Polarization of Spins of Galaxies in Cosmic Filaments

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Abstract: New data suggest that the initial period of evolution of galaxies should be modified. Here, on the basis of the cosmology described within the Scale-Symmetric Theory (SST), we explain in a very simple way why spins of massive galaxies are, generally, perpendicular to cosmic filaments whereas of dwarf galaxies are, generally, tangential to them.

New data [1] suggest that there was not a sufficiently long period during the mainstream Big Bang for concentration of baryonic matter, partially separated from dark matter, to create the discs of massive galaxies in very early Universe. Within the Scale-Symmetric Theory (SST) we propose new scenario of creation of the Universe [2], [3].

Main features of the SST cosmology are as follows.

1) The expansion of the Universe was separated in time from the inflation [3], [4].

2) The return shock wave created after the SST inflation the cosmic structure which looked as very big quasar (the Protoworld) [3].

3) Inside the torus of the Protoworld, there were created massive protogalaxies with supermassive black holes in their centres [3].

4) Due to a phase transition of the Protoworld, its torus and supermassive central black hole transformed into dark matter (DM) [3]. The spinning DM loops (they are built of the entangled Einstein-spacetime (ES) components moving with the speed of light in "vacuum" c – they are the spin-1 neutrino-antineutrino pairs with spins tangent to the DM loops), with centres overlapping with the associations of the neutron black holes (NBHs), are the basic DM structures [3], [5].

5) Only then there were the inflows of dark matter and dark energy (DE) into the baryonic protogalaxies [3]. DE appeared due to the decay of the Protoworld virtual field composed of the virtual electron-positron pairs produced in the $d = 2$ states of the nucleons (it is the first/ground state above the Schwarzschild surface for the nuclear strong interactions [4]) so speed of the pairs was $\sim 0.64c$ [3], [4]. Due to the phase transition of the Protoworld, there appeared the ordered radial motions of the electron-positron pairs – the radial velocity of the front of such field was $\sim 0.64c$ [3]. We know that ordered motions decrease dynamic pressure so there were inflows of additional ES components into the expanding field composed of the virtual electron-positron pairs – dark energy is the field composed of the additional ES components (they are not entangled and they interact gravitationally only) so it can not be

distinguished from the ES. DE increased dynamic pressure in our Universe so it is responsible for its expansion.

The early Universe was the binary system of cosmic loops composed of rotating massive protogalaxies [3]. The two spin-1 cosmic loops with antiparallel spins decayed to smaller loops – they expand and evolve due to the dark energy. The smaller loops were the precursors of the cosmic filaments. To conserve the spins of galaxies, their spins must be parallel or antiparallel to their resultant velocity. The SST cosmology shows that the spin speeds of massive galaxies in a circular cosmic filament should be very low in comparison with the speed of expansion of the cosmic filamentous loops – it leads to conclusion that, generally, spins of massive galaxies should be perpendicular to the cosmic filaments. On the other hand, according to the SST cosmology, the dwarf galaxies appeared, generally, due to explosions between massive galaxies i.e. dwarf galaxies were moving tangentially to the cosmic filaments. To conserve spins, spins of the dwarf galaxies should be, generally, tangential to the cosmic filaments. It is consistent with observational data but described here the physical origin of the polarization of spins of galaxies in cosmic filaments (perpendicular for massive galaxies and tangential for dwarf galaxies) is very different from presented in other papers [6].

References

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