

# The Expanding Universe as a Magnetic Monopole

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**Abstract:** The alignment of the angular-momentums/spins of quasars and the perpendicularity of the planes of the main disc of massive spiral galaxies and the disc of a vast polar structure (VPOS) which contains the satellite galaxies, some globular clusters and stellar and gaseous streams, suggest that the Universe as a whole and the massive galaxies have a history that cannot be easily explained within the Cosmological Standard Model (CSM). Here, applying the Scale-Symmetric Theory, we showed that at the beginning of expansion of the Universe there appeared in the binary systems of protogalaxies two perpendicular discs each composed of the dark-matter (DM) loops. Dynamics of the binary systems of protogalaxies and the early Universe leads to perpendicularity of the main disc and VPOS. During the highest radial acceleration of the protogalaxies just at the beginning of expansion of the Universe (initially it was cosmic double loop with left-handed internal helicity of each loop), to stabilize the main disc and conserve its angular momentum, the binary systems of protogalaxies made a rotation (i.e. a rotation of their rotation and magnetic axes) of 90 degrees in such a way that initially the angular-momentums/spins (and magnetic axes) were mostly antiparallel to their radial velocities, i.e. initially the expanding Universe looked as a magnetic monopole. But the succeeding inflows of dark energy (locally they could be turbulent and they lasted a few Gyr) that initially caused the explosions of the binary systems of protogalaxies (in such a way appeared the VPOSs), partially destroyed the monopole-like structure of the early Universe. But a statistical analyse should show that described here correlation is preferred. The initial radial polarization of the spins of quasars explains their alignment.

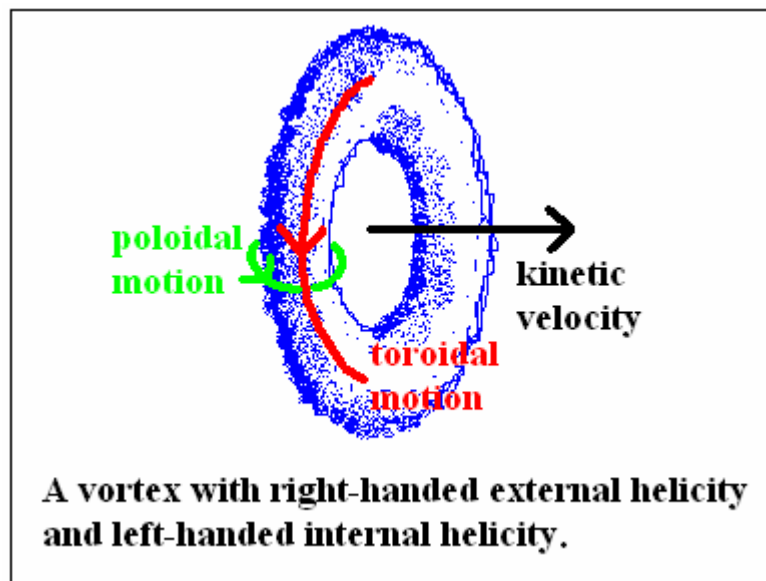
## Introduction and motivation

The Scale-Symmetric Theory (SST) 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-charge scale), and the cosmic-structures/protoworlds (it is the cosmological scale) that evolution leads to the dark-matter structures (they are the loops and filaments composed of entangled non-rotating-spin neutrino-antineutrino pairs), dark energy (it consists of the additional non-rotating-spin neutrino-antineutrino pairs interacting gravitationally only) and expanding universes (the “soft” big bangs due to the inflows of the dark energy into protoworlds) [1A], [1B]. The electric-charge scale leads to the atom-like structure of baryons [1A].

The alignment of the angular-momentums/spins of quasars and the perpendicularity of the planes of the main disc of massive spiral galaxies and the disc of a vast polar structure (VPOS) which contains the satellite galaxies, some globular clusters and stellar and gaseous streams, suggest that the Universe as a whole and the massive galaxies have a history that cannot be easily explained within the Cosmological Standard Model (CSM) [2], [3], [4], [5].

According to SST, the very early Universe was the cosmic double loop composed of rotating protogalaxies built of the neutron black holes [1B]. Each of the two cosmic loops, due to the left-handedness of the residual Higgs field, had left-handed internal helicity i.e. angular momentums of the protogalaxies were antiparallel to their toroidal velocities that were tangent to the cosmic loops. It means that initially the magnetic axes of the protogalaxies were tangent to the cosmic loops as well. Protogalaxies, due to the quantum entanglement, were grouped in larger structures [1B] but the dominating structures were the binary systems.



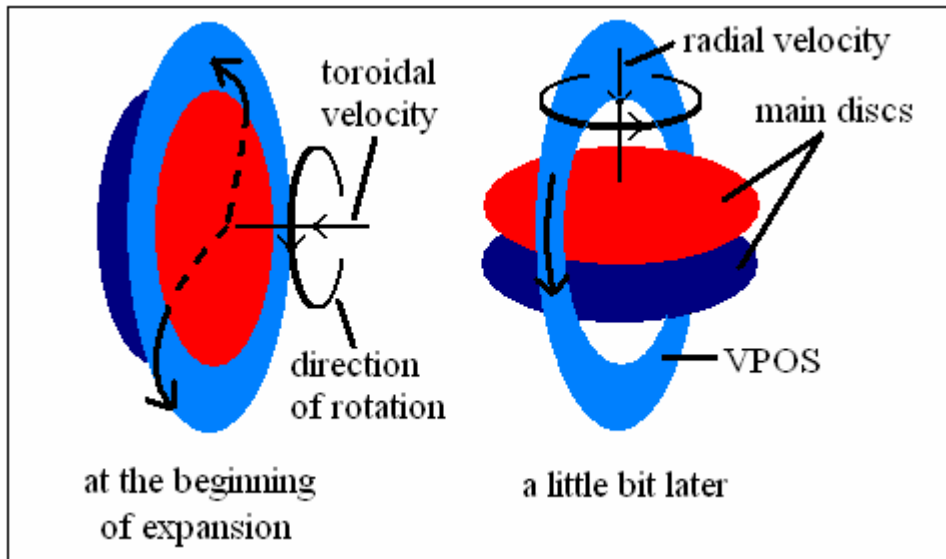
Due to the inflows of the dark energy into the binary systems of protogalaxies, the directional explosions were also between the main discs of the protogalaxies, especially along radial directions of them. The main discs rotated so ejected plasma collected in a disc (in the VPOS) in the plane of the main discs (see Fig.). The rotating baryonic plasma creates the dark-matter (DM) loops [6], [7], [8] so the DM-“ordinary”-matter interactions additionally stabilize the VPOS. The DM structures are not a part of the Einstein spacetime but they decrease local pressure of it so there are inflows of the Einstein spacetime to equalize the dynamic pressure. By using other words we can say that rotating baryonic plasma produces the DM loops from the Einstein-spacetime components. This process decreases local dynamic pressure – it forces the inflows of the Einstein-spacetime components to equalize the pressure. In such a way, the DM structures acquire their mass.

The inflows and next expansion of the dark energy significantly accelerated radial motions of the binary systems of protogalaxies just at the beginning of the expansion of the Universe.

In the cosmic-double-loop/early-Universe, the angular momentums of the protogalaxies were tangent to the cosmic loops because such orientation conserves the structure of rotating compact discs when it behaves as a rigid body. To stabilize the main disc (with time, the two parallel main discs fused into one) and conserve its angular momentum when the toroidal motion transformed into the radial motion, the binary systems of protogalaxies made a rotation (i.e. a rotation of their rotation and magnetic axes) of  $90^\circ$  in such a way that just after the transformation the angular-momentums/spins (and magnetic axes) were mostly antiparallel to their radial velocities, i.e. initially the expanding Universe looked as a magnetic monopole. The rotating VPOSs did not behave as a rigid body so there was not a rotation of their plane. It leads to the present-day perpendicularity of the main disc and VPOS. Just there are the two perpendicular discs composed of the DM loops interacting with “ordinary” matter.

But the succeeding inflows of dark energy (locally they could be turbulent and they lasted very long time in a cosmic scale) that initially caused the explosions of the binary systems of protogalaxies (in such a way appeared the VPOSs), partially destroyed the monopole-like structure of the early Universe. But a statistical analyse should show that described here correlation is preferred.

The initial radial polarization of the spins of quasars explains their present-day alignment.



## References

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