

## Basic Structures of Different Size Scales

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**Abstract:** Here, applying the Scale-Symmetric Theory (SST), we listed the basic structures in the Universe at different scales. They are as follows: multi-loop-like structures, condensate-like structures, atom-like structures, and binary systems. We have highlighted the structures that should be discovered or accepted in the future. Black hole with a central singularity and 3-quark model of baryons do not fit into the generalized scheme presented here. There is place for the quarks as the loops.

Table 1a. *Basic structures of different size scales*

Basic structures	Size scale			
	Cosmic	Star/planet	Atomic	Particle-physics
<b>Multi-loop-like</b>	1. Circular-like filaments composed of galaxies and dark matter	1. Rings of gas and dust	1. Fullerene-like structure	1. Neutral pion as binary system of loops [1] <b>Will be discovered</b>
<b>Condensate-like</b>	1. Cluster of galaxies 2. Black hole (BH) composed of the neutron black holes [2] <b>Will be discovered</b>	1. Globular clusters	1. Liquids and solid bodies	1. Atomic nuclei 2. Condensates of Einstein-spacetime components in centres of charged fermions [1] <b>Will be discovered</b> 3. Condensates of pions and other mesons [1] <b>Will be discovered</b>

Table 1b. *Basic structures of different size scales*

Basic structures	Size scales			
	Cosmic	Star/planet	Atomic	Particle-physics
<b>Atom-like</b>	<b>1.</b> Quasar: BH + accretion disc + opaque torus <b>2.</b> Active galaxy: quasar + orbiting stars and dust <b>3.</b> Galaxy + orbiting satellite dwarf galaxies <b>4.</b> Core of massive galaxy + orbiting stars <b>5.</b> Protoworld: BH + torus + ring [2] – it was the initial cosmological state before the expansion of the Universe <b>Will be accepted</b>	<b>1.</b> Star + planets <b>2.</b> Planet + moons of the planet	<b>1.</b> Atoms: atomic nucleus + “orbiting” electrons	<b>1.</b> Baryons: central condensate + torus/charge + loops of pions or pions on baryonic shells (there can be quarks as the loops [3]) [1] <b>Will be discovered</b> <b>2.</b> Neutrinos: central condensate + torus/weak-charge [1] <b>Will be accepted</b> <b>3.</b> Charged leptons: central condensate + torus/electric-charge [1] <b>Will be discovered</b>
<b>Binary system</b>	<b>1.</b> Two-core galaxy <b>2.</b> Two galaxies with bar <b>3.</b> Binary systems of galaxies	<b>1.</b> Binary systems of stars	<b>1.</b> Binary systems of atoms as, for example, H <sub>2</sub> , O <sub>2</sub>	<b>1.</b> Deuteron

There are four basic structures in the Universe at the four listed size scales (cosmic scale, star/planet scale, atomic scale, and particle-physics scale): multi-loop-like structures, condensate-like structures, atom-like structures, and binary systems.

Black hole with a central singularity and 3-quark model of baryons do not fit into the generalized scheme presented here. There is place for the quarks as the loops [3].

We have highlighted the structures that should be discovered or accepted in the future that existence follows from the Scale-Symmetric Theory (SST) based on the successive phase transitions of the non-gravitating, superluminal Higgs field [1].

**References**

- [1] Sylwester Kornowski (6 June 2016). “Foundations of the Scale-Symmetric Physics (Main Article No 1: Particle Physics)”  
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- [2] Sylwester Kornowski (29 June 2016). “Foundations of the Scale-Symmetric Physics (Main Article No 2: Cosmology)”  
<http://vixra.org/abs/1511.0223>
- [3] Sylwester Kornowski (3 December 2015). “Reformulated Quantum Chromodynamics”  
<http://vixra.org/abs/1512.0020>