# Dark enegry and asymmetry time quantum gravity

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The cosmological constant problem is a challenge for quantum gravity. The minimum vacuum energy is calculated taking into account the contribution of all fields and roughly speaking all particles and antiparticles must be reduced to zero, which means that vacuum has a zero value in quantum field theory.

$$E = \frac{1}{2}\hbar\omega$$

However, there is a small but non-zero vacuum energy in cosmology.
We are giving a radical new solution to this problem. We believe that the unitary nature of quantum gravity is non-linear in time [1].

$$\frac{\partial^3 S}{\partial t^3} + \frac{\partial S}{\partial t}\frac{\partial^2 S}{\partial t^2} = G\hbar \cdot \partial_\alpha \partial^\alpha \Gamma$$

$$\Gamma \approx e^{\alpha\beta\gamma}\partial_\alpha S \;\; \partial_\beta S \;\; \partial_\gamma S$$

This means there is an energy correction to the vacuum, which is not symmetrical in time, the energy balance when particles and antiparticles contract is disturbed.We believe that the asymmetrical part of the energy correction is non-linear in time with the unitary phase of the wave function

$$\omega_0^3 = \frac{\partial^3 S}{\partial t^3} + \frac{\partial S}{\partial t}\frac{\partial^2 S}{\partial t^2}$$

This asymmetrical correction affects the energy balance of the vacuum

$$\rho_{VAC} \sim \omega_0^4 = (G\hbar \cdot \partial_\alpha \partial^\alpha \Gamma \;)^{\frac{4}{3}}$$

The right side of our equation contains the curvature of fluctuations in quantum fields, roughly speaking, cut by high modes of oscillation

$$\partial_\alpha \partial^\alpha \Gamma \sim k^5$$

The general formula for calculating the vacuum energy density from the non-linearity of time in quantum gravity is obtained

$$\rho_{VAC} \sim \left( \frac{k^5}{M_p^2} \right)^{\frac{4}{3}}$$

In empty space, only the Higgs field has free quantum fluctuations, the average value of the Higgs field is known, it is proportional to the mass of the Higgs boson

$$\rho_{VAC} \sim \left( \frac{M_{higgs}^5}{M_p^2} \right)^{\frac{4}{3}} \sim 10^{-122} M_p^4$$

By substituting, we find an amazing coincidence with real values. Thus, vacuum fluctuations of fields affect the non-linearity of time in quantum gravity, that is, it violates the time symmetry of the vacuum energy balance.

It is also possible that non-linearity time may affect hadron asymmetry

$$\delta \sim \left( \frac{M_X^2}{M_p^2} \right)^{\frac{1}{3}}$$

Interestingly, this model allows you to consider the relationship of non-linear time and the collapse of the wave function

$$i \frac{\partial^3 \psi}{\partial t^3} = G\hbar \cdot R \;\; \psi$$

$$R = \partial_\alpha \partial^\alpha \; | \psi |^2$$

$$| \psi |^2 = \frac{dP}{dV}$$

In general, our model is surprisingly diverse and allows you to take a different look at the nature of time based on two constants (Planck constant and Newton constant gravity).

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