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# Vacuum Energy of the Universe, Large scale magnetic field and nontrivial topology in QCD.

*Tuesday 30 April 2024 15:00 (45 minutes)*

We discuss a new scenario for early cosmology when the de Sitter phase emerges dynamically.
This genuine quantum effect occurs as a result of dynamics of the topologically nontrivial sectors in a strongly coupled QCD in an expanding universe.
We argue that the key element for this idea to work is the presence of nontrivial holonomy in strongly coupled gauge theories. The effect is global in nature and cannot be formulated in terms of a gradient expansion in an effective
local field theory. We discuss some profound phenomenological consequences of this scenario as the dynamical generation of the Dark Energy (DE).
The corresponding estimates lead to the dark energy magnitude which is expressed in terms of the dimensional QCD parameter and is amazingly close to the observed value, $\rho_{\rm DE} \sim H\Lambda_{QCD}^3 \sim (10^{-3}eV)^4$. We argue that anomalous coupling of the dark energy emergent field with Maxwell electrodynamics generates the large cosmological magnetic field as a result of the helical instability.
The generated magnetic field must be correlated on the scale of the visible Universe.

The talk is based on recent paper:
Ariel Zhitnitsky, "Cosmological Magnetic Field and Dark Energy", Phys.Rev.D 99 (2019) 10, 103518 e-Print: 1902.07737

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