Detection of a Dim Sphere Composed of Massive Cold Galaxies (they Consist of Bare Neutron Black Holes) at Mean Redshift 0.6415 will Validate the Scale-Symmetric-Theory Cosmology

Sylwester Kornowski

Abstract: In a cosmic scale of a few hundred Mega-parsecs, according to the General Relativity (GR) cosmology, the mean number density of massive galaxies (their mass is greater than 11 powers of ten multiplied by solar mass) should be about 0.0072 massive galaxies per cubic Mpc whereas according to the Scale-Symmetric Theory (SST) should be 0.0067. We can see that both results are similar, about 0.007. On the other hand, the surveys of massive galaxies lead to number densities about 10 times lower. It leads to conclusion that there must be big number of dim/cold massive galaxies. N. Trujillo formulated following question: Where are the untouched massive “relic” galaxies in the nearby Universe? Here, applying the SST, we show that most of them should be close to the threshold redshift 0.6415 and they should be composed of the bare neutron black holes. Such dim sphere of massive galaxies forces the radial acceleration of all galaxies at redshift about 0.35 up to 0.6415, and deceleration of all galaxies above such threshold redshift. The SST cosmology shows that the distribution of redshift of massive galaxies must be balanced in such a way that the average redshift was 0.6415. We showed that the postulated within the GR cosmology an acceleration of expansion of spacetime is an illusion (for redshift 0.35 up to about 0.6, we observe an acceleration whereas for redshift higher than about 0.6, we observe a deceleration). In reality, the SST shows that there indeed are the regions of acceleration and deceleration but their existence follows from the gravitational attraction of the massive dim sphere at mean redshift 0.6415. SST leads to conclusion that we should see a weak redshift quantization for redshift lower than 0.6415. Future more precise surveys of galaxies should confirm that the SST cosmology is correct. Here we described the number density of massive galaxies as a function of redshift and, separately, as a function of the SST time distance, we compared the SST, GR and Special-Relativity relative recession velocities (RRV), we described the redshift quantization, and we solved the luminosity problem of quasars.

1. Introduction

The Scale-Symmetric Theory (SST), [1], shows that the succeeding phase transitions of the superluminal non-gravitating Higgs field during its inflation (the initial big bang) lead to the different scales of sizes/energies [1A]. Due to a few new symmetries, there consequently appear the superluminal binary systems of closed strings (entanglons) responsible for the quantum entanglement (it is the quantum-entanglement scale), stable neutrinos and luminal neutrino-antineutrino pairs which are the components of the luminal gravitating Einstein spacetime (it is the Planck scale), cores of baryons (it is the electric-charges scale), and the cosmic-structures/protoworlds (it is the cosmological scale) that evolution leads to the dark matter, dark energy and expanding universes (the "soft" big bangs) [1A], [1B]. The electric-charges scale leads to the atom-like structure of baryons [1A].

The SST shows that there is the two-component spacetime that consists of the superluminal non-gravitating Higgs field composed of tachyons (the gravitational fields are the gradients produced in Higgs field by gravitating masses), and the luminal gravitating Einstein spacetime composed of the neutrino-antineutrino pairs [1A]. In the Einstein spacetime, the neutrino-antineutrino pairs interact gravitationally only – such pairs we will refer to as the free pairs. The dark energy consists of the additional free neutrino-antineutrino pairs that appeared due to the evolution of the Protoworld that was created before the expansion of the Universe (i.e. before the "soft" big bang which was separated in time from the initial big-bang/inflation) [1B]. The dynamic pressure of the dark energy causes that the gravity cannot stop the expansion of the Universe. According to SST, the dark matter consists as well of the neutrino-antineutrino pairs but the pairs are entangled (it is the long-distance superluminal/non-local quantum entanglement) so there are the dark-matter (DM) structures – such structures, due to the quantum entanglement or/and confinement, can interact with visible matter i.e. with hadrons and charged leptons [1A], [1B]. Photons and gluons are the rotational energies of the neutrino-antineutrino pairs [1A]. The DM structures consist of entangled *non-rotating-spin* neutrino-antineutrino pairs. Speed of the pairs in relation to their moving emitter/source and their mass are unchangeable so DM structures are perfectly elastic. Spins of neutrinos in a pair are parallel so it carries unitary spin. Resultant weak charge of a pair is equal to zero whereas gravitational mass of a pair composed of stable neutrinos is very small ($m_{pair} \approx 6.67 \cdot 10^{-67}$ kg [1A]) so detection of the neutrino-antineutrino pairs is much difficult than the neutrinos. It is the reason that we still cannot detect them.

2. Number density of massive galaxies as a function of redshift

In a cosmic scale of a few hundred Mega-parsecs (there, in the Universe, are the walls, nodes, filaments, voids and the two-component spacetime), according to the General Relativity (GR) cosmology, the mean number density of massive galaxies (mass $M_G > 10^{11}$ solar masses) should be ~ $0.0072\ \text{Mpc}^{-3}$. This value follows from the observed mean density of baryonic matter $\rho_{B,GR} = (0.4181 \pm 0.0043) \cdot 10^{-27}\ \text{kg/m}^3$ [2] and the SST cosmology which shows that initially, the masses of all massive galaxies were quantized $M_{G,initial} = 8.52 \cdot 10^{11}$ solar masses, [3], and they consisted of the neutron black holes [1A]. Such massive galaxies evolved due to the inflows of the dark matter and dark energy [1B]. Due to asymmetrical such inflows, the massive galaxies with the quantized-mass had exploded in different way so there appeared different numbers of the dwarf and satellite galaxies. According the SST, a prescription for evolution of massive galaxies is very simple – lower observed mass of massive galaxy means more dwarf and satellite galaxies and more intergalactic gas and dust (for example, we can compare the Milky Way with Andromeda). But notice that the dwarf galaxies can be separated from their massive sources so we can observe a deviation from the above prescription. Moreover, luminosity of less massive big galaxies together with their dwarf and satellite galaxies should be for the same redshift z higher. It means that if inflows of dark matter and dark energy were insignificant then such massive galaxies should be dim/cold and their mass should be close to $M_{G,initial}$. Since number density of visible massive galaxies is much lower than it follows from the mean density of baryonic matter so there should be big number of such dim/cold galaxies.

Notice as well that insignificant inflow of dark energy into massive galaxy causes that there is less baryonic matter so accretion disc is running shorter. According to SST, acting accretion disc produces both the visible jet and the baryonic clouds carried by the visible jet and scattered due to the visible-jet axis rotation. In the cooler regions of galaxy, in such baryonic clouds, formation of stars appears – it means that declining accretion disc stops star formation.

According to the SST, the mean number density of massive galaxies should be ~ 0.0067 Mpc^{-3}. This value follows from the calculated mean density of baryonic matter $\rho_{B,SST} = (0.385 \pm 0.008)\cdot 10^{-27}\ \mathrm{kg/m^3}$ [1B]. We can see that both results are similar, about 0.007. On the other hand, the surveys of massive galaxies lead to number densities about 10 times lower than the mean [4], [5]. In paper [4], the obtained number density of red massive galaxies is about 0.00025 for redshift $z = 0$ and about 0.0001 for $z = 0.7$. Even if we add the blue massive galaxies (on the assumption that there is about 4 times more the blue than the red ones), we obtain respectively 0.00125 and 0.0005. These results are respectively 5.6 and 14 times lower than the mean number density ~ 0.007. In paper [5], the obtained number density of all massive galaxies is about 0.001 for redshift $z = 0.65$ and about 0.0001 for $z = 2$. These results are respectively 7 and 70 times lower than the mean number density ~ 0.007. It leads to conclusion that there must be big number of dim/cold massive galaxies. N. Trujillo formulated following question: Where are the untouched massive "relic" galaxies in the nearby Universe [6]?

Emphasize as well a few facts that follow from SST.

2.1.

To avoid the transformation of the initial disc in the most massive galaxies, [1B], into an ellipsoid, galaxies must decrease their angular momentum via explosions i.e. via production of dwarf and satellite galaxies. It leads to conclusion that the dim/cold massive galaxies should be the ellipsoids composed of the bare neutron black holes.

2.2.

SST shows that if not the dynamic pressure in the initial region filled with the massive protogalaxies, then all the massive galaxies should be on a ring with the threshold redshift $z = 0.6415$ [1B].

2.3.

All of a sudden, in the most distant Universe appear well formed large galaxies at redshift of about 12 and smaller. SST shows that it is not due to the end of some dark ages and reionization as it is assumed in the Cosmological Standard Model (CSM) but due to the fact that we cannot see the initial period 7.75 Gyr of evolution of the protogalaxies – we can see only the last period about 13.8 Gyr [1B].

2.4.

According to SST, the ground state of the Einstein spacetime, which density dominates, does not expand – there expands the dark energy but its mass density is about 10^{54} times lower than the Einstein spacetime so the two-component spacetime and the Universe as a whole are flat [1B]. The expanding dark energy counteracts the gravitational braking. Just the dark energy is needed to balance the gravitational braking.

2.5.

Number of satellite galaxies and dwarf galaxies should be independent from redshift or should insignificantly decrease with decreasing redshift. It follows from the fact that such galaxies were produced due to the explosions of the massive galaxies during the unseen initial period 7.75 Gyr of their evolution [1B]. Such conclusion is consistent with observational facts [6]. With time, the not numerous smaller galaxies were "re-absorbed" by the massive galaxies.

We can see that most of the dim/cold massive galaxies/black-holes should be on the sphere with mean redshift z = 0.6415. Future more precise surveys of galaxies and massive black holes should confirm that the SST cosmology is correct. Such dim sphere of massive black-holes forces the radial acceleration of all galaxies at redshift about 0.35 up to 0.6415 and deceleration of all galaxies above the threshold redshift (see Figures and Table 1). We substantiated that the postulated within the GR cosmology an acceleration of expansion of spacetime is an illusion (for redshift 0.35 up to about 0.6, we observe an acceleration whereas for redshift higher than about 0.6, we observe a deceleration). In reality, the SST shows that there indeed are the regions of acceleration and deceleration but their existence follows from the gravitational attraction of the massive dim sphere at mean redshift 0.6415.

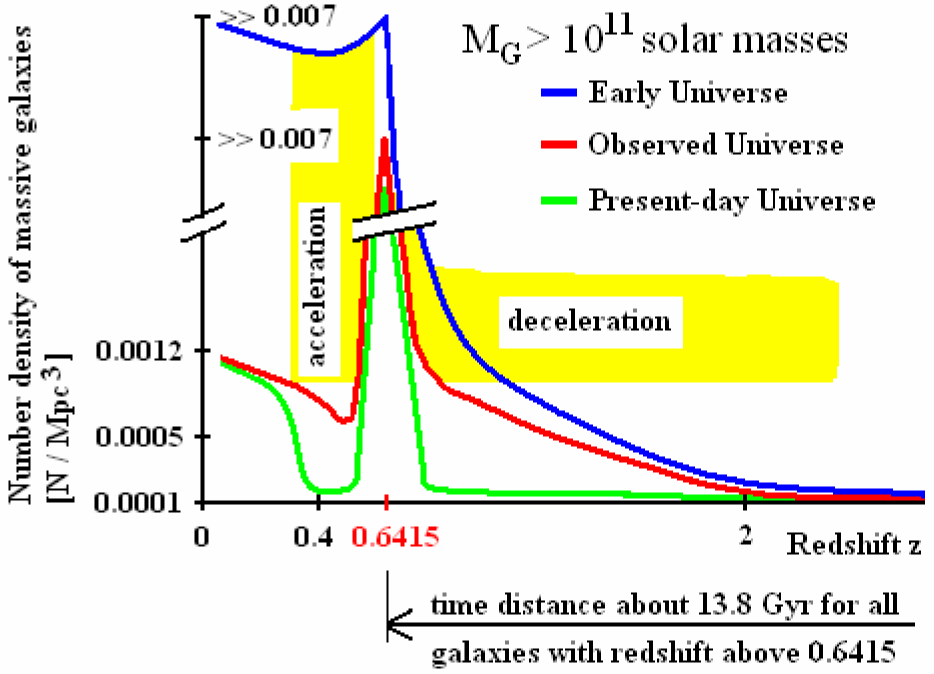

Fig. 1. Number density of massive galaxies as a function of redshift

But why the acceleration is observed only from $z \approx 0.35$, not from $z = 0$? According to SST, initially the neutron black holes in centres of the massive-galaxies/quasars had produced antiparallel half-jets in the Einstein spacetime, [7], and there was radial polarization of them [1B]. It caused a compression of the quasars in centre of the dim sphere (there appeared a minimum in the number density between the centre of the dim sphere and the sphere) and there appeared the cascades of aligned quasars outside and inside the dim sphere especially near it. The cascades of the luminal motions/jets in the Einstein spacetime caused that there appeared galaxies with redshift greater than 1. With time, the jets decayed so the recession velocities (recessional velocity is the rate at which an object is moving away, typically from Earth) of the galaxies decelerated below $z = 1$. But according to SST, the speed of light in "vacuum" c, due to the quantum entanglement, is the speed of photons in relation to their source or a last-interaction object (it can be a detector) i.e. we must treat, for example, a decelerating galaxy and the earlier emitted photons as one system, i.e., when kinetic energy of the galaxy decreases then the earlier emitted photons, for an observer on Earth, are redder and redder i.e. their redshift is invariant and still can be greater than 1 even if the present-day radial speed of the galaxy is lower than the c. Due to the quantum entanglement, it is wrongly assumed in CSM that after the light is emitted, it does not matter what happens to the emitting photons; it is untrue that a change in radial velocity of a galaxy-source does not change wavelengths of the photons that are received even if the spacetime does not expands. Of course, it is true that cosmological redshift can result from expansion of spacetime.

But why the dim/cold massive galaxies are primarily at redshift 0.6415? It results from the initial large-scale structure. The very early Universe was the double loop composed of protogalaxies grouped in larger structures [1B]. The inflows of the dark matter and dark energy were less intensive in the central parts of the larger structures composed of the typical massive galaxies. Lack of explosions in the central parts of the larger structures caused that the dim/cold massive galaxies are primarily at the threshold redshift 0.6415. Moreover, the dim sphere can have the equator with higher mass density of the cold massive galaxies. In absence of explosions of the most massive galaxies, there did not appear baryonic plasma so creation of accretion disc is impossible so impossible is also creation of visible jet, but there still is produced the invisible jet in the Einstein spacetime [7]. The invisible pairs of antiparallel half-jets with radial polarization, produced by the cold massive galaxies the dim sphere consists of, cause that other galaxies cannot reach the dim sphere due to the gravitational attraction but they can move toward it for some period.

The very low mean mass density of the baryonic matter in comparison with the of Einstein spacetime (about 1 part in 10^{55} parts) causes that even due to the not smooth distribution of the baryonic matter and dark matter, the Universe behaves as a flat object.

Existence of the dim sphere composed of dim/cold massive galaxies/black-holes solves the problem of the missing baryons [8].

3. The relative recession velocities (RRV)

Consider the differences between GR and SST. The radial components in the Friedmann-Robertson-Walker (FRW) metric are as follows [9]: $ds^2 = -c^2\, dt^2 + a(t)^2\, d\chi^2$. For $dt = 0$, radial distance is $D = a\, \chi$. Differentiating this proper distance gives a two-component velocity i.e. the derivative of the a multiplied by χ (it is the recession velocity that appears in the definition for the Hubble constant, H, in GR; it is associated with the expansion of the Einstein spacetime – on the other hand, SST shows that the ground state of the Einstein spacetime is invariant so physical constants are invariant as well [1A]) plus the a multiplied by derivative of the χ (it is the recession velocity in Special Relativity (SR) that does not appear in the definition for Hubble constant; it is not associated with the expansion of the Universe).

Here we calculated the recession velocities within SST, GR and SR. We used the parameters that are derived within the SST cosmology: $H = 70.5$ km s^{-1} Mpc^{-1}, $\Omega_M = 0.314$, $\Omega_\Lambda = 0.686$, **flat Universe**. We used the cosmological calculator [10].

We can see that the distance between the SST curve and GR curve increases with increasing redshift for redshift about 0.35 up to the threshold redshift $z = 0.6415$. It causes that for this interval, the Type Ia supernovae are in distances greater than it results from GR so they are fainter than they should be and it is consistent with the observational facts. Moreover, due to the existence of the dim sphere, there is the gravitational acceleration for this interval of redshift. But emphasize once more that this acceleration does not follow from acceleration of expansion of the Einstein spacetime, i.e. does not follow from an increase in energy density of the dark energy.

Table 1 *Relative recession velocity (RRV), v/c, as a function of redshift for* H=70.5, Ω_M=0.314 *and flat Universe*

Redshift z	**Relative Recession Velocity from GR**	**Relative Recession Velocity from SR**
0.28	0.262	0.242
0.4	0.363	0.324
0.5	0.441	0.385
0.6415	0.544	0.459
0.787	0.642	0.523
1	0.769	0.600
1.14	0.844	0.642
5	1.797	0.946
12	2.265	0.988
10^7	3.198	~1

In Fig. 2, we drew the early-Universe SST curve (it is unobservable) and we drew the present-day SST curve (it is unobservable as well). We deliberately did not draw the observed SST curve because, due to the duality of relativity, due to the invisible jets in the Einstein spacetime and the regions of acceleration and deceleration, we cannot calculate precise absolute magnitude of galaxies – especially it concerns the region of deceleration. Consider, for example, a galaxy with observed redshift $z = 7$. Consider the relative recession velocity (RRV). According to SST, photons now detected were emitted when RRV was indeed 7. But due to the cascades of the invisible jets in the Einstein spacetime with radial polarization, galaxies with such redshift ($z = 7$) could be very close (in cosmic scale) to galaxies with redshift $z = 0.6415$. To see a galaxy, according to SST, the RRV must be below 1 – it can be due to the region of deceleration caused by the dim sphere. It means that the galaxy still has observed redshift 7 but in reality, the galaxy is and was much closer to Earth than it follows from GR so the galaxy looks brighter. Just GR incorrectly judges the distances to galaxies, especially to galaxies with redshift higher than about 0.35.

Emphasize once more that according to SST, at the same distance can be galaxies with different observed redshift, especially it concerns the region close to the threshold redshift $z = 0.6415$.

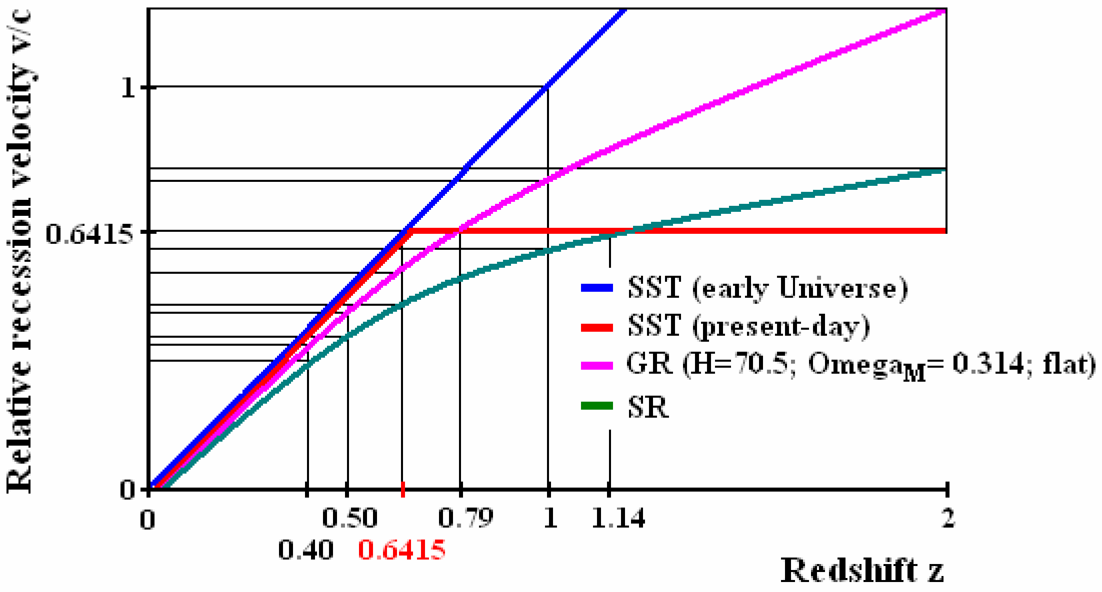

Fig. 2
Discrepancy between SST, GR and SR for recession velocity.

Notice that the distribution of redshift for massive galaxies must be balanced in such a way that the average redshift was $z = 0.6415$. It means that there should be very low number density for massive galaxies with redshift $z > 2$. Emphasize once more that in the SST cosmology, redshift is equivalent to relative recession velocity.

The Scale-Symmetric Theory shows that spatial distance to most distant observed baryonic Universe is 4.971 Gyr only whereas the recession velocity, not redshift (maximum redshift is ~ 12), on the front of the expanding baryonic matter is 0.6415. It leads to conclusion that spatial distance to the present-day (so unobservable) baryonic front of the ~ 21.6 Gyr old Universe is 21.6 Gyr · 0.6415 ≈ 13.9 Gyr whereas the present-day time distance is 13.9 Gyr / (1 – 0.6415) ≈ 38.7 Gyr. On the other hand, the unobservable distance to the present-day baryonic front of the General-Relativity Universe is about 44 Gyr (it is for $\Omega_M = 0.314$, $\Omega_\Lambda = 0.686$, and flat Universe). In a cosmic scale, it is close to the SST time-distance (not spatial distance) cosmology. The approximate description of the Universe within the GR cosmology (it does not distinguish the time distance from the spatial distance, and there appears the expanding spacetime, which in reality does not expand) causes that in the GR cosmology appear paradoxes such as, for example, the accelerating expansion of spacetime (in reality, spacetime does not accelerate its expansion and it even does not expand; there expands the dark energy only) versus the invariance of the Planck constant associated with spin. According to SST, gravitational constant G depends on density of the non-gravitating Higgs field, [1A], so expanding spacetime should lead to dependence of G on time.

The incorrect GR cosmology causes that we still cannot “sew together” the distant Universe (from the CMB) and the local Universe (from the measurements made by A. Riess’ team [11]) – we obtain different values for Hubble constant. It shows that the GR cosmology starts from wrong initial conditions.

4. The number density of massive galaxies as a function of the SST time distance and the redshift quantization

The initial acceleration of the protogalaxies was due to the advection caused by the dark-matter (DM) filaments with radial arrangement – they were the cascades of jets produced in the Einstein spacetime by the quasars. Such filaments, via the virtual charged pion-antipion $(\pi^+\pi^-)^*$ pairs (mass of pion is $M_{Pion(+,-)}$ = 139.57 MeV [1A]), interacted, due to the nuclear weak interactions, with the pairs of condensates in the neutron-proton (np) pairs (one condensate has mass Y = 424.12 MeV [1A]). To calculate the advection velocity (or relative-recession-velocity (RRV) = Δz_{Period}), we can use the formula for advection velocity that follows from interactions of baryonic matter with dark matter [12]

$$v_{advection,orbital} / c = (2\alpha_{w(....)} m_{actual} / m_{o,initial})^{1/2} = const.. \qquad (1)$$

Here we can rewrite formula (1) as follows

$$v_{advection,orbital} / c = \Delta z_{Period} = (2\alpha_{W(proton)} 2 M_{Pion(+,-)} / (2 Y))^{1/2} = 0.1110, \qquad (2)$$

where $\alpha_{W(proton)}$ = 0.0187229 [1A].

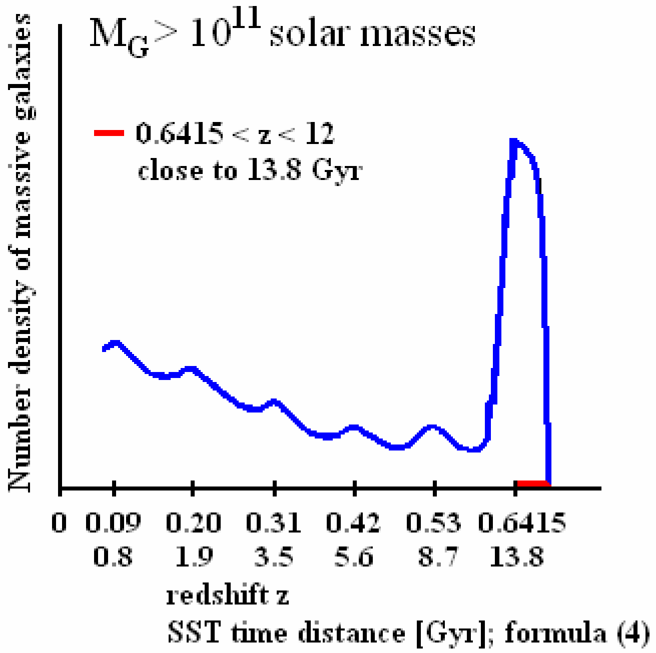

Fig. 3. Number density of massive galaxies as a function of time distance

Such advection should lead to following peaks in the distribution of massive galaxies inside the redshift interval <0, 0.6415>

$$z_n = z_{Threshold} - n\,\Delta z_{Period}\,, \tag{3}$$

where $z_{Threshold} = 0.6415$, $n = 0, 1, 2, 3, 4, 5$ (we should observe six peaks for $z_n \approx 0.64$, 0.53, 0.42, 0.31, 0.20 and 0.09). The peaks that appear in this paper are consistent with results that follow from the surveys of quasars [13]. But the initial inflows of the dark matter and dark energy into the baryonic matter had created the turbulent motions of protogalaxies which should partially destroy the initial redshift quantization. The last observations suggest that a redshift quantization does not appear. Future more precise data should show whether there is a weak redshift quantization. Emphasize that if redshift come from an expanding spacetime, the curve describing dependence of the number density of massive galaxies plus quasars on redshift should be smooth. Even small deviation from a smooth distribution will suggest that the beginning of the expansion of the Universe was separated in time from the inflation as it is in the SST cosmology.

SST shows that maximum advection velocity in nuclear plasma can be ~ 58,000 km/s [7] – this value leads to the redshift period $\Delta z_{Period,second} \approx 0.19$ also. Then, excluding the main peak for redshift 0.6415, the shifted number density of massive galaxies for redshift 0.42 – 0.45 should be most pronounced.

Notice as well that majority of massive galaxies with redshift higher than the threshold redshift 0.6415 were close to the time distance from observer 13.866 ± 0.096 Gyr [1A] and that the most distant observed massive galaxies are already 7.75 Gyr old. It leads to conclusion that contrary to the dim/cold galaxies at the mean redshift 0.6415, the maximum number density of the brighter massive galaxies (i.e. of the red and blue massive galaxies) should be shifted towards redshift ~ 0.7 – it is consistent with observational facts [14].

On the other hand, SST shows that the massive galaxies and quasars with redshift higher than the threshold redshift 0.6415 should all be in time distance close to 13.866 ± 0.096 Gyr [1B]. It means that, for example, mean apparent size (directly observed) of quasars with redshift higher than 0.6415 practically should not depend on redshift – of course, it is true when we do not calculate size indirectly involving the GR recession velocity because it leads to too big distance from observer for $z > 0.79$ so calculated GR size is smaller than the real one (according to GR, the massive galaxies at $z \sim 2$ were 4 times smaller, whereas number of satellite and dwarf galaxies practically does not depend on time [6] – it means that the real sizes of massive galaxies at high redshift must be greater than it follows from GR and it is consistent with the SST cosmology). The same concerns the luminosity (the total amount of emitted energy per unit time) for $z > 0.79$ so the GR luminosity is higher than the real luminosity that results from the SST cosmology (the distances between the GR luminosity and real luminosity are higher for higher redshift). The mainstream models have difficulty in reproducing the observed weak evolution since $z \sim 1$ of the luminosity of the early-type bright and massive galaxies [14].

According to SST, time distance from observer for $z \le 0.53$ we can calculate from following formula (it is not a linear function, whereas the spatial distance as a function of redshift is the linear function) [15]

$$T_D = z\,T\,/\,(1 - z), \tag{4}$$

where $T = 7.75$ Gyr.

5. The luminosity problem of quasars

According to SST, quasars are powered by accretion of baryonic matter into central black hole composed of neutron black holes i.e. composed of biggest neutron stars [7], [1B]. Majority of emitted energy is generated in the accretion disc due to the nuclear weak interactions of baryonic plasma with inspiraling flow of dark matter via virtual pairs [7]. The dominating efficiency of such processes is equal to the coupling constant for the nuclear weak interactions $\alpha_{W(proton)} = 0.0187229$ ($\sim 1.9\%$). But maximum efficiency of the processes near the surface of the black hole is 41.42% [7].

The dominant efficiency, $\sim 1.9\%$, is too low to explain observed luminosity of quasars within the GR cosmology but is sufficient to do it within the SST cosmology. Due to the quantum entanglement of photons with their sources that fixes the speed of light c (the duality of relativity described within SST), and due to the fact that there is the centre of the expanding Universe [1B], the time distance (it is close to the GR cosmological distance for $z < 0.8$) to most distant observed massive galaxies/quasars should be about $L_T = 13.866 \pm 0.096$ Gyr but spatial distance is $L_S = 4.971$ Gyr only [16]. It causes that the real luminosity of quasars is about $(L_T / L_S)^2 \approx 7.8$ times lower than it follows from the GR cosmology. We can see that we do not need the observed efficiency about 10% to 20%, say 15% as the mean efficiency in GR cosmology [17] – we need $15\% / 7.8 \approx 1.9\ \%$ as it follows from the SST cosmology. For example, a proton in the stellar fusion can emit following electromagnetic energy: $\alpha_{em}\, m_{proton} \approx 6.85$ MeV i.e. efficiency is $0.73\% = \alpha_{em} \cdot 100\%$, where α_{em} is the fine structure constant. In the nuclear weak interactions efficiency of emitted energy is $\alpha_{W(proton)} \cdot 100\% \approx 1.9\%$ that can transform into electromagnetic energy of scattered charged particles.

Emphasize once more that the illusory big luminosity of quasars follows from the fact that the spatial distance is about $F = L_T / L_S \approx 2.79$ times smaller than the SST-time-distance (for $z < 0.8$, the SST-time-distance is close to the GR-cosmological-distance).

Dent in 1965-1966 and Moffet in 1965 noticed that the diameters implied by the time scale of coherent radio variations are so small that they indicate the quasars to be much closer than cosmological redshift would allow (see [18]). Halton Arp argued that redshift is not due to Hubble expansion and that quasars are not in cosmological distances [18]. SST shows that Arp is right – quasars are in the SST spatial distances that are about 3 times shorter than the cosmological distances for $z < 0.8$.

6. Summary

Detection of a dim sphere composed of dim/cold massive galaxies (they should be the massive black holes composed of the bare neutron black holes described within SST) at mean redshift 0.6415 will validate the Scale-Symmetric-Theory Cosmology.

SST shows that we should see a weak redshift quantization for redshift $z \leq 0.6415$.

According to GR, the massive galaxies at $z \sim 2$ were 4 times smaller whereas number of satellite and dwarf galaxies practically does not depend on time [6] – it means that the real high-redshift sizes of massive galaxies must be greater than it follows from GR and it is consistent with the SST cosmology.

The luminosity problem of quasars follows from the fact that the SST special distance is about 2.79 times shorter than the SST time distance that is close to the GR cosmological distance for $z < 0.8$.

References

[1] Sylwester Kornowski (2015). *Scale-Symmetric Theory*
[1A]: http://vixra.org/abs/1511.0188 (Particle Physics)
[1B]: http://vixra.org/abs/1511.0223v2 (Cosmology)

[2] Planck Collaboration (10 August 2015). "Planck 2015 results. I. Overview of products and scientific results"
arXiv:1502.01582v2 [astro-ph.CO]

[3] Sylwester Kornowski (18 June 2016). "The Dark-Matter Mechanism and Orbital Speeds of Stars in Galaxies"
http://vixra.org/abs/1410.0031v8

[4] Brown, Michael. J. I., *et al.* (January 2007). "The Evolving Luminosity Function of Red Galaxies"
ApJ, Volume 654, Issue 2, pp. 858-877
arXiv:astro-ph/0609584v2
See Figure 4 in following paper:
Aday R. Robaina, *et al.* (30 June 2010). "The Merger-Driven Evolution of Massive Galaxies"
arXiv:1002.4193v2 [astro-ph.CO]

[5] S. Tamburri, *et al.* (Accepted 2 September 2014). "The population of early-type galaxies: how it evolves with time and how it differs from passive and late-type galaxies"
A&A 570, A102 (2014)

[6] Nacho Trujillo "The growth channel of massive galaxies"
www.iac.es/project/traces
www.physics.ox.ac.uk>trujillo_iau311

[7] Sylwester Kornowski (25 January 2016). "The Revised Theory of Black Holes and Accretion Discs"
http://vixra.org/abs/1508.0215

[8] "The problem of the missing baryons"
https://astro.uni-bonn.de>igm>whim

[9] Tamara M. Davis and Charles H. Lineweaver (2000). "Superluminal Recession Velocities"
http://cds.cern.ch>record>files

[10] Edward L. Wright (10 October 2006). "A Cosmological Calculator for the World Wide Web"
arXiv:astro-ph/0609593
http://www.astro.ucla.edu/~wright/DlttCalc.html (2006, PASP, 118, 1711)

[11] Adam G. Riess, *et al.* (9 June 2016). "A 2.4% Determination of the Local Value of the Hubble Constant"
arXiv:1604.01424v3 [astro-ph.CO]

[12] Sylwester Kornowski (19 June 2016). "Interactions of the Dark-Matter Loops with Baryonic Matter Once More"
http://vixra.org/abs/1606.0191

[13] M. B. Bell and D. McDiarmid (7 March 2006). “Six Peaks Visible in the Redshift Distribution of 46,400 SDSS Quasars Agree with the Preferred Redshifts Predicted by the Decreasing Intrinsic Redshift Model”
arXiv:astro-ph/0603169v1

[14] A. Fritz *et al.*: VIPERS (23 January 2014). “The VIMOS Public Extragalactic Redshift Survey (VIPERS): A quiescent formation of massive red-sequence galaxies over the past 9 Gyr”
arXiv:1401.6137v1 [astro-ph.CO] (23 January 2014)

[15] Sylwester Kornowski (1 January 2016). “An Illusion of Acceleration and Deceleration of Expansion of the Observed Universe”
http://vixra.org/abs/1408.0116

[16] Sylwester Kornowski (1 January 2016). “The Evolution of Massive Galaxies”
http://vixra.org/abs/1406.0014

[17] Jordi Miralda-Escudé
www.am.ub.edu/~jmiralda/quasars.html

[18] Halton Arp (1967). “Peculiar Galaxies and Radio Sources”
Astrophysical Journal **148**: 321-366