



Contribution ID: 29

Type: talks

Algebraic version of the critical phenomena theory in the vicinity of critical points

Wednesday, January 22, 2025 3:00 PM (30 minutes)

1) It is proposed the application to critical phenomena of the previously proposed [1] hypothesis of the phase transition-decomposition of the maternal universe, described by the semisimple Clifford algebra (CA) $Cl(1,9)$ [2], to direct sum of CA $Cl(1,3)$ (which corresponds to our Universe) and “universes-algebras” $Cl(0,4)$, $Cl(0,6)$, which have degenerate time degree of freedom into space one.

The motivation for constructing such model and various related studies is caused by recent discoveries in astrophysics, especially when using the James Webb Space Telescope (JWST). These discoveries are questioned the Standard Model with the Big Bang theory (BB). In contrast to the BB theory in this dynamical algebraic model (DAM), it is proposed that the BB did not exist at all, but a phase transition from infinite and continuous universe took place.

2) It is considered a paradigm portals reversible energy tunneling between Minkowski space $Cl(1,3)$ and $Cl(0,4)$ - spaces, which are isomorphic in terms of the sum equality of the corresponding signatures. This fact may explain phase transitions and the appearance of fluctuations when the system achieves the vicinity of critical points not statistically, as in standard theories, but in a systematic natural way, using (i) invertible transformations of the metric in critical area and (ii) the law of conservation of energy as basic invariant under decomposition of the maternal space $Cl(1,9)$.

Here we till ignore reversible tunneling into $Cl(0,6)$ spaces which are non-isomorphic to our Universe as unlikely.

3) Examples of model using in comparison with standard theories of critical phenomena are given, in particular, this algebraic model is used to construct a phase diagram that may differ from the usual QCD phase diagram, the causes and consequences of this difference are given.

1. S.O. Omelchenko. The hypothesis of phase transition from supersymmetric matter to ordinary one. In: Proc. of XXXI-th Annual Scientific Conference of the Institute for Nuclear Research, May 27-31, 2024 (Kyiv, 2024) p. 42.
2. P. Lounesto. Clifford algebra and spinors. 2nd ed. (Cambridge: Cambridge University Press, 2001) 346 p.

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Session Classification: Session Contributed talks