PHENOMENA OF DISCRETNESS, COMMENSURABILITY, QUANTIZATION IN WAVE UNIVERSE AND MEGALITHIC ASTRONOMY

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Toth disposed for Measure,
Number and Order were in the Universe

ABSTRACT

Representations about dynamic structure of surrounding World, a theme, that traditionally is considered by cosmology is the theme, where the Present face to face meets with the Past.

And, according to many data, which the archaeoastronomy, including the megalithic astronomy, brings to us, the priority in effectiveness of idea, at least, in some aspects not always belongs to the modern standard cosmology, that uses by all advantages of technotronic,computer age.

Force of idea not always directly depends from achieved (general) national product, or from power and novelty of computing devices. That, may be seems as unexpected, conclusion may be seriously argumented in the light of alternative representations of the Wave Universe concept [Chechelnitsky, 1980-1998].

Such feelings investigators, possibly, experience for a long time, but only now this conclusion will not seems as Ad hoc attract (adapt) to any weekness, if we shall take into consideration, in particular, important aspects of the wave (megawave) structure of the Solar system.

In this connection it is relevant to recall the ancient nondied (but till now succesfully ignored by standard science) tradition of the Harmonices Mundi.

The alternative purposeful investigation of real existing astronomical systems in framework of the Wave Universe concept (see monograph - Chechelnitsky A.M. Extremum, Stability, Resonance in Astrodynamics and Cosmonautics, Mashinostrojenie, 1980, 312 pp., (1988) and consequent publications) discovers the astonishing world of new earlier unknown appearances, phenomena, effects.

That is, first of all, (in connection with investigations of the closest and well observed object - the Solar System) reality of its wave (megawave) structure of quantization "in the Large" of its dynamical parameters, the order harmony of its natural rhythms, etc.

Generality and universality of those striking phenomena are verified also by existence of similar appearances in dynamical structure that were well observed during "Voyager's" flights to the physially autonomous satellite systems of planets - Jupiter, Saturn, Uranus, Neptune (see- Chechelnitsky A.M. Doklady AN SSSR, v.303, N5, pp.1082-1088, 1988; Reports to World Space Congress, Washington DC, 1992; Reports to COSPAR Congress, Hamburg, 1994, Birmingham, 1996, etc.)

In the knowledge system of Wave (Megawave) Universe the answers may be obtained to numerous questions and problems which really exist, but even do not arise in the frames of standard knowledge system.

* Where is the latent sence of observed megaquantum effects (quantization "in the Large") in the structure of real astronomical systems?

* What is the genesis of the everywhere observed Nature and Cosmos rhythms?

* Does the (postulated by standard knowledge) unsurmountable barrier between structures of micro- and megaworld elementary objects actually exists?

* Etc,...

In accordance with the Wave Universe concept and megawave astrodynamics it is shown that the genesis of well-known in astrogeophysics and Global Change observational rhythms, its commensurability, "symphony" is determined by the wave structure of the Solar System and by existence of large length and great period waves in the cosmic plasma.

The discovered in space observations, experiments and interpreted in Wave Universe concept set of new phenomena in the structure of really existing gravitationally coupled systems indicates the origin of the new "hot point" of science.

It possesses by the extreme heuristic potential and is open to new observations, experiments, theoretical generalizations.

The attentive consideration of inheritance of past, in particular, of megalithic astronomy indicates some properties, which in terms of achieved comprehension may be qualificated as the manifestation of discreteness, comensurability, quantization of symptomatic properties of wave dynamic system (WDS).

In connection with that, some questions can arise:

* What the manifestation of such properties in archaeoastronomical monuments means, about what the evident comlexity of megalithic geometry says?

* To what extent the demonstration of its in ancient monuments is purposeful; is the choice of characteristic discrete modula, sizes, quanta, which its creators used, accidental or regular?

* How much significant, validity are the modula of discreteness, discovered by some investigators (Thom, Broadbent, Kendall, etc)

* Why using modula, evidently, have unity and universality, applicability to various far extended monuments ?

* In what degree deap the megalithic creators of monuments possessed the comprehension of fundamental dynamic properties of the Solar system? By what it was based, what is the theoretical foundation of such understanding ?

And, in connection with it, the one of central questions arizes:

* What indeed the giant monuments of ancient World (henges, temples, piramids, etc) mean, for what its were constructed, what aims its creators pursued? To whom and what they demonstrated?

By what these qiant efforts were stimulated, what ancients fear, what they hope ?

Analysis of many of astronomically important ancient monuments, in particular, of such complex as skilfully builded egg - shape in plane Woodhenge, from point of view of Wave Universe concept, offers the possibility to approach to the comprehension - what aims creators of these monuments pursued and what its can "say" to us about

representations, by which constructors, astronomers, priests were guided thousands years ago.

The logic of investigation in cosmology, search of truth in the comrehension of World, probably, invariant concerning of actually experiencing time.

That logic and achieved modern results, evidently, can ptompt the direction of following investigations in archaeoastronomy.

All this can lead to more adequate, more deap understanding of inheritance, which the great predecessors left to contemporary.

And it can be happen, that paying steady attention to ancient temples and myths, carring out the objective analysis, based on advanced modern researches, we shall be succeded to destroy on of more habitable and steady mythologems - representation of modern science about idea primitiveness of man and thinker of Ancient World and of Pre-History.

THE LATENT SENSE AND THE REALITIES OF MEGALITHIC ASTRONOMY

Megalithic monuments strike an imagination by its mightness, wonderful variety and, simultaneously, by some universality and global widespreadness.

Why and for what? The problems, that are connecting with sense, appointment, geography and widespreadness of megalithic monuments may be adequately comprehended, if, first of all, it will be correctly relized the *motives, dominating intentions*, by which the builders of giant constructions were guidanced.

What were the problems, that troubled them?

On what questions they wanted to obtain answers?

What goals they persecuted?

For mobilization of so extraordinary, giant human, intellectual, technological resources millenium ago the unusual, extraordinary motives were needed - similar to sizes of these megalithic monuments. Hardly it may be common considerations of phylosophical, conceptual or calm religion plane.

With the most probability it may be motives, that touched questions *of life and death*, of survive in unusual, extraordinary circumstances of Nature and Cosmos. Without fails, it were the times, when sad experience of mighty natural catastrophes was particularly strainly felt and yet was not forgotten.

This horrible and sad challenge was accepted, first of all, by the most advanced part of society (by priests, initiates, etc.), and intellectual, human, technological possibilities of socium were directed if not for prevention, then, at least, for comprehention, forecasting, essential decreasing of catastrophes damages.

It was begun or prolonged with particular intensiveness the hunting for effective predictors, for harbingers, who can give a signal about times of Great Changes and with the most probability - about Great, Extreme Catastrophes.

As ancients said: "Don't give God to you to live at times of Great Changes!"

Megalithic Observatory - as Tools of Perception, Foreseeing, Prediction.

Our answer at the central question briefly looks as follow

Proposition.

Megalithic monuments, that are human buildings, are the manmade tools directed on study, perception, *prediction of Future* - first of all - of *extreme catastrophes*.

Effective decision of so grand problems (that remain nonsolving and actual for our days) is possible in that case, if these megalithic monuments represent *astronomical observatories* for investigation of motion of celestial bodies - of long - periodical and of the most informative predictors.

Megalithes - for Moon?
Megalithic Monuments - Lunar Observatories?

In the archaeoastronomy it is a common place the next representation (Wood, 1981, p.25, p.12):

"... Considering the directions, that were been based in Stonehendge, and making conclusion, that it was Solar and Lunar observatory, Hawkins introduce the suggestion, that it was, in particular, *a computer for lunar eclipses* prediction...".

"... Now it is considering, that the most of these monuments for neolitic and early bronze age peoples were the places, where they created a new geometry, kept systematical observations of Sun and Moon and developed complex methods of *lunar eclipses predictions*."

Such constatantions of modern archaeoastronomy are representing, at least, as *insufficient* in the light of new representations of our times.

There are many arguments for this conclusion. We point out only some of them.

It is nessesary to know very nonecritically the ancient history, the evidences of ancient observators, the narrative sources data, or to ignorate purposely its to consider, that, for instance, the character of Lunar movement on it's orbit (in particular, the Lunar synodical period) *as constant* and according to now observating period ($T=29.53^{d}$).

Only self-confidence of clear theoretics - specialists in celestial mechanics - that is fed by faith in *absolute stability* of the Solar System (and of obediently following them historians - amateurs of astronomy) can support such none-hestitating belief in stability and invariancy of now observating parameters of celestial bodies movement.

Really: "The mathematical theories are truth unless its don't refer on reality".

Megaliths - for Sun, Planets, Moon.

Megalithic Monuments - Observatories of the Solar System (Sun and Planets).

As a matter of fact, we suppose, the following system of representatios about of sense and status of megalithic monuments is justify.

Proposition.

Megalithic monuments (observatories), in all case, - in early epoch of its raising, generally speaking, were not Lunar observatories, or, more cautionly, were *not only Lunar* observatories.

From the very begining its were designed as *observatories of the Solar System* (of Sun, Planets, Comets, Moon), i.e. for observation of celestial bodies, it's mutual configurations on stars (and relatively Milky Way) background.

Its intented for continous following at considerable configurations of Sun, Planets, etc on Sky, i.e at *predictors* of menacing spontaneous catastrophes on Earth.

QUANTS OF NATURE AND COSMOS.

WAVE UNIVERSE. WAVE ASTRODYNAMICS

The principle possibility of dynamical synthesis of the classical celestial mechanics and astrophysics continual aspects, follows from the *Wave Universe conception* and wave conception of the astrodynamics - the *megaquantum wave astrodynamics* (Chechelnitsky, 1980 -1997) (see Fig.1).

Megawaves. One of the basic ideas of the Wave Universe conception is the assertion of the existence of some waves in any megasystem (astronomical system) of Universe, in particular, in the Solar system. These waves actual realise short-range interactions in the scale, compared with scale of the system.

The Suggestion. Let us study the Solar system, - as the *wave dynamic system* of megaworld. There are *megawaves* (large astronomical scale waves with large lengths and periods), which induce, propagate, and absorbed due to the cosmic medium. These megawaves are responsible for the dynamic structure (and geometry) of the Solar system (the *co - dimension principle* (Chechelnitsky, 1980).

Micro-Mega Analogy.

When quantum mechanics was developing, the main role in the comprehension of the microobject dynamic structure belonged to the analogy of the structure between the atom and planetary system.

Apparently, the time has come to return debts. And at present this dynamic analogy works vise versa: now astronomical (in particular, planetary) systems are studied in analogy - with atom systems (Fig.2).

Besides the investigation of *fundamental wave equations* (Chechelnitsky, 1980, 1986), some quantitive representations on megawaves properties (if these waves are considered as some analog of the De Broglie waves for megaworld astronomical systems) can be received, in particular, from the following relations of the megaquantum wave astrodynamics:

$$v = d^{-} \cdot K, \qquad E = d^{-} \cdot \Omega, \qquad \Delta x \cdot \Delta v \geq (1/2) d^{-}$$

Here K - wave number, Ω - circular frequency, E - normalized (divided by m -mass) energy of megawaves ($E = E/m = (1/2)v^2$), $d^{-} = d/2\pi$ - fundamental constant of normalized action (sectorial velocity, circulation) with the dimension [$cm^2 \cdot s^{-1}$].

The quantization constant $d^{-} = d/2\pi$ in the microworld for the atom is determined by Planck's constant $h^{-} = h/2\pi$ and electron mass m_e

$$d^{-} \sim h^{-}/m_e = 1.158 \ cm^2 \cdot s^{-1}$$

The mentioned relations above represent the megaquantum analogs of the Bohr, Planck-Einstein, Heisenberg relations well-known in the microworld quantum mechanics, accordingly. It should be emphasized that, at least, in the frame of the wave astrodynamics, the formal analog of Heisenberg incertainty relation ($\Delta x \cdot \Delta v \geq (1/2) d^{-}$ - *difractional* incertainty relation) does not have such a wide prohibitive sense, as in the Copenhagen interpretation

of microworld quantum mechanics (Born, 1963, Jammer, 1985).

Megaquantum World of the Solar System Distance Quantization.

Radial Quantization. The high-precision information on the geometry (in particular, on semi-major axes) of planetary orbits, gives the possibility to receive some single-valued, intriguing facts. They were found in the 70-ies using the quantum of (linear size) distance $a_* = a_*^{[1]} = 8R$ (R - radius of Sun) and caused the astonishment surprise showing a great set of *integer* numbers, which characterized the dynamical structure and geometry of the Solar system (Fig.3).

It concerns differences of $\Delta a^\wedge$ - normalized (divided by a_*) planetary distances $a^\wedge = a/a_*$ for orbits a_i, a_j

$$\Delta a^\wedge_{i,j} = a^\wedge_i - a^\wedge_j, \qquad (i, j = 1,2,3....),$$

as however. in many cases, and on the normalized distances $a^\wedge_i = a_i / a_*$ themselves.

The integerality phenomenon

$$\Delta a^\wedge = \text{Integer [Semi-Integer]},$$

as and the

$$a^\wedge = \text{Integer [Semi-integer]},$$

has a deep physical basis. Such a nonaccidental abundance of integer (semi-integer) numbers (in the absence of anything ad hoc fitting parameters) shows the conceal, early unknown, but really existing phenomenon of the Solar system *wegawave* structure (Chechelnitsky, 1984; 1992 b,c, Table 1).

Azimuthal Quantization. The effects of *quantization "in the Large" - the megaquantum effects*, are not less interesting. They were discovered for $P_i = 2\pi a_i$ perimeters of planetary orbits, normalized by a_* quantun, i.e. for

$$P^\wedge_i = P_i / a_* = 2\pi a_i / a_* = 2\pi a_i ,$$

$$\Delta P^\wedge_{i,j} = P^\wedge_i - P^\wedge_j$$

Azimuthal Quantization $P^\wedge$, $\Delta P^\wedge = \text{Integer [Semi-Integer]}$

is a very characteristic pattern of the physically distinguished orbits and it occurs rather often (Chechelnitsky, 1992 b,c, Table 1).

Sectorial Velocity Quantization. In this case we speak about the observed effect of the discreteness - the quantization of the dynamical value $L = (K \cdot a)^{1/2} = L_{N=1} \cdot N$ of the sectorial velocity, normalized by $L_{N=1} = L_*/(2\pi)^{1/2}$, where $L_* = (K \cdot a_*)^{1/2}$.

Taking into account the interpretation of N quantum number, as $N = L/L_{N=1}$, we can talk about integer (semiinteger) ability of the N quantum number.

For planetary orbits of Mercury (ME), Venus (V), Earch (E), Mars (MA), we have, in particular, $N = (2\pi a/a_*)^{1/2}$

$$N = 7.911;\ 11.050;\ 12.99;\ 15.969, \text{ close to } \textit{integer}$$

$$N = 8;\ 11;\ 13;\ 16, \text{ accordingly (Fig.3).}$$

At the definite conceptual supposition this effect may be connected with the well-known quantization effect of kinetical momentum ($K^{(m)} = mva$, where m - mass) or action.

In this aspect, it has been known since the times Planck, Einstein, Bohr, De Broglie. Although, we should stress, that in the quantum mechanics (of microworld) the quantization namely of the kinetical momentum $K^{(m)} = mva$ was always discussed, but not of the *sectorial velocity (or circulation)* $L = K^{(m)}/m = va$.

Since Kepler's times (his second law) the notion and dynamical value of the *sectorial velocity* has taken the importance place in the astrodynamics, in space sciences.

Wave Structure. Stability. Quantization.

What does this set of integer numbers, its abudance, and variety mean? What is the reason of these effects of quantization "in the Large" - megaquantum effects in the Solar system being observed? What (or Who?) makes one measure these gain astronomical distances with such a surprising regularity and certainty in space, where any road markings are absent? God, Extra-Terrestrial Mind. Nature? We don't doubt that it is made by the Nature itself - due to its own immanent laws and general mechanisms.

That is - in many respects - the Wave astrodynamics laws, *including* interference mechanisms.

But in this case we again discover the nonlimited essential, creating presence of *medium* and its most important physical atributes, and first of all, - the *propagation velocity*

of small perturbances, the sound velocity of cosmic plasma.

The Stability of the wave configurations, including the distinguished elite orbits, evidently is connected with the existence of *state waves - megawaves*, that are representing *superposition, interference of running (travelling)* megawaves in the cosmic plasma.

Medium (Cosmic Plasma). Interference. State Waves. Stability. Quantisation.

Such is the conceptual, genetic consequence of factors and notions, and it reflects deep sense of physical processes forming the observed geometry and dynamics of WDS, including the wave structure of the Solar system.

But not the opposite, when at first a certain noncausal quantization is postulated. Beforehand we must not find any metaphysical, "philosophical" sense in the notion the quantization.

In this case, the quantization in general (as megaquantum effects, in particular) - that is some property (pattern) of stability, the way the wave configurations exist in the WDS for a long time.

In such case, in the astrodynamics commensurability and resonance effects, widely observed in celestial body motion - that is not only the fact of the classical celestial mechanics, which trouble and prevents the theorists to make their manipulations with the expanding series.

This is reflection of the quantization "in the Large" effects, of the megaquantum effects - the consequence *of stability of the wave configurations* and wave processes that take place in the large astronomical system.

Wave and Shell Hierarchy of Astronomical System.

Arbitrary astronomical systems of the Universe being considered as the wave dynamic systems (WDS) possesses the structure very much resembling the *shell structure* of the Solar-planetary system (Chechelnitsky, 1985, 1986 a) Well-known satellite systems are not an exception in such sense. The astronomical system (as WDS) is characterized by hierarchy of enclosed, spatially and structurally (radially) separated regions $G^{[s]}$ shells (s=...,-2,-1,0,1,2....). Similarly, some space separated shells may he distinctly identified in the Solar-planetary system - $G^{[0]}$ - Intra-Mercurian, $G^{[1]}$ - occupied by the I(Earth) planetary group, $G^{[2]}$ - occupied by the II (Jupeiter) planetary group, $G^{[3]}$ - Trans-Pluto shell.

Sound Velocities Hierarchy. The hierarchy of the $C_*^{[s]}$ *sound velocities* - phase velocities of the (multi component cosmic medium) cosmic plasma small perturbations *(megawaves)* (Chechelnitsky, 1985, 1986 a) is closely connected with the hierarchy of $G^{[s]}$ shells

$$C_*^{[s]} = (1/\chi^{s-1})\cdot C_*^{[1]}, \qquad (s=....,-2,-1,-1,0,1,2....).$$

Here $C_*^{[1]} = 154.3864\ km\cdot s^{-1}$ is the calculated value of sound velocity in the $G^{[1]}$ shell, that was made valid by observation, and $\chi \cong 3.66(6)$ - is the *fundamental parameter of hierarchy* (Chechelnitsky, 1980-1986).

Dynamic Parameters - Sectorial Quantization. The linear dependence between the L sectorial velocity and (quantum) N number is related to other dynamical parameters.

Let's give some of them - relations of the first (the main) approximation:

* Orbital velocities

$$v^{[s]} = C_*^{[s]}(2\pi)^{1/2}/N$$

* Semi-major axes

$$a_N^{[s]} = a_*^{[s]}\cdot N^2/(2\pi). \qquad a_*^{[s]} = K/(C_*^{[s]})^2, \quad K = GM \ \ (M - mass\ of\ WDS).$$

That is an analog of Bohr square law for atomic orbits semi-major axes (Born, 1963).

Sectorial velocities

$$L^{[s]} = L_*^{[s]}N/(2\pi)^{1/2}, \quad L_*^{[s]} = (K\cdot a_*^{[s]})^{1/2}, \quad L_{N=1}^{[s]} = L_*^{[s]}/(2\pi)^{1/2}$$

Elite Orbits. Week and Strong (Dominant) Orbit.

Elite states (orbits, levels) - that are preferable, physically distinguished states, that are characterized by high stability, more times long age of existence.

Characteristic properties, physical - mathematical patterns of elite orbits are properties of discrete quantization of:

* Sectorial velocities (circulations)

$$L = v.a = (K\cdot a)^{1/2}$$

* Distances (space coordinates): Radial (a), Azimuthal ($P=2\pi a$)

Observing physycal-mathematical effects of the quantization (discret, integer), both

separatly and in totality, defined the measure of stability, depth of potential well, existence time of physically distinguished, elite states (orbits, levels).

Dominant orbits - that are *most strong*, most potential wells, states of wave dynamic system. Observing orbits of planets in the Solar system - dominant states from that set.

Dominant orbits have values (not obligatory exactly integer, semi-integer), that lay in some neighbourhood (the attractive region) of the planetary (dominant) values

N = 8; 11; 13(15.5); 16; (19.5); 21.5; (22.5),

as it follows from the Solar system observating data (Chechelnitsky, 1986).

FUNDAMENTAL PARAMETER OF HIERARCHY.

At 70-th in investigation of wave structure of Solar system (Chechelnitsky, 1980) it have been diascovered significent arguments for existance of *shell structure, hierarchy and similarity - dynamical isomorphysm* - of Solar system shells.

First of all, that concerned to dynamical isomorphysm of clearly observed $G^{[1]}$ and $G^{[2]}$ shells connecting respectively with I (Earth's) and II (Jovian) groups of planets.

It was determined that arrangement of physically distinguished - *elite* (particularly powerful, strong-*dominant*) orbits of Mercury in $G^{[1]}$ (and Jupiter in $G^{[2]}$), Venus in $G^{[1]}$ (and Saturn in $G^{[2]}$) shells brightly underline the similarity of geometry and dynamics of processes, lowing in these shells, with accuracy up to the some scale factor.

The quantitative characteristics of that izomorphysm, the recalculation coefficient χ - *Fundamental parameter of hierarchy (FPH)* - may be used the ratio, for instance, of

(Keplerian) orbital velocities v

$v_{ME}/v_J=47.8721\ km\cdot s^{-1}/13.0581\ km\cdot s^{-1}=3.66608 = \chi$

$v_V/v_{SA}=35.0206\ km\cdot s^{-1}/9.6519\ km\cdot s^{-1}=3.62836 = \chi$

Sectorial velocities L

$L_J/L_{ME}=1.01632\cdot10^{10}\ km^2\cdot s^{-1}/0.27722\cdot10^{10}\ km^2\cdot s^{-1}=3.66608 = \chi$

$L_{SA}/L_V=1.37498\cdot10^{10}\ km^2\cdot s^{-1}/0.37895\ km^2\cdot s^{-1}=3.628357= \chi$

Semi-major axes a

$a_J/a_{ME}=5.202655\ AU /0.387097\ AU = 13.440164 = (3.666082)^2= \chi^2$

$a_{SA}/a_v = 9.522688\ AU /0.723335\ AU = 13.164975 =$

$=(3.628357)^2= \chi^2$

Orbital periods T (d - days)

$T_J/T_{ME}=4334.47015\ d/87.96892\ d = 49.272744=(3.666082)^3= \chi^3$

$T_{SA}/T_V=10733.41227d / 224.70246\ d = 47.76722=(3.6283568)^3= \chi^3$

In the published at 1980 monograph (Chechelnitsky,1980) (date of manuscript acception - 11 May 1978) was analized this dynamical izomorphysm, similarity of geometry and dynamics of physically distinguished - orbits of I (Earth's) and II (Jovian) groups.

According to the content of "Heuristic Analysis" division (Chechelnitsky,1980, pp.258-263, Fig.17,18) similarity coefficient - recalculation scale coefficient of

megaquants

$$\Delta^{I} = L_{ME}/3 = 0.924 \cdot 10^{9}\ km^{2} \cdot s^{-1}$$

$$\Delta^{II} = L_{J}/3 = 3.388 \cdot 10^{9}\ km^{2} \cdot s^{-1}$$

of L - sectorial velocities (actions, circulations) of I and II groups of planets is equal

$$\Delta^{II}/\Delta^{I} = L_{J} / L_{ME} = 3.66(6) = \chi$$

It was not surprise, that transition to another shells of Solar (planetary) system (to Trans-Pluto and Intra-Mercurian shells) would be characterized with the same χ - *Fundamental parameter of hierarchy* (FPH)

$$\chi = 3,66(6).$$

Universality of FPH

Analysis of (mega)wave structure of physically autonomous satellite systems of Jupiter, Saturn, etc., indicated, that discovered χ Fundamental parameter of hierarchy (FPH) plays in its the similar essential role, as in the Solar (planetary) system, characterizing the hierarchy, recursion and izomorphysm of shells.

Thus, it takes shape the essentially *universal* character of (FPH) - its validity for the analysis of (mega)wave structure *of any WDS.*

That corresponds to representations, connected with *co-dimension principle* (Chechelnitsky,1980, p.245)

"...fundanental fact is that when we pass on to another WDS, the value of d [character value of sectorial velocity (action, circulation)] doesn't remain constant, but varies according scales of these systems. This fact is the consequence of *co-dimension principle* ..."

"Magic Number" χ=3,66(6) ("Chechelnitsky Number", FPH).
Role and Status of Fundamental Parameter of Hierarchy in Universe.

Previous after primary publications (Chechelnitsky, 1980-1985) time and new investigations to the full extent *convince* the theory expectations, in particular, connected with the $G^{[s]}$ shells hierarchy in each of such WDS, with the hierarchy of levels of matter (and WDS) in Universe, with the exceptional role of the *introduced in the theory* χ FPH (Chechelnitsky, (1978) 1980-1986).

The very brief resume of some aspects of these investigations may be formulated in frame of following short suggestion.

Proposition (Role and Status of c **FPH in Universe) (**Chechelnitsky, (1978) 1980-1986).

By the central parameter, which organizes and orders the dynamical and physycal structure, geometry, hierarchy of Universe

* "*Cosmical Staircase*" of matter levels,

* *Internal* structure each of real systems - wave dynamic systems (WDS) at *any levels* of matter, is (manifested oneself) of χ - *Fundamental Parameter Hierarchy (FPH)* - nondimensional number χ =3,66(6).

It may be expected, that investigations can to the full (extent) show, that χ - FPH, generally speeking, is presented and appeared *everywhere* - in any case, - in an extremely wide circle of dynamical relations, which reflect the geometry, dynamical structure, hierarchy of real systems of Universe.

We aren't be able now and at once appear all well-known to us relations and multiple links, in which oneself the (Chechelnitsky) χ=3.66(6) *"Magic Number"* manifests.

We hope that all this stands (become) possible in due time and with new opening opportunities for the publications and communications.

THE SOLAR SYSTEM AS WDS

Megaworld Quanta.

The Solar System, distinguished in series of other WDS by it's concrete value of the Sun gravitational parameter

$$K_{\odot} = 1.32712438 \cdot 10^{11} \text{ km}^3 \cdot \text{s}^{-2},$$

is characterized by the hierarchy of embedded $G^{[s]}$ Shells and by corresponding series of $TR_*^{[s]}$ Transspheres with semi-major axes

$$a_*^{[s]} = (\chi^2)^s \cdot a_*^{[0]} = (\chi^2)^{s-1} \cdot a_*^{[1]}, \qquad s=...-2,-1,0,1,2,...$$

$$a_*^{[1]} = 8R_{\odot}, \qquad R_{\odot} = 695997 \text{ km},$$

where χ=3.66(6) - *Fundamental parameter of hierarchy* (Chechelnitsky,1980-1997).

The set of permissible physically distinguished - *elite* (including the strong elite - *dominant*) orbits is represented in form

$$a_N^{[s]} = a_*^{[s]} \cdot (N^2/2\pi) = a_{N=1}^{[s]} \cdot N^2$$

For all that the first (N=1) elite orbits are described by the *gomological series*

$$a_{N=1}^{[s]} = a_*^{[s]}/2\pi = (\chi^2)^{s-1} \cdot a_*^{[1]}/2\pi, \qquad s=...-2,-1,0,1,2,...$$

Essentially, its are the modula of *radial* quantization.

Universal Phenomena of Discretness and Quantization.
Observed Discretness Module of Megalithic Monuments.
Megalithic yard (A. Thom Module).

According to the commentary of Wood, 1981 (p.76):

" Megalithical yard is one from the most disputing suppositions of professor A. Thom. At his account, it was very explicit unit of measurement equal 0.829 m, that has application in all Nord-West Europe at building of stone circles, rings and rows ...".

Broch yard (MacKie Module).

According to another commentary of Wood (1981, p.250):

"... By MacKie opinion, megalithic mathematics survived at North Scotland to iron age. He studied size of strengthenings which have names "broches". These momuments inherent only for Scotland... .

... He statistically analized diameters of round broches and deduced the " broch yard " with length 0.837m, that is only 1% more then megalithic yard...".

Iberian Vara.

According to A.Thom, see also MacKie, 1974 (p.170):

"... This is the '*megalithic yard'*, equal to 0.829 m (2.72 ft) and strikingly similar to the modern *Iberian vara* of between 0.843 and 0.838 m (2.766 and 2.7495 ft) (Thom, 1967, p.34)".

Etalons and Modula of Megalithic Monuments and Nature and Cosmos Quanta.

Macroworld Quanta.

In the hierarchy of discretness modula, in particular, of linear size quanta, the quanta, associated with characterizing *sizes of man*, have a special interest. In connection with that it is interesting to take attention at following correspondence.

Proposition.

The module of quantization - the linear size quantum, that is incident to megalithic monuments (observatories), discovered by A.Tom and equal to

$$a=0{,}829 \text{ m},$$

correctly coincides with the quantum of Solar System (connected with Transspheres series)

$$a_*^{[-7]} = (\chi^2)^{-8}\cdot a_*^{[1]} = 8R_\odot/\chi^{16} = 5.216 \text{ m},$$

$$a_{N=1}^{[-7]} = a_*^{[-7]}/2\pi = 0.830 \text{ m}$$

Peoples of megalithic epoch (investigators, initiates, priests), apparently, *directly "overlooked" it in Nature* (of course, they didn't use modern analitical relations).

Megalithic Inch.

According to A. Thom there is exist also the representation for the *megalithic inch* and the interconnection between three units of size

1 megalithic rod = 2.073 m,

1 megalithic yard = 0.829 m,

1 megalithic inch = 0.00207 m = 2.07cm

$$1 \text{ [m.r]} = 2.5 \text{ [m.y]} = 100 \text{ [m.i]}$$

From the point of view of Wave Universe Concept (WU Concept) that is consequence of follow.

Proposition.

Characteristic (experimentally observed) in megalithic archaeoastronomy coefficient near 2.5 (using also for the calculation of circles sizes in megalithic cites) in reality (WU Concept) has the following analitical representation

$$2.5 \rightarrow (2\pi)^{1/2} = 2.5066$$

Characteristic (experimentally observed) in megalithic archaeoastronomy coefficient $100=2\times 50$ in reality (WU Concept) has the following analitical representation

$$100 = 2\times 50 \cong 2\chi^3, \qquad \chi^3 = 49.296296$$

and hence

$$1 \text{ [m.y]} \approx (100/2.5)\text{[m.i]} \approx 40\text{[m.i]} \approx \{2\chi^3/(2\pi)^{1/2}\}\text{[m.i]}$$

Another Modula (Reith, p.270-271):

"... It is interesting , I think, *to point* out that in *Assyria of Sargon's time (2300 B.C.)* - which is roughly contemporary with the construction of *the British megalithic sites - Oppert (1872, 1874)* found evidence at Khorsabad of the use of a *linear standard, named U (ahu)* in the *cuneiform script*, which was equivalent *to 10.8 in*.

Furthermore, Flinders Petrie (1934) reported a similar unit of 10.9 in used at *Ushak*, a unit *'eastern foot'* of 10.8 in, and *'oscan foot'* of 10.85-10.95 in.

One megalithic yard is equivalent to *tree* such "feet" (3×10.9=32.7 in), and *six* such "feet" are equivalent to the quantum of 5.44 ft discussed by Kendall as an acceptable unit from Thom's measurements of British megalithic cites."

Thus we have in general representation,

$$a = a_{N=1}^{[-7]}(P/Q),$$

besides $P=N^2$, $Q=1$, $a = a_{N=1}^{[-7]} N^2$,
the representation

$$P=1, \quad Q=3, \; a = a_{N=1}^{[-7]}/3$$

Universality, Global Widespreadness of Megalithic Modula.

In the light of above discussion it is not difficult to comprehend the unique and universal widespreadness of discovered size modula of megalithic cites that is consequence of the fundamental character of these units and its physical sense, which follows from WU Concept.

GREAT BELT OF MEGALITHIC OBSERVATORIES

Two Aspects. Many observed megalithic monuments (observatories) are characterized by, at least, two distinguished special circumstances.

 # Typical (standard) construction. Well known megalithic observatories contain *rectangle* of astronomically significant directions, that is *inscribed in circle* (of sight points, megalithes). Such nonaccidental architecture, reminding the *mandale,* evidently, *has also the special astronomical sense.*

 # Distinguished Latitude. Well known megalithic observatories have tendency to locate in geographical latitudes close to

$$\varphi = 51° \text{ N}$$

If is it accidentally?

Discussed aspects of structure and localization of megalithical observatories from the analitical point of view represent interdepending and give cause for the special

Proposition.

Ancient creators of megalithic observatories aim to use the most simple - symmetrical construction - *rectangle* (of the astronomically significant directions), *inscribed in circle* (of sight points, megalithes).

(According to Wood , 1981, P.23:

" Piter Newham found, that *long* sides of *fourangle* are orientated to the *most Northern* point of set of "high" Moon, and if to look to opposite direction,- to the most southern point of it's rise.

He discovered once more wonderful fact: *four based stones* form the fourangle, *short and long sides of that* are *perpendicular* each other. To build *rectangle,* sides of that mark *Solar and Lunar* directions, *is possible only at Stonehendge latitude. At other latitudes* it will be the *parallelogram.*")

It may be indicated that this case analitically corresponds to the special relation

$$A = \varphi ,$$

where

φ - latitude of megalithic monument,

A (and h) -azimuth (and altitude) of Sun over the real horizon in the moment of sunrise or sunset.

Assuming for simplicity, that apparent horizon coinside with real (and then h=o), it may be received from the standard formula of spherical astronomy

$$\cos A \cdot \cos\varphi \cdot \cosh = \sin\delta - \sin\varphi \cdot \sinh$$

more simple relation

$$\cos A \cdot \cos\varphi = \sin\delta$$

In the summer solstice it is valid the equality

$$\delta = \varepsilon$$

where δ - inclination of Sun,

ε - inclination of equator to ecliptic.

And then for the considering special case the relation

$$\cos^2\varphi = \sin\varepsilon$$

is valid.

For those epoches of ancient history, when ε inclination not strong differed from modern value and

$$\varepsilon = 23°.43929,$$

$$\cos^2\varphi = \sin 23°.43929,$$

observed φ latitude of megalithic observatories localization not strong differs from

$$\varphi\ (=A) = 50°.898$$

This zone of constructive prefered latitudes also represents *The Great Belt of Megalithic Observatories.*

It extents along all Earth sphere: in Eurasia - from Atlantics to the Pacific Ocean and in America - from the Pacific Ocean to Atlantics.

Here are some of the most bright representatives of that Great Belt.

In Eurasia:

Stonehendge (51°11'N),
Kievitsa (Chekhia),
Kazarovichi (Ukraine),
"goroditsha" (sacral places in wood zone of East Europe),
Babka (51° N),
Hodosevichi (53° N),
Tushemla (54° N),
ancient town Arkaim (52°39'),
Savin (sacral place on river Tobol, Kurgan region, 55°.4 N),
mountain Ocharovatelnaia at west Altai,

at the same latitude (51°-52° N) -

sacral place Semisart (Kara-Bom) at Altai,
mountain Arzhan (Tuva),
standing Malta in Baikal region.

It is interesting to point attention also, that Mongol sacral places of Chingis - Han epoch attracted to the sacred by ancient stories regions. Its also lie at latitudes of the Great Belt.

Past, Present, Future in the Light of Wave Universe Concept.

There are no doubts, that real break in sciences about Universe, including sciences about Anthroposphere, is possible only on base of wide conceptual generalizations

and in light of serviceable effective theory. "There is no best practically, then good Theory"- in that our predecessors were constantly convinced.

Let's suppose, that the approach, connected with the Wave Universe Concept and Wave Cosmogeonomy, opens very encourage perspectives.

The Wave Universe Concept permits to use the wide set of means of analytical and experimental studing of Present, with using of wide data of Past and critically verificating of theory and new knowledge (for all that in many cases successfully reconstructing the fundamental representations of far predecessors), and on the base of obtained new knowledge, effective theory to try to look up in Future.

There are weighty foundations to say: "Yet it is not Evening..."

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