanning particle energies (not available at the time of Rutherford) a significant deviation from the Rutherford extrapolation occurs by which the size of the nucleus was determined.

Quantum mechanical model of hydrogen (proton and electron)
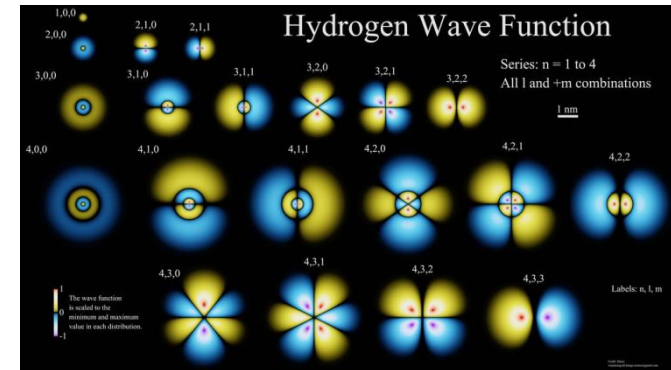
Sharp departure from Rutherford model for energy > 27.5 MeV
Farwell & Wegner, Phys. Rev, 93,356 (1954)
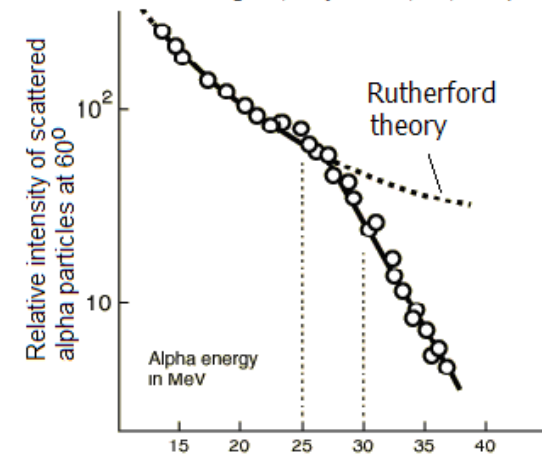
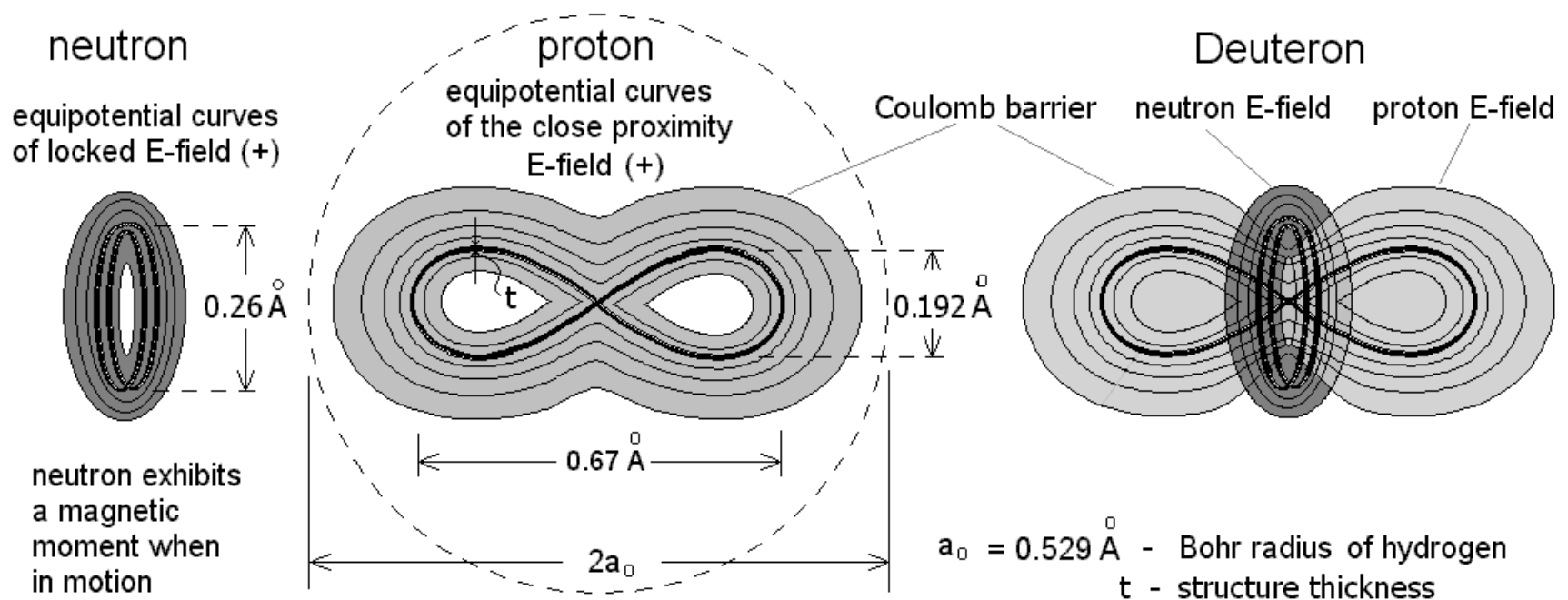Courtesy of Eisberg, R. M. and Porter, C. E., Rev. Mod. Phys. 33, 190 (1961)

Revealing the underlined structure of elementary particles and the building trend of atomic nuclei, relying on experimental data from different fields

- **Particle data experiments**
- **X-ray properties of the elements in a solid state.**
- **Laue back-reflection patterns**
- **Relation between the nuclear binding energy and X ray spectra of the elements**
- **Oxidation numbers (valences) of elements. Principal and secondary ox. numbers.**
- **Ionization potential dependence of Z number**
- **Orbital interactions and pairing between the electrons from different orbitals**
- **Radioactive decay of unstable isotopes**
- **Optical atomic spectra**
- **Photoelectron spectra of molecules**
- **Nuclear magnetic resonance of the elements**
- **Nuclear configuration and VSEPR model for chemical compounds**
- **Vibrational properties of the atoms in the molecules in a gas phase.**

All elementary particles contain superdens helical substructure

This conclusion is based on analysis of particle data experiments and quantum mechanica properties as interaction between the particle structure and the Cosmic Lattice

- **Proton and neutron possess one and a same superdens substructure. The proton is twisted torus, while the neutron is double folded. The charge of the neutron is locked in the near field by the SG (nuclear) forces and not detectable, but when in motion it creates a magnetic field.**

neutron

equipotential curves of locked E-field (+)

0.26 Å

neutron exhibits a magnetic moment when in motion

proton

equipotential curves of the close proximity E-field (+)

t

0.67 Å

$2a_0$

Deuteron

Coulomb barrier   neutron E-field   proton E-field

0.192 Å

$a_0 = 0.529$ Å - Bohr radius of hydrogen

t - structure thickness
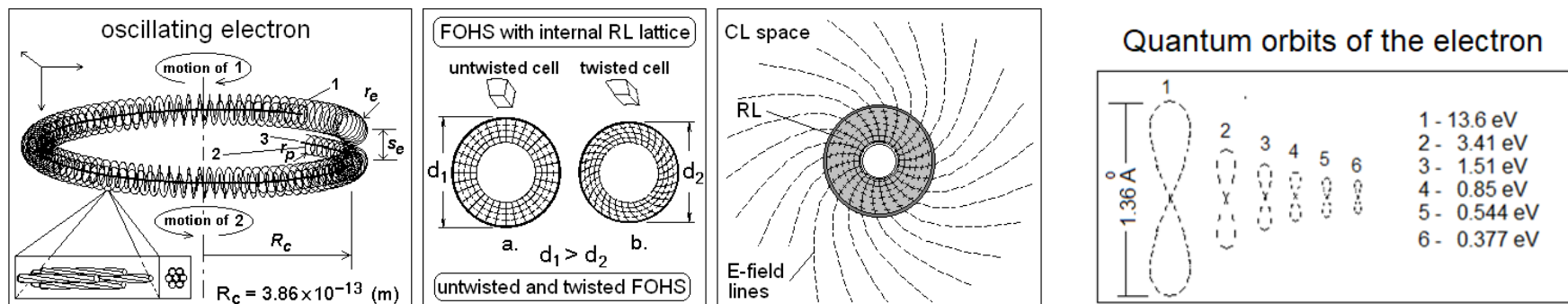
Structure and shape of the electron

What are the classical explanation of the following quantum mechanical features?
- Electron spin
- Quantum mechanical features corresponding to primary quantum numbers at 13.6 eV; 3.41 eV, 1.51 eV 0.85 eV etc.
- Anomalous magnetic moment
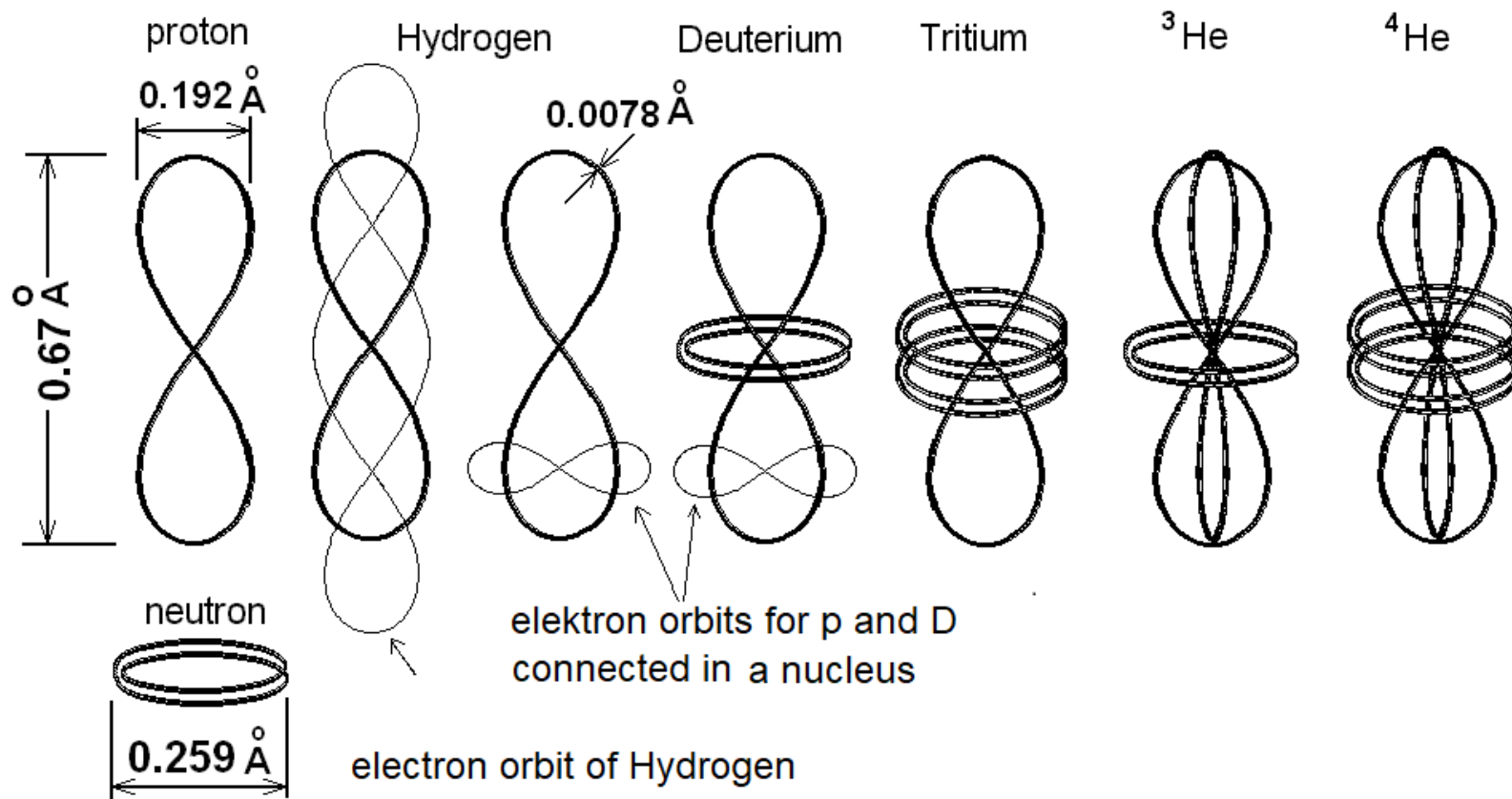- Compton radius experimentally derived by Arthur Compton

Electron is a small 3-body oscillating system exhibiting a screw-like motion with preferred quantum velocities (13.6 eV, 3,4 eV, 1.51 eV…) due to interaction with the Cosmic Lattice. ***This determines the size of quantum orbits of free electron as shown below.***

S. Sarg, Physics Essays, Vol. 16, No 2, 180-195, (2003).

oscillating electron — motion of 1, motion of 2, r_e, s_e, r_p, 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

Quantum orbits of the electron — 1.36 Å
1 - 13.6 eV
2 - 3.41 eV
3 - 1.51 eV
4 - 0.85 eV
5 - 0.544 eV
6 - 0.377 eV

BSM-SG models of smallest atomic nuclei

proton   Hydrogen   Deuterium   Tritium   ³He   ⁴He

0.192 Å

0.67 Å

0.0078 Å

neutron

0.259 Å

elektron orbits for p and D
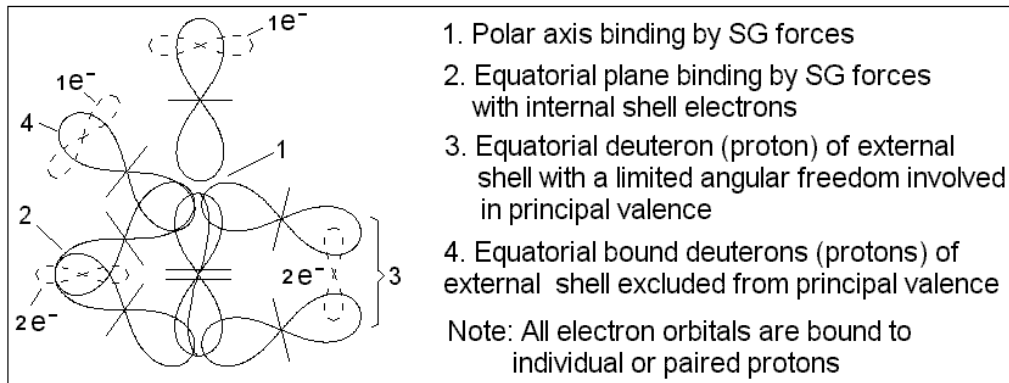connected in a nucleus

electron orbit of Hydrogen
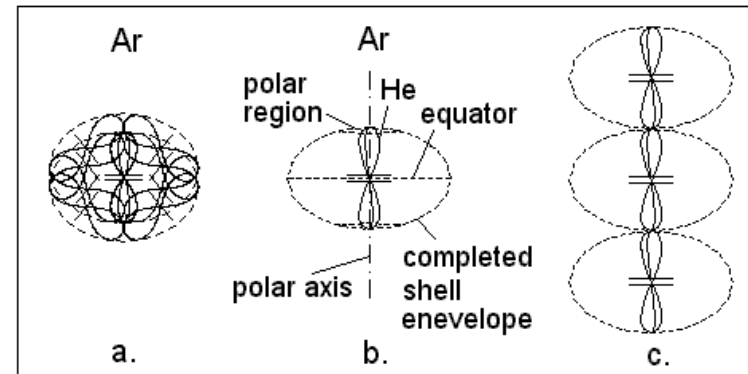
$$F_{SG} = G_{SG} \frac{m_{01} m_{02}}{r^3}$$ **Supergravitation low**

Rules for the formation of light and heavy atomic nuclei obeying physical laws. Types of nuclear bonds. What defines nuclear spin? Stable and unstable atomic nuclei.

1. Polar axis binding by SG forces
2. Equatorial plane binding by SG forces with internal shell electrons
3. Equatorial deuteron (proton) of external shell with a limited angular freedom involved in principal valence
4. Equatorial bound deuterons (protons) of external shell excluded from principal valence

Note: All electron orbitals are bound to individual or paired protons

Polar axis and chain structure of atoms with z > 18

• Conclusiions:

• All stable atomic nuclei have strict rotational symmetry about an axis defined by one or more helium nuclei which are the densest.

• Electron orbits are strictly defined by the nearby electric field of the protons.

• The magnetic field from the orbiting electrons interacts with the magnetic fields of the neutrons revolving around the protons. The magnetic field of the electron is much stronger than the magnetic field of the neutron, while the latter has a much greater mass.

• If the total magnetic moment of the orbiting electrons and neutrons exceeds the total energy of the SG bonds, or breaks the symmetry to a limit value, the nucleus decays.

Atomic nuclei of elements of second and third row of the Periodic table.
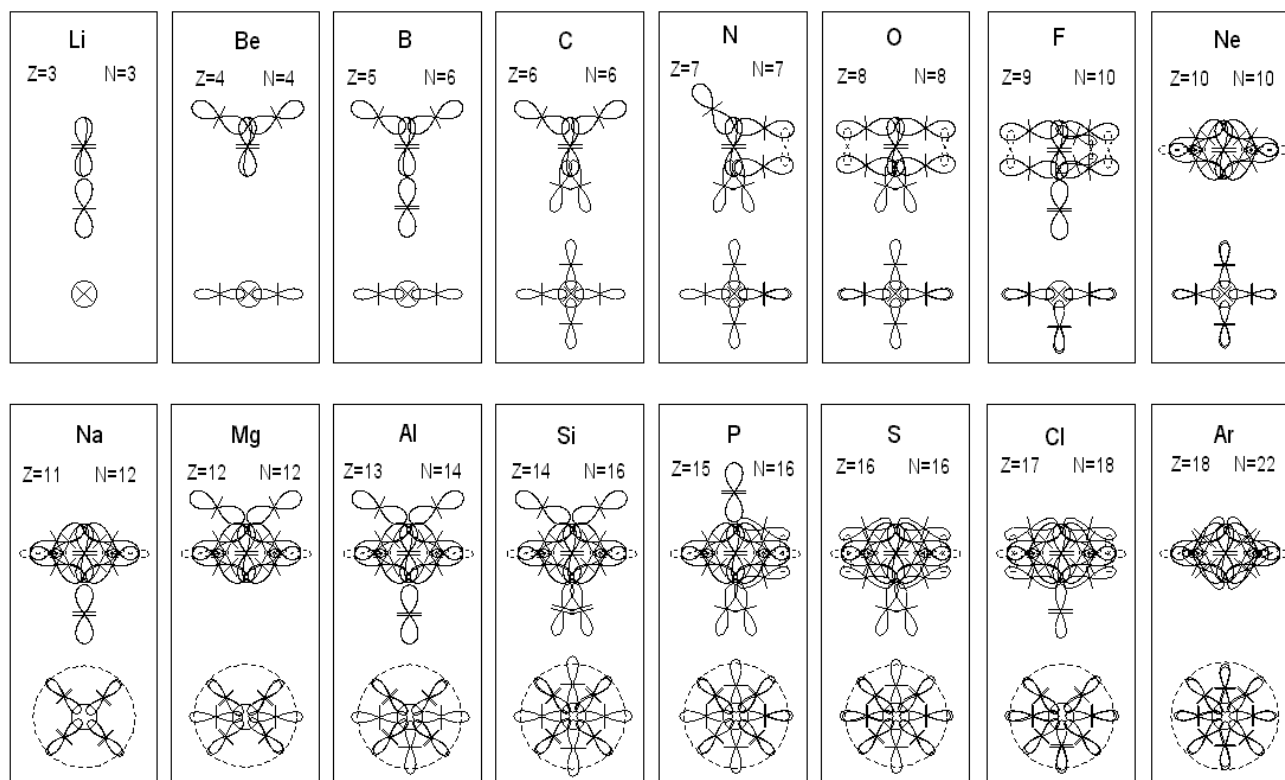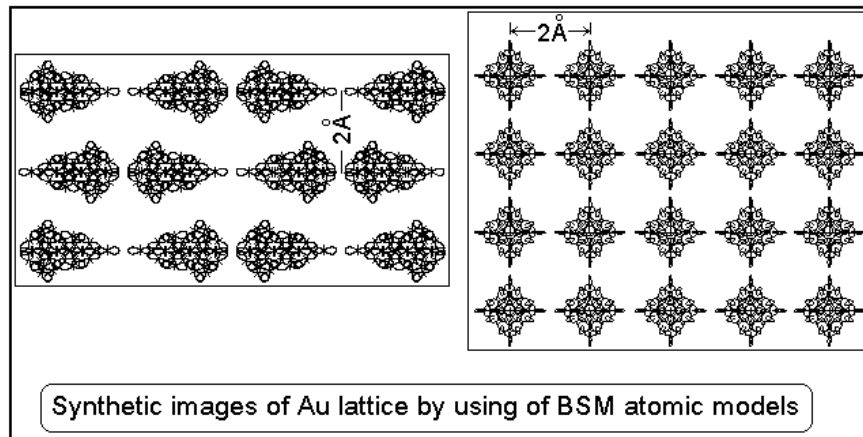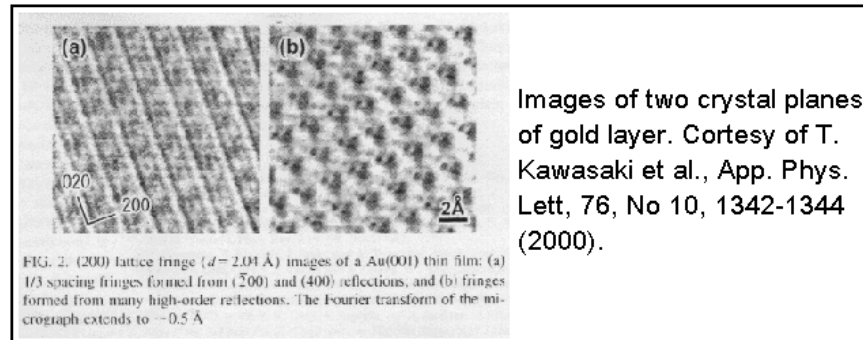

Moke-up of the Argon atom

Note: The principal chemical valence increases with z-number until the deuterons (protons) from the two poles are at different planes passing through the polar axis. In further z increase the deuterons (protons) are bound by electronic orbits at equatorial region and excluded from the principal valence. At noble gases all deuterons are bound at equatorial region by SG forces and excluded from any chemical valence.

BSM-SG   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

Ce Z=58   Gd Z=64   W Z=74   Au Z=79   Hg Z=80   Rn Z=86
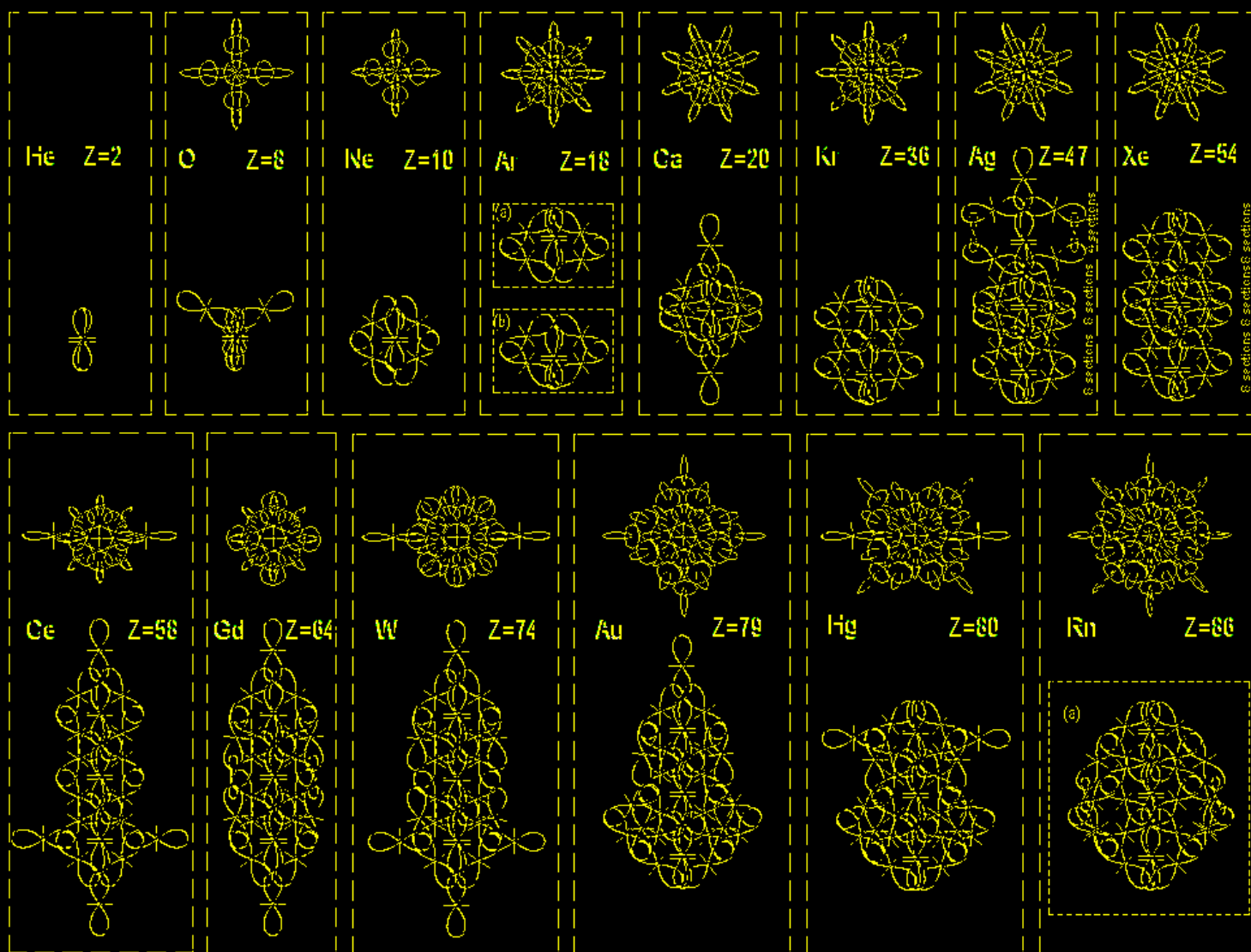
Copyright © 2001 by Stoyan Sarg

Comparison between images of crystal planes of gold layer obtained by electron microscopy and synthetic image using the BSM-SG atomic models

Images of two crystal planes of gold layer. Cortesy of T. Kawasaki et al., App. Phys. Lett, 76, No 10, 1342-1344 (2000).

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

Synthetic images of Au lattice by using of BSM atomic models

The inter-atomic distance between the observed and synthetic images matches. In BSM-SG models it is based on the size of proton derived determined theoretically by cross analysis from different fields.

BSM-SG atomic models in nanotechnology
Example of analysis of Single sheet graphene

Carbon atom
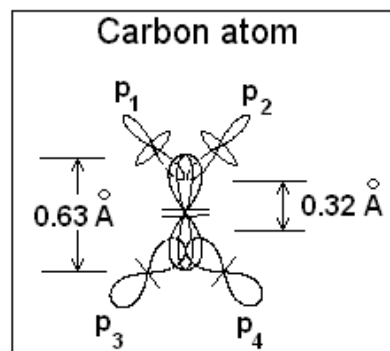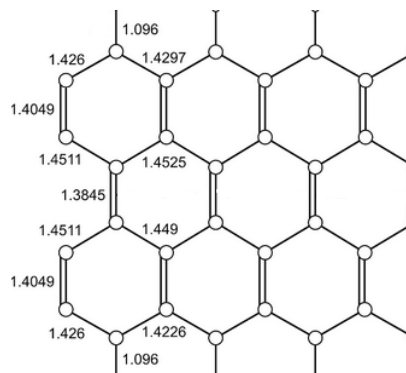
Note:

The plane of P1 & P2 is perpendicular to the plane of P3 &P4. This provides a slight displacement of the locations of the electronic orbits. This feature is detectable by the TEAM microscope.

The analysis of TEAM image shows that the single sheet of graphene is not planar
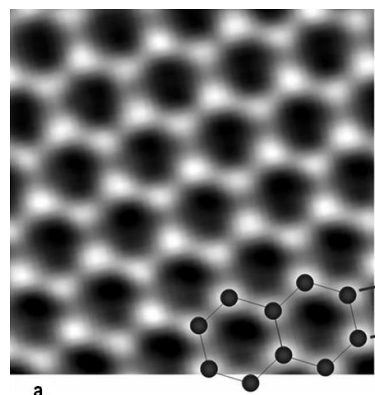
a.   TEAM microscope image of a single wall Carbon sheet
b.   Processed image showing a signature of 2 parallel planes
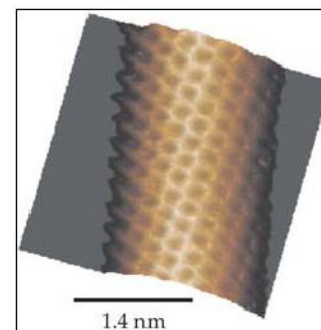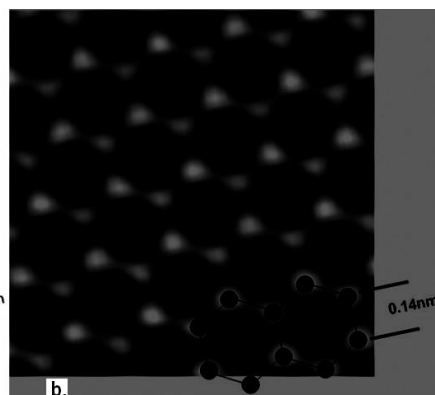
Nanotube, Courtesy of A. Javey et al. Nano Lett., 4, 1319, (2004

Modeling of silver nanopyramids observed by electron microscope using the BSM-SG models

Supergravitational forces play a very important role in nanotechnology

Silver nanoparticles. Courtesy of R. Jin et al.
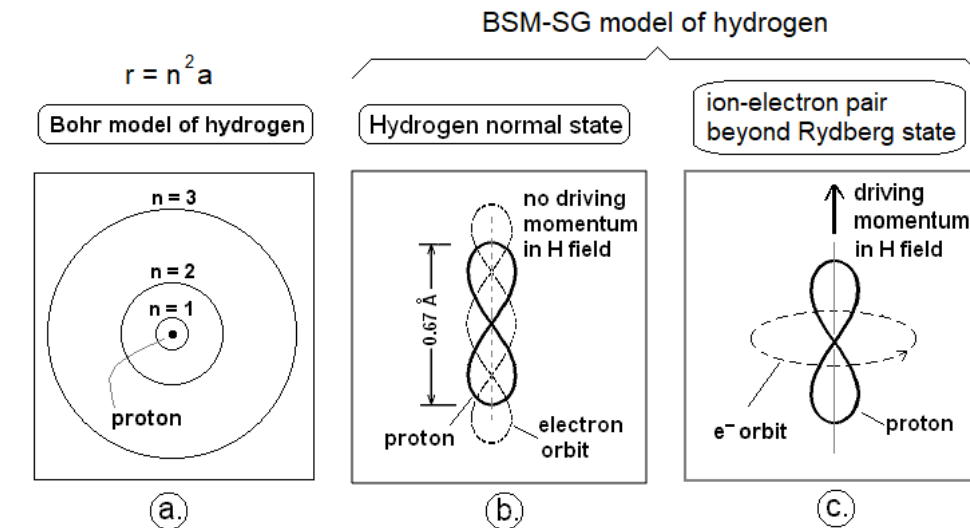Nature, 2003 Oct 2;425(6957):487-90.

200 nm
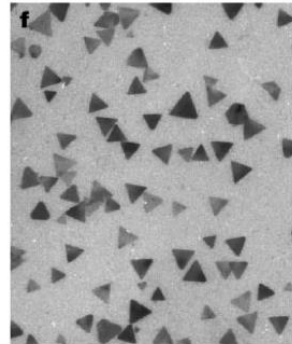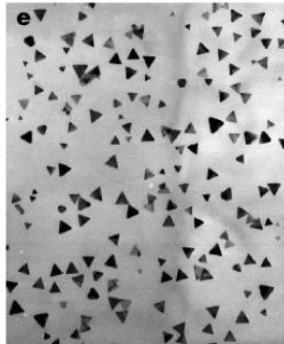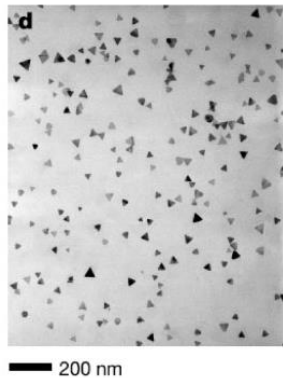
Flat fractal triangle formed
by 9 triangles 27 Ag atoms)

Internal valence orbitals are co-
nected and EB bonds are switched.
This feature provides the stability.
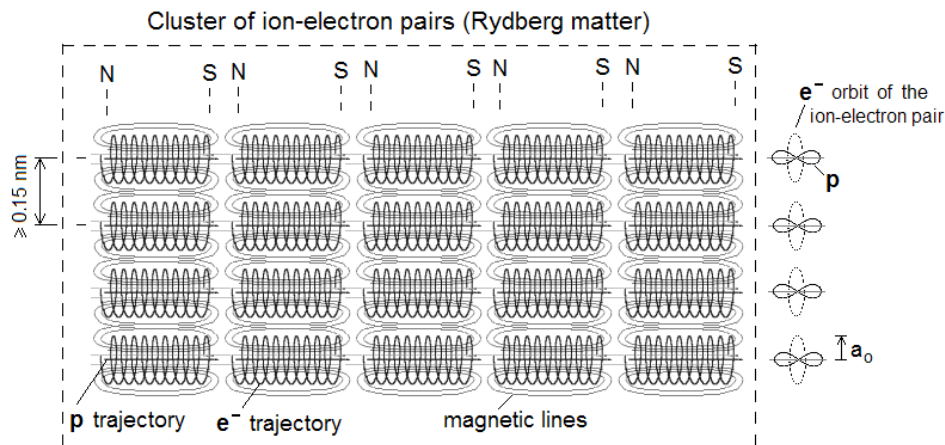The next fractals are prisms made
by paralell fractal triangles.

Triangle formed by 3 Ag atoms
held by SG (Wan der Waal forces)

Ag

Valence electron orbital

EB bond

Scale: 1 Å

1.9 nm
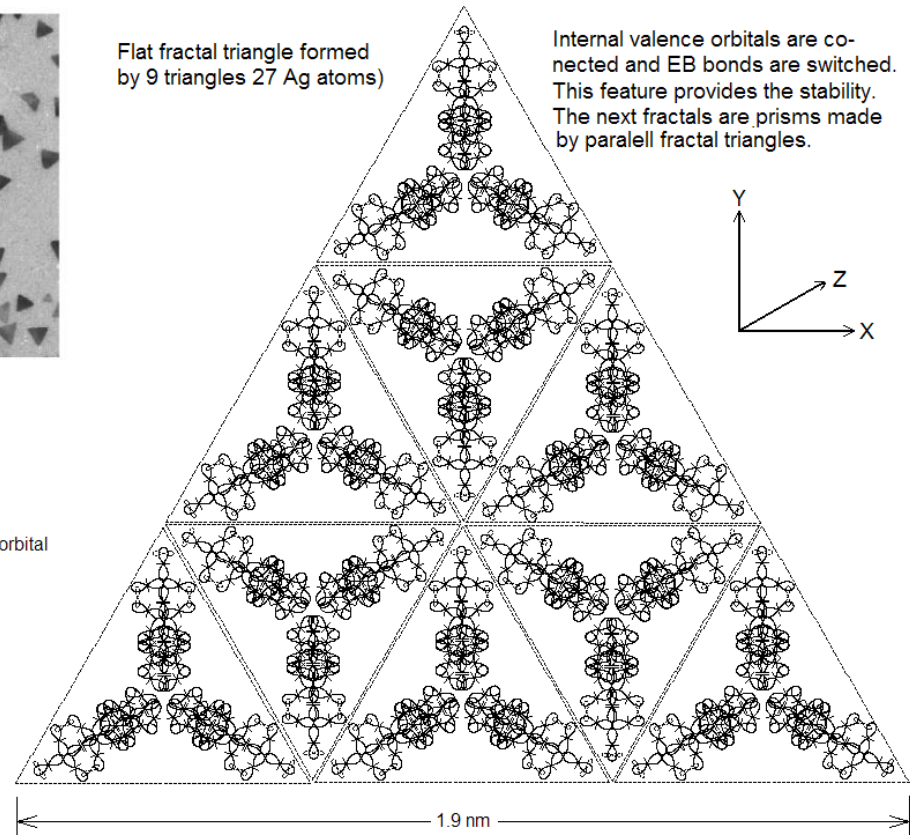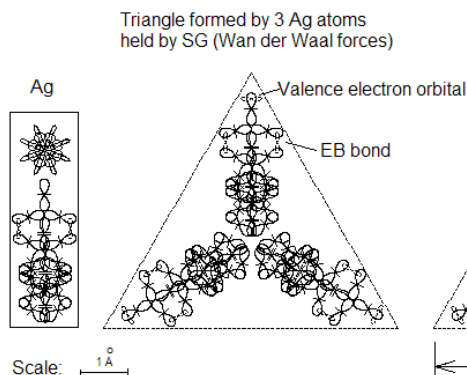
The trend continues in the upper level fractal formations in XY plane and in Z axes as stacks. This
leads to formation of triangular prisms in the nanoscale range.

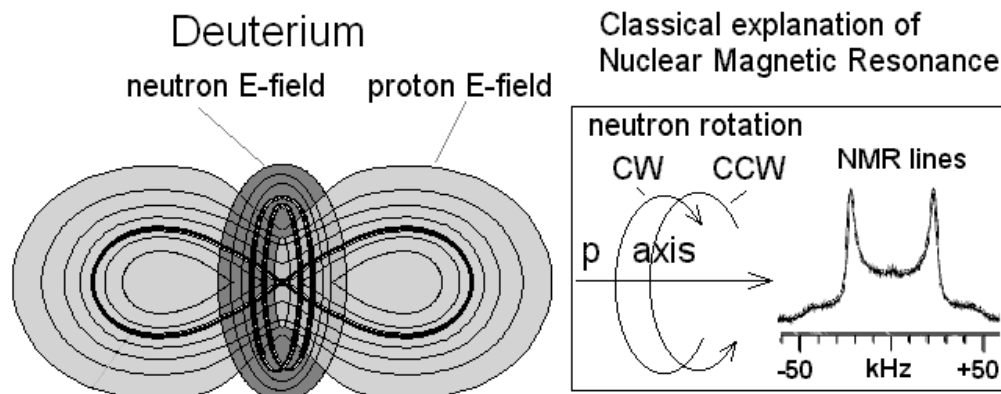## Explanation of Rydberg state and Rydberg matter in EM activated plasma

BSM-SG model of hydrogen

$r = n^2 a$

Bohr model of hydrogen

n = 3
n = 2
n = 1
proton

a.

Hydrogen normal state

no driving momentum in H field
0.67 Å
proton   electron orbit

b.

ion-electron pair beyond Rydberg state

driving momentum in H field
e⁻ orbit   proton

c.

The electron trace in a Rydberg state is helical due to its anomalous magnetic moment. This provides a a constant driving momentum, while the spin flipping assures oscillations in a small space.

Cluster of ion-electron pairs (Rydberg matter)

≥ 0.15 nm

N   S N   S N   S N   S N   S

e⁻ orbit of the ion-electron pair

p

a_0

p trajectory   e⁻ trajectory   magnetic lines

• Rydberg atoms form clusters (Rydberg matter) having a compound magnetic moment. It may interact with the magnetic moment of a heavier nucleus that it is in a proper spin state.

• Rydberg matter is created by electrical arc, and also by gamma or negative beta radiation.

Classical definition of the nuclear spin

Deuterium

neutron E-field   proton E-field

Classical explanation of Nuclear Magnetic Resonance

neutron rotation

CW   CCW   NMR lines

p axis

-50   kHz   +50

The rotating neutron over proton creates a magnetic field which is referenced to the magnetic field of rotating proton

The magnetic moment from the neutron's spining over the proton interacts with the magnetic moment of the orbiting electron. In atoms with more protons and neutrons, the combined magnetic moments determine more complex nuclear spin states.

Nickel

4 radial D pairs

8 radial D pairs
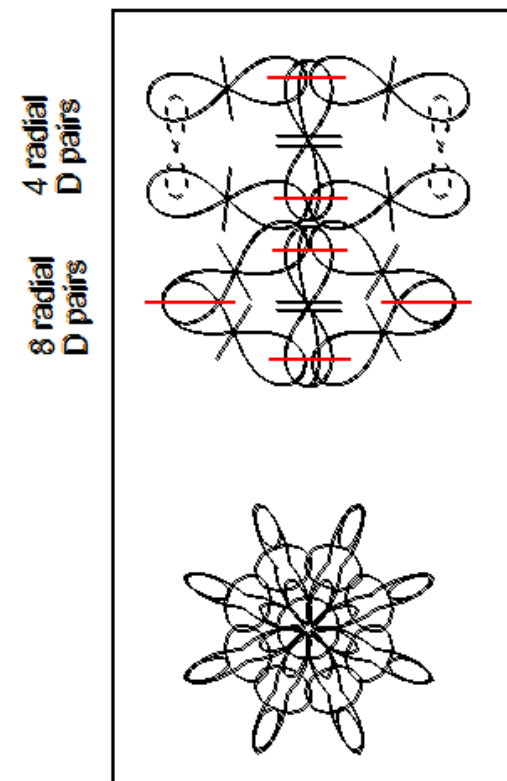
Legend

—— orbital planes of internal shell electrons

—— neutron

Nuclear fusion in plasma involving the Rydberg state of hydrogen

Legend: —— Orbital planes of internal shell electrones
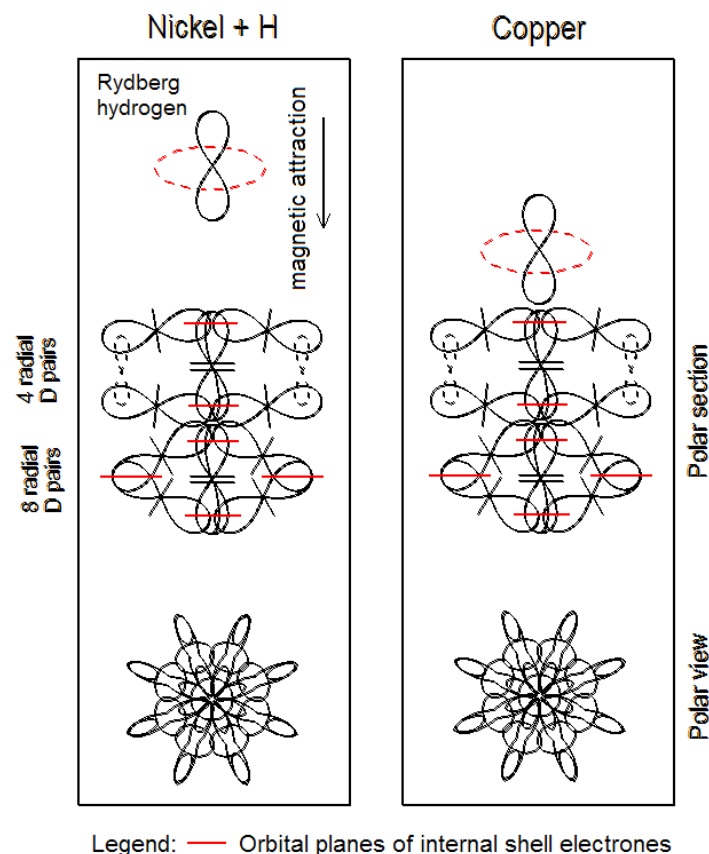
This graphical modeling illustrates the proton capture experiment reported by Focardi and Rossi for the reactions:

$$^{62}Ni + p \rightarrow {}^{63}Cu + 5.6\,MeV$$

$$^{64}Ni + p \rightarrow {}^{65}Cu + 6.9\,MeV$$

S. Focardi and A. Rossi, A new energy source from nuclear fusion, 2010.

Two effective mechanisms for producing of a Rydberg matter of hydrogen (or deuterium) are known:

(1)   electromagnetic - by plasma discharge or microwave radiation,

(2)   by beta or gamma radiation.

Conclusion: The magnetic field of the Rydberg hydrogen (or deuteron) interact constructively with the internal shell electrons of Ni nuclei that are in a proper spin state. This provides a proper hydrogen alignment with the Ni nucleus and momentum for overcoming of the Coulomb barrier.

Detailed analysis of (Ni + H) LENR: http://gsjournal.net/Science-Journals/Essays/View/5281

Derivation an important parameter of the Supergravitational law

$$F_{SG} = G_{SG} \frac{m_{01}m_{02}}{r^3}$$
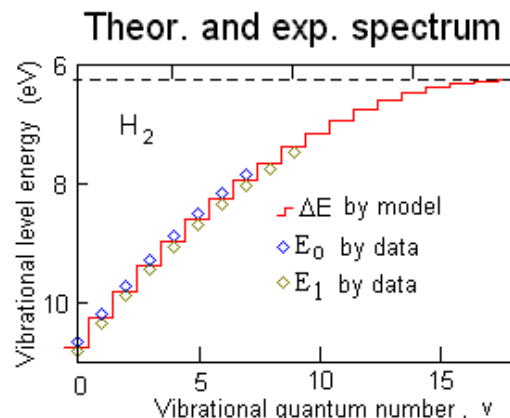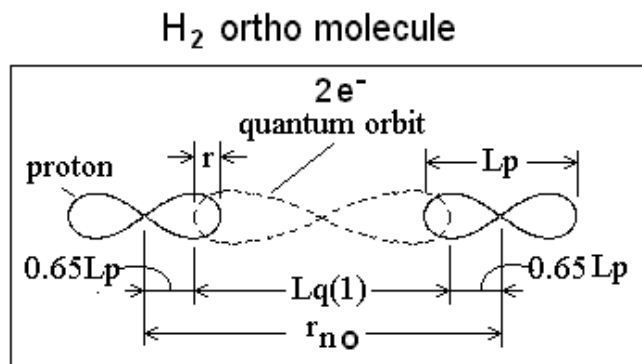
From theoretical model of H_2 spectrum the intrinsic constant product of the nuclear force and SG masses of proton (neutron) is found as **$C_{SG} = G_{SG}m_o^2 = 5.2651 \times 10^{-33}$ [Nm³]** (§9.7 of BSM-SG) Using this constant, the binding energy between proton and deuteron estimated by simplified approximate method is: 2.158 (MeV).The experimental value is: 2.2246 (MeV).

Conclusions:

1. The SG law is behind the binding force in the atomic nuclei and some Wander Wallss forces in molecules

2. The SG field in atomic nucleus is in balance with the total charge of protons and kinetic energies of all electrons including the magnetic moment energies

3. The conclusion 3 plays an important role for nuclear stability

Graphical modeling and analysis of simple molecules (2D images are shown)
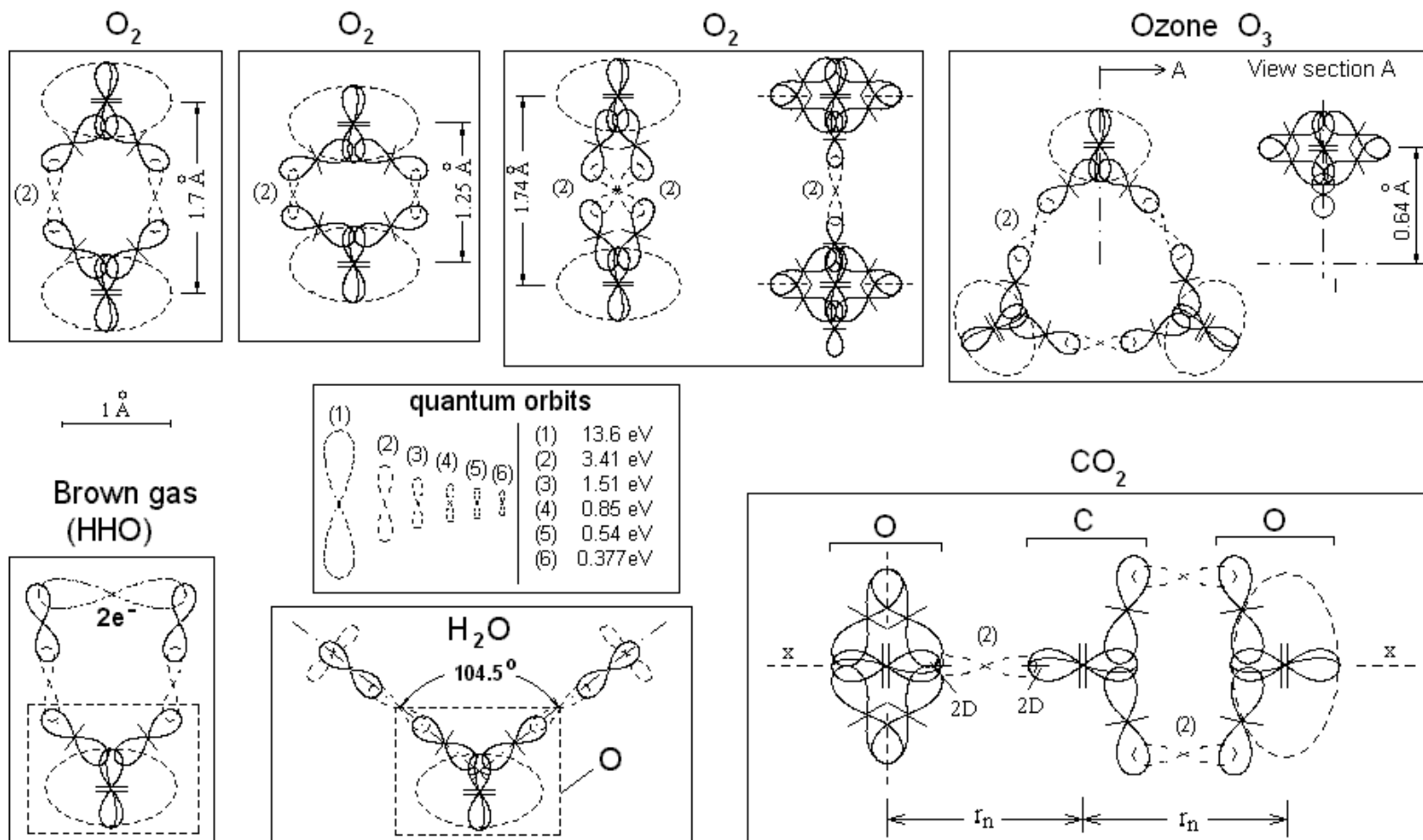
Understanding angular bond restrictions and why some molecules are bent and others - not
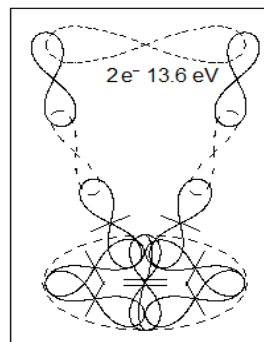
# Water molecule in a normal and a Brown's gas (HHO) state

quantum orbits

1 - 13.6 eV
2 - 3.41 eV
3 - 1.51 eV
4 - 0.85 eV
5 - 0.544 eV
6 - 0.377 eV

H2O water molecule

1 e⁻ 3.41 eV   1 e⁻ 3.41 eV

104.45 deg

HHO Brawn gas molecule

2e⁻ 13.6 eV
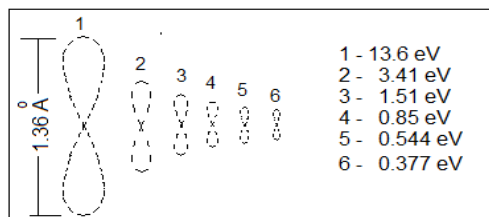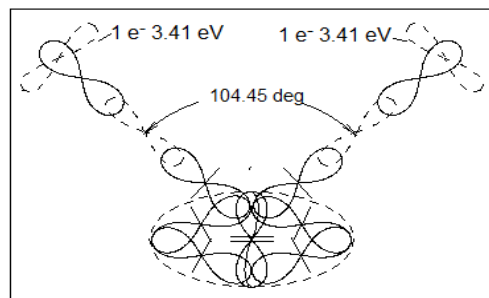
It is known that the angle between the two hydrogen atoms in the water molecule can vary within certain limits. In the HNO state (Brown's gas) the angle between the two protons is smaller, so much so that the 2 electrons with quantum orbits 2 (total energy 2 x 3.41 eV) are transferred to a common quantum orbit by 13.6 eV each (total energy 2 x 13.6 eV). As a result, the energy difference between a normal H2O and HHO molecule becomes: (2 x 13.6 eV) – (2 x 3.41 eV) = 20.38 eV Therefore, each Brownian gas molecule has a hidden energy of 20.38 eV, which is at the quantum level and does not lead to an increase in temperature at the same gas pressure. This is a potential energy storage capability predicted by the atomic models of the BSM-SG theory. (Link to Referred Article)

Graphical modeling of organic and biomolecules
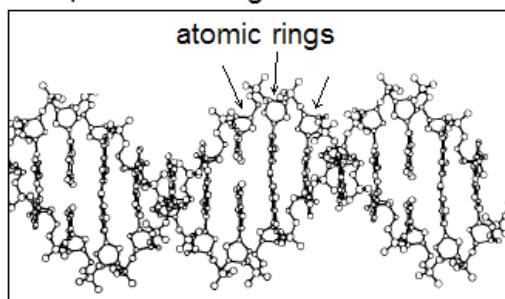

Aspirin molecule
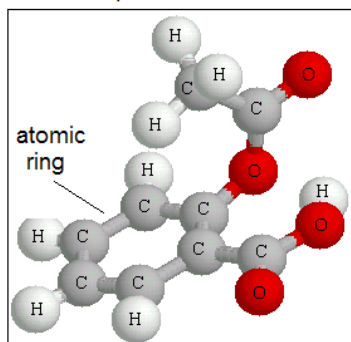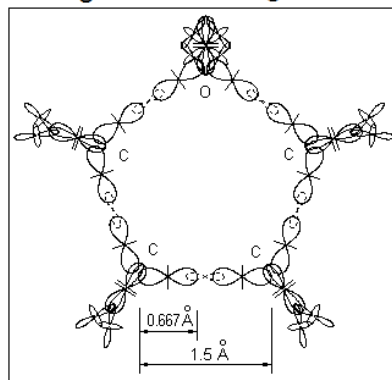

Aspirin by BSM-SG models

→
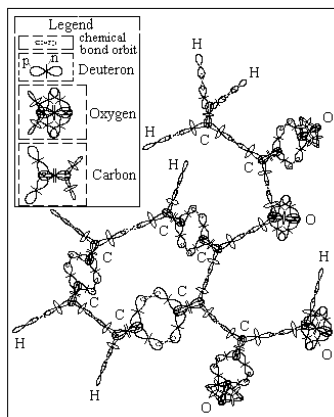
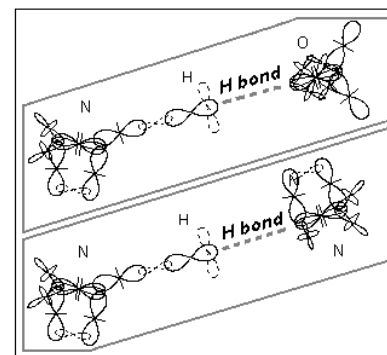Understanding the energy storage mechanism in some atomic ring molecules

Multiple atomic rings in DNA molecule

Single atomic ring in DNA

Two types of H-bonds in DNA (H-O and H-N)

A hypothesis about Levinthol's paradox, C-value paradox and decoding mechanism behind 20 flavours of the complex aminoacyle-tRNA synthetases was recently published in the article "A new Method for Analysis of Biomolecules Using BSM-SG Atomic Models", Journal of Biometrics and Biostatistics, 2017, 8:2,   DOI: 10.4172/2155-6180.1000339

Potential application of the BSM-SG atomic models.

• BSM-SG theory provides atomic models with 3D geometry and dimensions.

• BSM-SG models permits classical explanations of the boundary size of excited states, nuclear spin, angular restriction of chemical bonds and mutual magnetic interactions between quantum orbits.

• The Atlas of Atomic Nuclear Structures (ANS) provides BSM-SG models for the elements in the range 1<Z<103, using symbolic shapes for protons and neutrons. The derived models match perfectly to the rows and columns of the Periodic table.

• **BSM-SG models could be used in chemistry, nanotechnology and LENR as a 3D graphical modeling with a sub-angstrom resolution.**

www.helical-structures.org

BSM-SG Periodic Table online

PERIODIC TABLE OF ATOMIC NUCLEAR STRUCTURES WITH BSM-SG MODELS

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