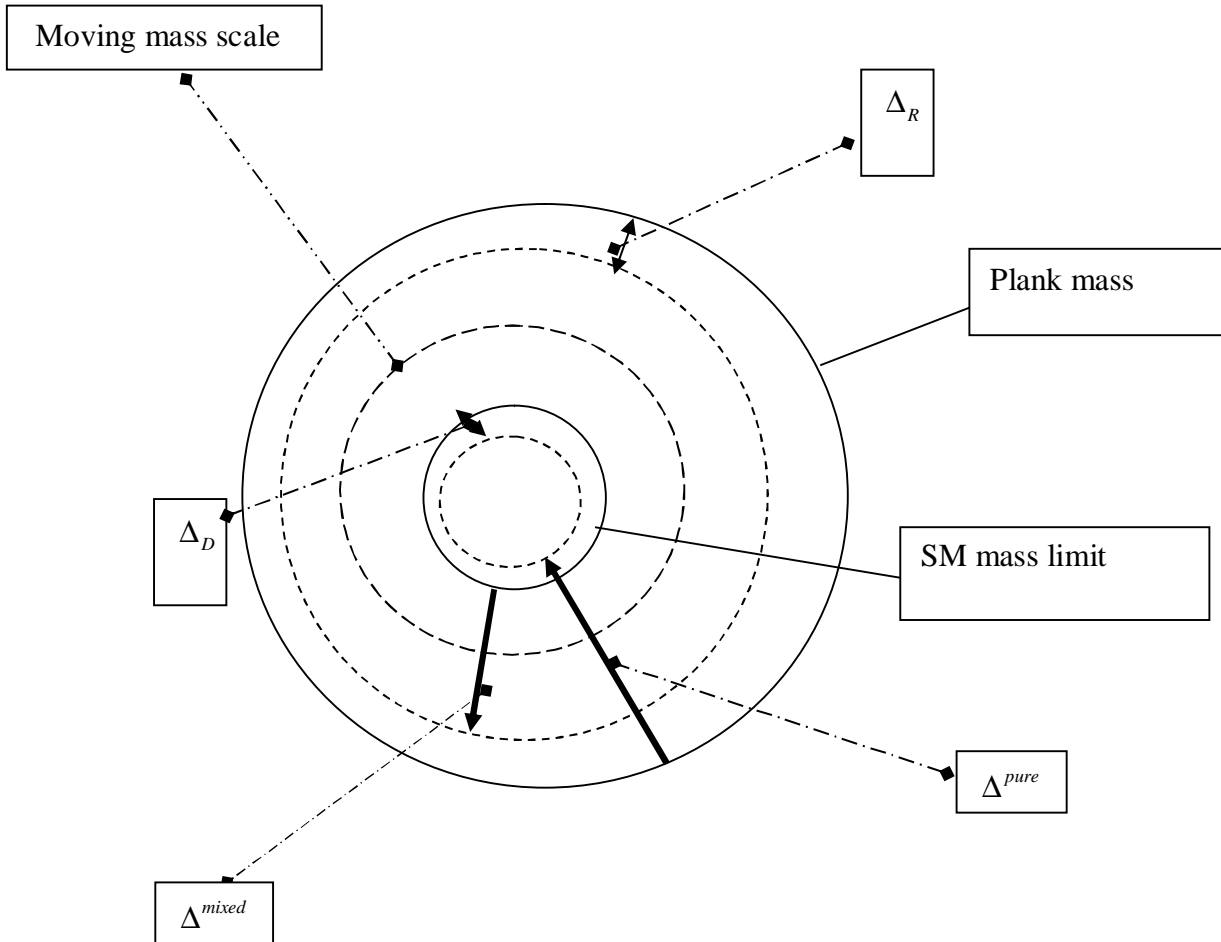


6. The new bosonic mechanism's approach to hierarchy problem.

a) Mass scale is moving due to Dark energy (Ξ – field)



1. direct path:

Mass scale dynamic Δ^{pure} is defined by De Donder–Weyl eqs. with Lagrangian in form $L_{FP_{pure}}$ (C 4.1):

$$\frac{\partial p_a^i}{\partial x^i} = \frac{-\partial p_a^i \partial_i y^a - L_{FP_{pure}}}{\partial y^a} \quad (C 6.1)$$

$$\frac{\partial y^a}{\partial x^i} = \frac{\partial p_a^i \partial_i y^a - L_{FP_{pure}}}{\partial y^a}$$

where

$$p_a^i = \frac{\partial L_{FP_{pure}}}{\partial (\partial_i y^a)}$$

Oscillation Δ_D is due to forced NLSE with the dark energy as the driving force (ref. note 2: Appendix A 5, paragraph 4, item 2 b)) with SM limit boundary.

2. restoring path:

Mass scale dynamic Δ^{mixed} is defined by De Donder–Weyl eqs. with Lagrangian in form $L_{FP_{mixed}}$ (C 4.2):

$$\frac{\partial p_a^i}{\partial x^i} = \frac{-\partial p_a^i \partial_i y^a - L_{FP_{mixed}}}{\partial y^a} \quad (C 6.2)$$

$$\frac{\partial y^a}{\partial x^i} = \frac{\partial p_a^i \partial_i y^a - L_{FP_{mixed}}}{\partial y^a}$$

where

$$P_a^i = \frac{\partial L_{FP_{mixed}}}{\partial (\partial_i y^a)}$$

Oscillation Δ_R is due to \exists of Plank scale.

\forall Eqs. (C 6.1) - (C 6.2) :

$$i \in [1, 4] \subset \mathbb{Z} , \quad a \in [1, 3] \subset \mathbb{Z} ; \quad (y^1, y^2, y^3) = (A_{ik}, C, f_i) .$$

b) Δ : Dark matter constituent

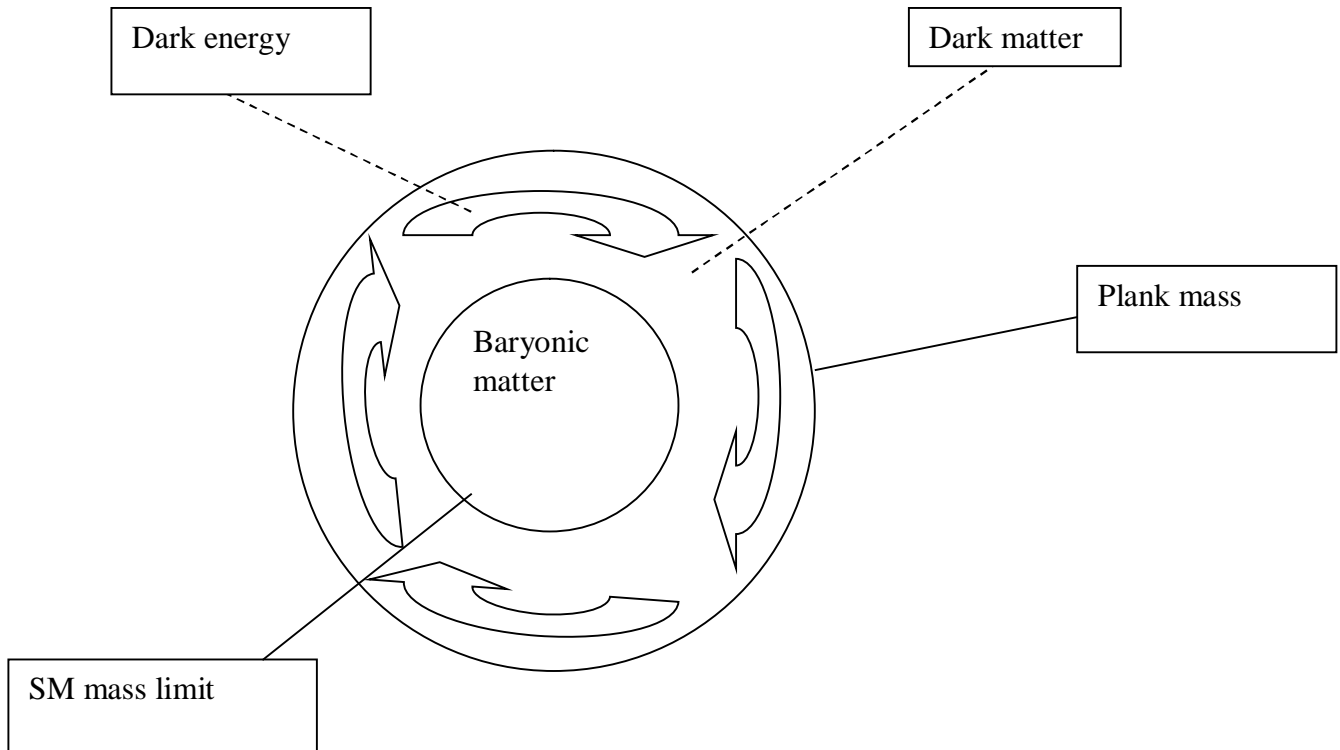


Fig. 17 a) Δ - Mass gap between SM mass limit and Plank mass is determined by Dark energy (Ξ - field);
b) Δ - Dark matter location.

1. Dark matter constituent is located within the boundary of Δ ;
2. Δ is defined according to the mass scale dynamic and is mathematically represented in item 6 a), ref. above.

a) Lorentz gauge and De Donder gauge conditions

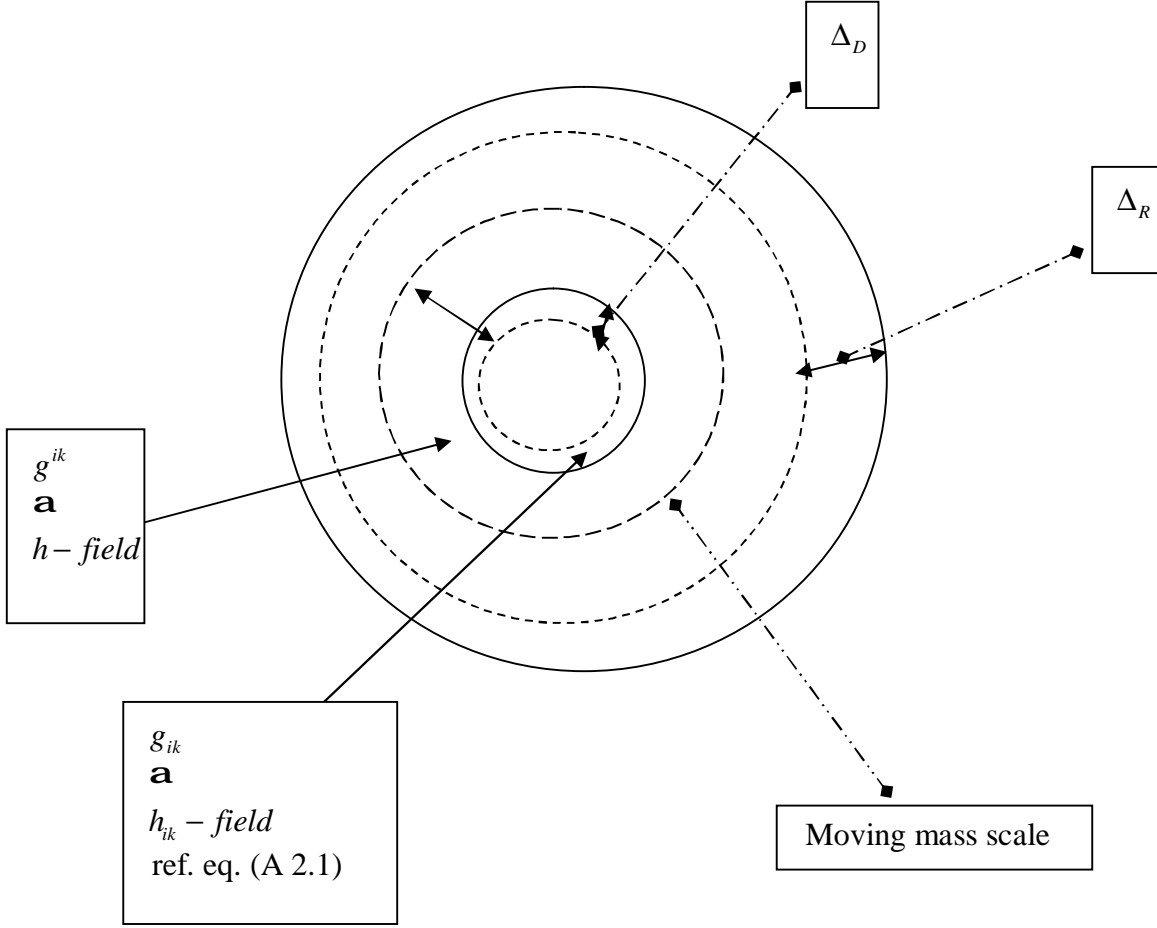


Fig. 17 c) Identification of gauge conditions for eqs. (C 6.1) - (C 6.2).

Oscillation Δ - eq. (C 1.1) correspondence:

1. $\geq \Delta_R < \text{'unbroken' state}$;
 2. $] \text{Moving mass scale}, \Delta_R[< \text{'vacuum' state}$;
 De Donder gauge is applied $\Rightarrow \partial_k (g^{ik} \sqrt{-g}) = 0$;
 $\exists \partial_i f(x) \wedge \neg \exists A_i(x)$ ref. eq. (0.0.1);
 3. $] \Delta_D, \text{Moving mass scale}[< \text{'mixed' state}$;
 Lorentz gauge is applied $\Rightarrow \partial_i A^i(x) = 0$
 $\exists A_i(x)$ ref. eq. (0.0.1);
- f** the condition (ref. note 2: Appendix A 5, paragraph 4, item 2 b)) with SM limit boundary is satisfied for entropic electromagnetic field f_i .
4. $\leq \Delta_D < \text{'pure' state}$.