

Contents

Chapter 1: Introduction

What is the purpose of this book and to whom it is addressed?	1-2
What useful could be learned from ancient time philosophers	1-5
Modified versions of the Platonic solids	1-8
Connection between one of the platonic solids and the fine structure constant	1-12
Relation between the Golden ratio and the fine structure constant	1-13

Chapter 2: How one alternative concept about space (physical vacuum) leads to a different vision about the Universe

1. Introduction	2-1
2. Concept of the Basic Structures of Matter (BSM) thesis	2-3
3. Length and time scales from micro to macro Cosmos (Figures 1 & 2)	2-6
Difference between the present and the new vision about the Universe (Fig.3)	2-7

Chapter 3.: Brief introduction to the Basic Structures of Matter theory and the derived atomic structures

1. The concept of the vacuum space as a key issue for building of unified field theory	3-1
2. The new point of view of the BSM theory	3-3
3. Quantum loops and possible orbits for electron with an optimal confined velocity. Embedded signature of the fine structure constant	3-11
3.1 Quantum motion of the electron in closed loop trajectories	3-11
3.2. Quantum orbits. Photon emission and absorption	3-13
3.3. Orbital motion electron Lifetime (excited state lifetime)	3-14
4. External shape and geometry of the proton and neutron	3-15
5. Atlas of Atomic Nuclear Structures	3-17
5.1. Physical atomic models according to BSM concept	3-17
5.2. Three-dimensional structure of the atomic nuclei and limited angular freedom of valence protons	3-17
6. Electronic bonds between atoms in molecules	3-19
7. Vibrational motion of atoms connected in a molecule by electronic bonds	3-19
8. Method for determination the possible configurations of some diatomic molecules	3-22
9. Examples of possible configurations of some molecules	3-22
10. Rotational component in vibrational rotational spectra of molecules	3-23
11. Structural and angular restrictions of electronic type chemical bonds	3-24
11.1. Restrictions from atomic nuclear configuration	3-24
11.2. Restrictions imposed by nuclear configurations of the involved atoms	3-24
12. Validation of BSM atomic model structural features by organic and biomolecules with known structure and atomic composition	3-25
12.1. General considerations	3-25
12.2. Ring atomic structures in organic molecules	3-26
12.3 Some abundant atomic structures in biomolecules	3-27
12.4 Weak hydrogen bonds	3-27

13. BSM atomic models and nanotechnology	3-28
Conclusions	3-28
References	3-29

Chapter 4: Zero Point Energy of the Space (physical vacuum)

1. Zero point energy of CL space and its relation to the Cosmic Background Radiation	4-1
2. Derivation of expressions about the CL space background temperature	4-1
3. CL space background temperature expressed by the parameters of CL space	4-4
4. Considerations for breakdown of the equivalence principle at internode range distance	4-4

Chapter 5: Stationary Universe and Galactic Cycle. Envisioned processes of matter evolution beyond the Big Bang (Extraction from BSM theory)

12.A.1. Introduction	5-1
12.A.2. Weak points of the Big Bang concept	5-1
12.A.3. Introduction into the BSM concept about the Universe.	5-3
12.A.4. Low level structural organization of the intrinsic matter	5-3
12.A.4.3 Intrinsic Gravitation and mass-energy balance of the primordial matter	5-9
12.A.4.4. Relation between the the dynamical properties of the lower level structures and some parameters of CL space	5-12
12.A.5. Formation of upper order congregations in the surface region of the bulk matter.	5-13
12.A.5.1. Energy balance between structures of same type but different congregational order	5-13
12.A.5.2. Frequency dependence of the IGRM and IGSPM vectors on the type and congregational order of the structure	5-14
12.A.5.3. Hypothesis of embedded embedded fine structure constant in a lower level structures of matter organization	5-15
12.A.6. Intrinsic Gravitational Constant	5-18
12.A.7. Weak dependence of IGRM period from the congregational order	5-15
12.A.8. Processes of primordial bulk matter of two substances leading to eruption	5-22
12.A.9. Prisms formation	5-25
12.A.10. Summary about important structural features and processes at the lower level of matter organization	5-27
12.A.11. Protogalactic egg and phases of its internal evolution	5-27
12.A.11.1. Preincubation period	5-27
12.A.11.2. Phase of rectangular lattice	5-28
12.A.11.3 Phase of crystallization	5-29
12.A.11.4. Crystallization inside the internal spaces	5-30
12.A.11.5. Cluster refurbishing	5-32
12.A.11.6. Explosion phase of the protogalactic egg.	5-33
12.B. BSM concept of stationary universe	5-35
12.B.1 Recycling and incubation phases	5-36
12.B.2. Galaxy collapse subphase	5-36
12.B.3. Preservation of the information about the prism's matter quantity and handedness	5-37
12.B.4 Variation of diameter to length ratio parameter for prisms from different galaxies	

and galactic recycles	5-38
12.B.4.1 Condition for interconnection between CL spaces from different galaxies and galactic recycles	5-38
12.B.4.2 Cosmological red shift	5-38
12.B.4.2.1 How the difference of the diameter to length ratio for prisms of different formations may affect the fundamental CL space parameters	5-38
12.B.5. Phenomena indicating a death (collapse) or a birth of a galaxy in the Universe	5-46
12.B.5.1 GRB without optical counterpart	5-47
12.B.5.2 GRB with optical counterpart	5-48
12.B.5.3 Phase of CL space formation . Hypothesis of transition type of CL space	5-50
12.B.5.4 The observable Universe as a conglomeration of galaxies with interconnected CL spaces	5-54
12.B.5.5 Galactic nucleus during the phase of recycling and incubation	5-54
12.B.6 Active galactic life	5-56
12.B.6.1 Some features of evolution after the explosion of the protogalactic egg	5-56
12.B.6.1.1. Interaction of the galactic nucleus with the visible matter of the host galaxy during the active life of the galaxy	5-67
12.B.6.1.2 Kinetic energy storage mechanism of the galactic nucleus	5-59
12.B.6.2. Galaxy rotational problem	5-60
12.B.6.3 Some features of the processes of star formation and their evolution	5-62
12.B.6.3.1 Main sequence and particular points	5-62
12.B.6.3.2 Physical process related to the zone of instability in H-R diagram, according to BSM	5-63
Appendix. Helical Structures	5-67

Chapter 6: Applications Emerging from the New Understanding about Space and Matter

New vision about a controllable fusion reaction D+D->He with efficient energy yield	6-3
Modeling and analysis in nanotechnology using the structural models of atoms according to the Basic Structures of Matter theory	6-7

Application of BSM atomic models for theoretical analysis of biomolecules:

Hypotheses: 1. Energy storage mechanism in proteins; 2. DNA involvement in the cell cycle synchronization; 3. Decoding process in some of the complexes aminoacyle-tRNA synthetases -tRNA.

6-17

BSM chapters overview	7-1
Author's publications related to the BSM theory	7-13
Contents of BSM on CD ROM (second electronic edition)	C-1
Appendix: Atlas of Atomic Nuclear Structures and Structure of Elementary Particles	
Appendix: Derived equations and calculated physical parameters	