

The notion of changing the fine-structure constant (in this approach Dirac const depends on  $q_i$  (eq. (B 17 a) ) reflect the existence of a massless field that couples to matter (J.-P. Uzan, 2011). Noted is the source of appearance in ‘unbroken’ state gravitational- dark field in theory■ The Dirac const fine-tuned with tuning parameter  $tk_{\underline{e}}$  (ref. note 2, Appendix C - Chapter 4, paragraph 4.2) and the massless field appears non-contradictory as gravitational part (Lorentz invariant) in the combined gravitational-dark field eq. (1.1 a).

1. According to Lowenstein extension (J. H. Lowenstein and W. Zimmermann, 1975) this massless scalar field renormalizable.
2. Moving between ‘unbroken’ state to ‘vacuum’ state is described by the applicability of Zimmermann identity to linear symmetry transformations.

Thus, changing the geometry of spacetime and corresponding symmetries denoted by changing states of gauge field (ref. Fig. 14 Mass scales and corresponding symmetries) point out on existing mass gap as the mechanism of cancellation difference between energy density of dark energy and gauge boson masses.

Specifically scale factor of CPT invariance  $\sim 10^{14}$  **Gev** account for cancellation differences in energy scales between energy density of dark energy and gauge boson masses.

In the theory framework CPT violation is associated with changing symmetries.

J.-P. Uzan, arXiv: astro-ph.CO/1009.5514 (2011).

J. H. Lowenstein and W. Zimmermann, Comm. Math. Phys. **44**, 73-86 (1975).