ОБЪЕДИНЕННЫЙ
ИНСТИТУТ
ЯДЕРНЫХ
ИССЛЕДОВАНИЙ

Дубна

97-259

E2-97-259

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WAVE UNIVERSE AND SPECTRUM OF QUASARS REDSHIFTS

Submitted to «Phys. Rev. D»

1997

THE WAVE (MEGAWAVE) ASTRODYNAMICS CONCEPT

A wide set of yet noninterpreted (enigmatic from the point of view of standard paradigma of celestial mechanics and astrophysics [1,2]) observed and experimental data, connected with the dynamical structure and geometry of the Solar system (in particular, with the arrangement of planetary, satellite orbits, distribution of their velocities, etc.) and other astronomical systems can be adequately interpreted in the framework of Wave (Megawave) Astrodynamics (and Wave Universe concept) [2—6].

According to these representations, real objects observed in the Universe (in the megaworld, such as astronomical systems, for example, the Solar system) appear principally *wave* dynamic systems (WDS), in some sense similar to the atom system (Micro-Mega analogy [2]), and can be described by fundamental wave equations (in particular, Schrödinger-type equations) (Fig.1).

The unique dimensional parameter $\bar{d}$, which enters into such a wave equation, has the dimension of sectorial velocity (circulation) [cm²/s] and corresponds to the characteristic scale of system (Co-dimensional Principle [2]).

For the atom it has the order

$$\bar{d} = \bar{d}_e = \hbar / m_e = 1.15767\ \mathrm{cm}^2 \cdot \mathrm{s}^{-1}$$

($\hbar = 1.054572 \cdot 10^{-27}\ \mathrm{g \cdot cm^2 \cdot s^{-1}}$ — Planck's constant, $m_e = 9.109389 \cdot 10^{-28}$ g — mass of electron), for the Solar system (SS)

$$\bar{d} = \bar{d}_{SS} \approx 10^{19}\ \mathrm{cm}^2 \cdot \mathrm{s}^{-1}.$$

EXTREMELY LOW MASS

From the comparison of the circulation parameters, carried out in the end of 70s in the monograph [2, p.245], naturally follows an evident, lying on the surface, consequence.

Representing the Solar system constant

$$\bar{d} = \bar{d}_{SS} = \hbar_{SS} / m_{SS}$$

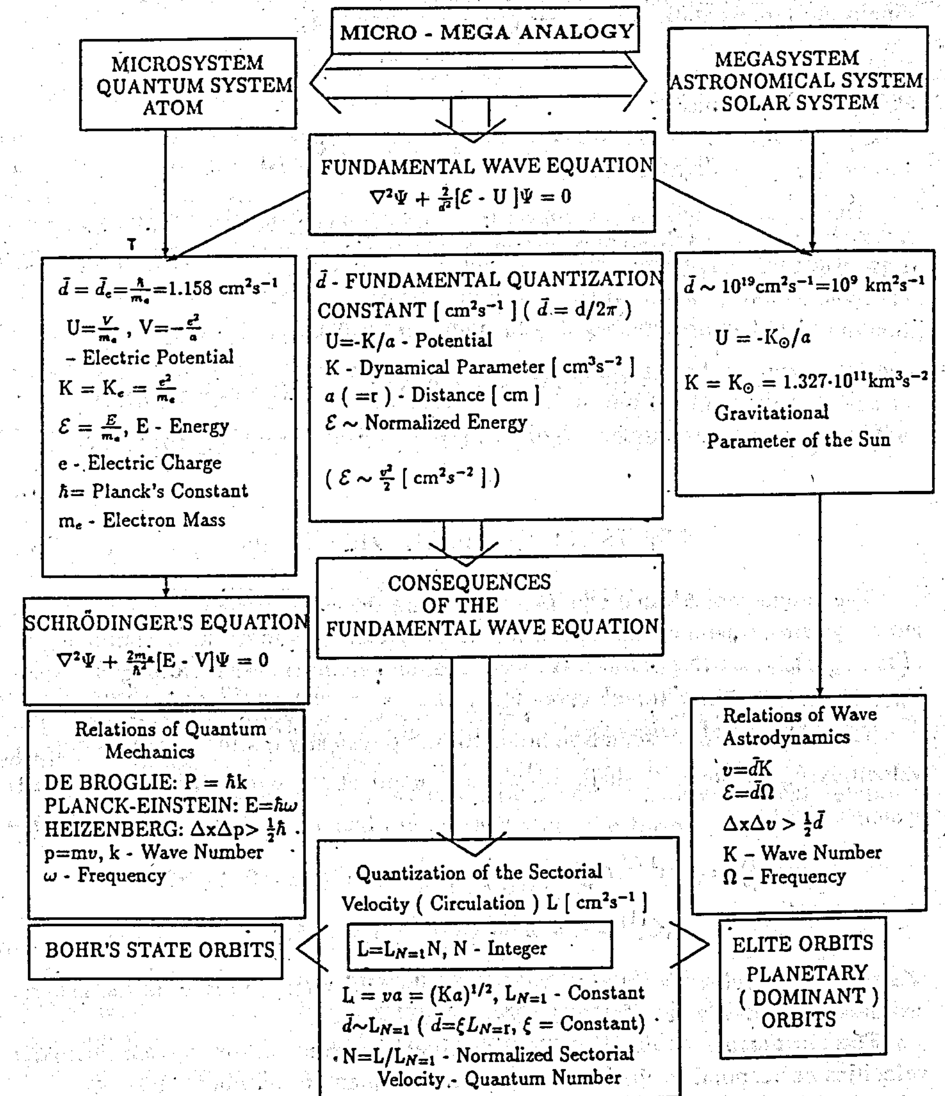


Fig.1

like as for atom ($d=d_e=h/m_e$), it is easy, for example, in the case $h_{SS}=h$, to obtain the representation

$$d=d_{SS}=h_{SS}/m_{SS}$$

and the order of mass

$$m_{SS}=h/d_{SS}\approx 1.054572\cdot 10^{-27}/10^{19}\approx 10^{-46}\text{ g.}$$

The physical sense of the appearance of such an extremely low mass merits a special discussion. Meanwhile just note that this valuation is close to the upper limit of the experimental valuation of the photon mass [7]:

$$m_\gamma < 9\cdot 10^{-10}\text{ eV}/c^2 = 1.604\cdot 10^{-42}\text{ g (Ryan, 1985),}$$

$$4.73\cdot 10^{-12}\text{ eV}/c^2 = 0.8432\cdot 10^{-44}\text{ g (Chernikov, 1992),}$$

$$1.0\cdot 10^{-14}\text{ eV}/c^2 = 1.782\cdot 10^{-47}\text{ g (Williams, 1971), etc.}$$

SPECTRUM OF ELITE VELOCITIES

The fundamental wave equation describing the Solar system (similarly to the atom system) separates the spectrum of physically distinguished, stationary — *elite* — orbits, corresponding to mean quantum numbers N, including the spectrum of permissible *elite* velocities v_N.

The following representation holds for the physically distinguished — *elite* — velocities v_N in the $G^{[s]}$ shells of wave dynamical (in particular, astronomical) systems [3—6]:

$$v=v_N^{[s]}=(2\pi)^{1/2}\cdot C_*^{[s]}/N,\quad C_*^{[s]}=C_*^{[1]}\cdot\chi^{-(s-1)},\quad s=0,\pm1,\pm2,\ldots$$

$$(C_*^{[1]}=154.3864\text{ km}\cdot s^{-1},\quad \chi=3.666),$$

where the elite values N (as it follows from observations) are close, in the general case, to the counting set of N —*integer* (*semi-integer*).

The most stable — *dominant* (strong elite) — orbits and the related *dominant* velocities correspond to the *dominant* values of quantum numbers close to

$$N=N_{Dom}=8;\ 11;\ 13;\ (15.5)\ 16;\ 19.5;\ (21.5)\ 22.5.$$

It can be shown that

$$N_{TR}=\chi(2\pi)^{1/2}\simeq 9.191$$

also is the physically distinguished (dominant) value N [6].

INVARIANCE (UNIVERSALITY) OF THE ELITE VELOCITIES SPECTRUM

The spectrum of physically distinguished elite velocities v_N and quantum numbers N of arbitrary wave dynamic system (WDS) has some universal peculiarity. It is practically identical — *invariant* (*universal*) — for all known observed systems of the Universe.

In particular, the velocity spectra of experimentally well investigated Solar and satellite systems practically coincide for the observed planetary and satellite — dominant — orbits, corresponding to some (dominant) values of quantum numbers N_{Dom}. Thus it can be expected that the spectrum of elite (dominant — planetary) velocities of the Solar system (well identificated by observations) can be effectively used as quite representative — *internal* (*endogenous*) — spectrum of elite (dominant) velocities, for example, of *far* astronomical systems of the Universe.

PHYSICALLY DISTINGUISHED REDSHIFTS

In the framework of the developed representations of Wave (Megawave) Astrodynamics and Wave Universe concept [2—6] the analytical representation can be obtained for physically distinguished — preferably observed (elite) — redshifts of far astronomical objects (galaxies, quasars).

The physically justified by experience (and correct consequences) relation $z=f(v)$ between the velocity v and the redshift z has the form

$$z=\beta^2=(v/c)^2,\quad \beta=v/c,$$

where $c=299792.458\text{ km}\cdot\text{s}^{-1}$ — light velocity.

This correlation between the redshift z and the (orbital) velocity v (as opposed to other relations) is carefully examined experimentally in laboratory conditions — on the Earth (Paund and Rebka's experiment) and in space — from the Sun (Brault's experimnet) [8].

It is also interesting to note that the used square dependence in the functional (mathematical) plane is in fact identical to the relation used in the calculation of the so-called gravity redshift [8]

$$z=GM/c^2r=(v/c)^2,$$

where $v^2=GM/r$, v — orbital velocity.

THE PEAKS z IN OBSERVATIONS AND IN THEORY

It may be shown that the most important peaks in histograms (of distribution) of the observed z unaccidentally and with sufficient reliability coincide with the physically distinguished — dominant — values $z_N^{[s]}$ (at $N = N_{\text{Dom}}$).

For example, the peaks widely known from observations (Figs.2, 3) from [9,10]

$$z \approx 2,\ z \approx 1,\ z \approx 0.5,\ z \approx 0.35 \text{ (and other)}$$

coincide with the dominant ($N = N_{\text{Dom}}$) $z_N^{[-6]}$ values of the $G^{[-6]}$ shell

$$z_N^{[-6]} = z_*^{[-6]} \cdot 2\pi / N^2,\quad z_*^{[-6]} = (C_*^{[-6]}/c)^2 = [(C_*^{[1]}/c)\cdot\chi^7]^2,$$

$z_N^{[-6]} = 2.067;\ 1.093;\ 0.782;\ (0.55)\ 0.516;\ 0.347;\ (0.286)\ 0.261$ and also (for $N_{\text{TR}} = 9.191$) $z_{\text{TR}}^{[-6]} = 1.57$.

ENDOGENOUS NATURE OF z

The set of large quantity of facts, agreement between theory and observations, including the possibility of correct description of distinguishing peaks z over all the observed redshifts range (beginning from $z = 0$) make the next conclusion natural.

Assertion. It seems very probable that the true genesis and physical nature of the observed redshifts is considerably closer connected with *the own* (*inner*) wave shell structure of astronomical systems (galaxies, quasars) than with the «kinematic» motion (translation) of their mass center — with the galaxies «expansion».

ABOUT THE EXISTENCE OF OBJECTS WITH EXTREMAL z

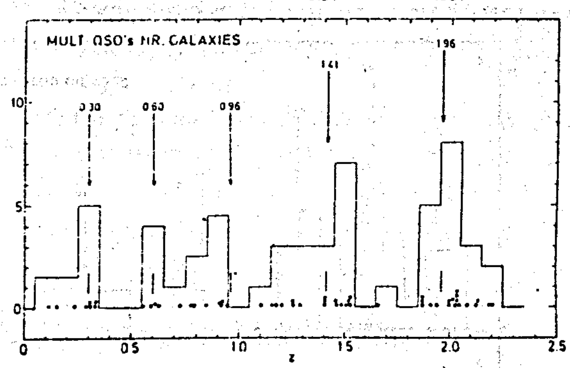
In the framework of the Wave Universe representations it must be expected that replenishing statistics of newly discovered astronomical objects will be characterized by the distribution peaks at z that correspond to the physically distinguished — *dominant* — values of redshifts, in particular, belonging to the $G^{[-7]}$ shell:

$$z_N^{[-7]} = z_*^{[-7]} \cdot 2\pi / N^2,\quad z_*^{[-7]} = (C_*^{[-7]}/c)^2 = [(C_*^{[1]}/c)\cdot\chi^8]^2 = 283.08668,$$

$z_N^{[-7]} = 27.79;\ 14.7;\ 10.524;\ (7.4)\ 6.947;\ 4.677;\ (3.847)\ 3.513.$

WU → 0.286 0.347 0.55 1.09 1.57 2.067

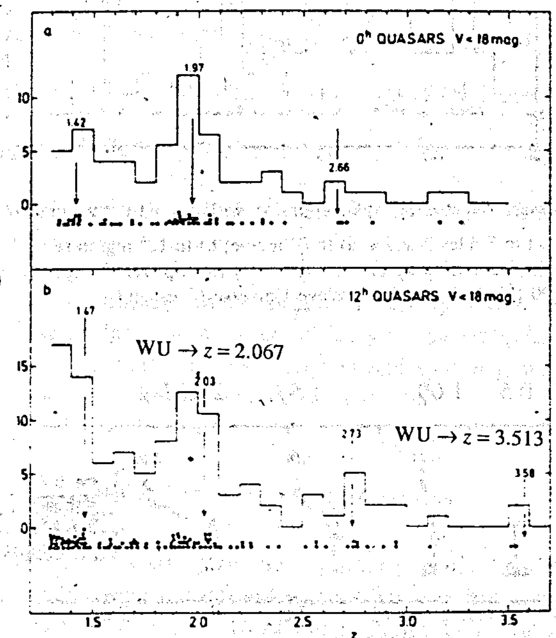
a)



The redshift distribution for multiple quasars around low redshift galaxies (57 quasars around 14 galaxies as listed in Table 1). The arrows mark the preferred redshifts as predicted from $\Delta \ln(1+z) = 0.206$ (H.Arp. As & Ap., 239, 1990 (Fig.1)). WU — Wave Universe (Concept)

1.57 WU → $z = 2.067$

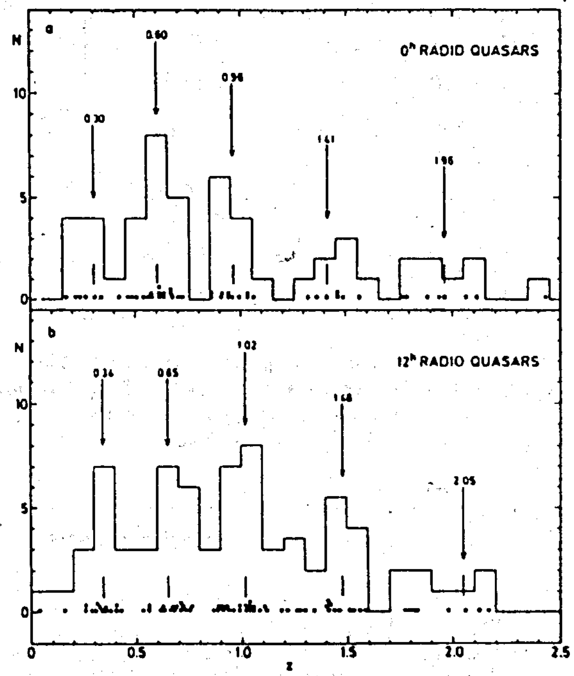
b)



All quasars from Hewitt/Burbidge Catalog with $z \geq 1.30$ and $V < 18$ mag. a) 0^h region as defined in Table 8; b) 12^h region as defined in Table 9 (H.Arp. As & Ap., 239, 1990 (Fig.9a,b)). WU — Wave Universe (Concept)

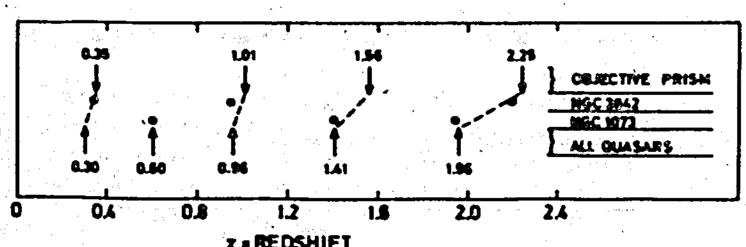
Fig.2 (a, b)

WU → z = 0.286 0.347 0.55 1.09 1.57 2.067

a) 

Quasars selected by radio emission with $S_{11} > 1.0$ flux unit as listed in Tables 3 and 4. a) In 0^h region; b) In 12^h region redshift peaks are shifted by $(1+z) \times (1+0.03)$ (H.Arp. As. & Ap., 239, 1990 (Fig.3a,b)). WU — Wave Universe (Concept)

WU → 0.347 0.55 1.09 1.57 2.067

b) 

Redshift peaks observed for different groups of quasars (H.Arp. IAU Symp., Beijing, China, 1986 (Fig.2)). WU — Wave Universe (Concept)

Fig.3 (a, b)

Already at present it is interesting to note apparently unaccidental compliance of the observed values of (remotest for 1986) quasars $z = 3.53$ (quasar OQ 172) and $z = 3.78$ (quasar PKS 2000-330) with the pointed above $z^{[-7]}$ dominant values of the $G^{[-7]}$ shell ($z = 3.513$ and $z = 3.847$).

Thus, it is not excluded that the quasars OQ 172 and PKS 2000-330 will become not as much *the last* from discovered quasars of preceding population QSO ($G^{[-6]}$) with active $G^{[-6]}$ shell as *the first* (and evidently having not the highest values of z) from discovered quasars of new population QSO ($G^{[-7]}$) with active $G^{[-7]}$ shell.

THE PROBLEM OF SEARCH

Basing on the above-discussed prognosis, we may also point to a set of supplementary physical orientating circumstances that essentially shorten the search field for the objects with extermal z. One of them resides in the fact that the search must be carried out, in particular, among the astronomical objects having abundant radiation (peculiarities, peaks, radiation anomalies), besides gamma, in close infrared range, too. Really, for example, for hydrogen L_α-line

$$\lambda(L_\alpha) = 1215.67 \text{ Å} = 121.567 \text{ nm} = 0.121567 \text{ µm}$$

we have the system of shifted (by the redshift $z = z^{[-7]}$) wave lenghts

$$\lambda_N^{[-7]} = \lambda(L_\alpha)(1 + z_N^{[-7]}) = 3.50;\ 1.90;\ 1.40;\ (1.02)\ 0.966;\ 0.69;\ (0.589)\ 0.548 \text{ µm}$$

that lay in *IR*-range.

Purposeful search of objects (most probably having z that are close to the pointed above), in particular, among such objects as Safert galaxies, Markarjan galaxies, may lead to discovery of new astronomical systems, which are characterized by extremal, so far unknown values of redshifts.

FOLLOWING OBSERVATIONS

Three years after the exposition of the preceding results in 1986 [11,12] followed by a discussion between a confined circle of researchers-astrophysicists, in the end of 1989, american scientists from the Palomar Observatory M.Schmidt, J.Gunn, D.Schnaider discovered the extremely far object of the Universe — quasar in the Ursa Major constellation. It is interesting to note also that using of the experimental «solar» value $N = 19.43$ (instead of $N = 19.5$) indicates the more close (to the discovered) value $z = 4.71$ (instead of $z = 4.677$).

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