A Unified Field Theory II

Spontaneous Creation of the Universe

Peter Hickman

Abstract

Further to the paper A Unified Field Theory [1], certain details have been reviewed and modified in this paper. Dark energy is now considered to be the inflaton field after inflation. As a consequence the cosmological density ratios are re-calculated to be: Dark energy 0.68, Dark Matter 0.27, Matter 0.05. A transition within the Higgs vacuum followed by inflation forms the Big Bang state, ie the spontaneous creation of the universe.

1 THE PRIMARY QUANTUM FIELD

In the paper [1]. there are 6 4d spinors with spins (1,1,3/2,1/2,2,0). Matter and Dark matter are now SU(4) color singlets formed from 2 4d spinors with a SU(4) color and anti-color state. The SU(4) symmetry is unbroken.

The primary quantum field (PQF) $\Psi(E)$ consists of matter and dark matter with the following degeneracies:

Matter

48 s=1/2

Dark matter:

64 s=3/2

169 s=0,1,2 consisting of:

124 s=0,1,2

45 s=1 SU(4) massive gauge bosons

The (0,0) state is now excluded as this is a particle-anti-particle pair. (Table 1 of [1]). The beta function of SU(N) to lowest order $\beta_1(\alpha)$ is [2]

$$\beta_1(\alpha) = \frac{\alpha^2}{\pi}\left(-\frac{11N}{6} + \frac{n_f}{3}\right) \quad \textbf{(1)}$$

where α is the coupling strength and n_f is the number of flavors. N=4, n_f= 6 hence $\beta_1(\alpha) < 0$. It follows that SU(4) is asymptotically free, similar to QCD SU(3).

2 DARK ENERGY

The inflaton field after inflation is dark energy.

The massless quanta of the asymmetric metrics with spin ±2 is the Inflaton field [1]. For each Matter and Dark Matter state there is an asymmetric metric in addition to the 3 asymmetric metrics which are free from matter and dark matter. The degeneracy of dark energy is (48+64+169+3)×2 =570

3 COSMOLOGICAL DENSITY RATIOS

The ratio of matter Ω_b to dark matter Ω_d in thermal equilibrium is using Fermi-Dirac and Bose-Einstein statistics:

$$\frac{\Omega_b}{\Omega_d} = \frac{14}{75} \quad \textbf{(2)}$$

The ratio of dark energy Ω_Λ to matter Ω_b in thermal equilibrium is using Fermi-Dirac and Bose-Einstein statistics:

$$\frac{\Omega_\Lambda}{\Omega_b} = \frac{284}{21} \tag{3}$$

After inflation the total energy density is at critical density

$$\Omega_\Lambda + \Omega_d + \Omega_b = 1 \tag{4}$$

Solving **(2)**,**(3)**,**(4)** gives $\Omega_\Lambda = 0.68$, $\Omega_d = 0.27$, $\Omega_b = 0.05$
which are in near agreement with Planck Mission Data [3]

4 6D GENERALISED CO-ORDINATES

Let each of the 6d generalised co-ordinates (p,q) follow a potential $V(\Phi^\dagger\Phi)$ of the form

$$V(\Phi^\dagger\Phi) = \mu^2(\Phi^\dagger\Phi) - \lambda^2(\Phi^\dagger\Phi)^2 \tag{5}$$

where $[\Phi^\dagger\Phi] = L$
It follows that there is a minimum $(\Phi^\dagger\Phi)_0 = \mu^2 / 2\lambda^2$
and hence an upper energy bound $E = \hbar c(2\lambda^2 / \mu^2)$

5 SPONTANEOUS CREATION OF THE UNIVERSE

The primary quantum field $\Psi(E)$ has energy $E \in [E_l, E_u]$, where E_l and E_u are the lower and upper energy bounds [1].
The Higgs vacuum state emerges with the gravitational interaction of the $\Psi(E_l)$ with $\Psi(E_u)$ PQF's with total spin 0 [1]. Thermalisation of these 2 PQF's results in a state which is equivalent to the gravitational interaction of 2 scalars with energy 246GeV, the Higgs vacuum.
Within the Higgs vacuum, as $\Phi^\dagger\Phi$ approaches the minimum, the energy of a particle approaches an upper bound. This results in the emergence of the $\Psi(E_u)$ and $\Psi(E_l)$ quantum fields prior to inflation.
The local inflaton field density can dominate resulting in inflation and the emergence of the PQF $\Psi(E_u \sim 10^{17} GeV)$ as the Big Bang state. Since SU(4) is asymptotically free, inflation ends when the spatial separation of SU(4) particles is the range of SU(4).

6 CONCLUSION

The Universe emerges when the Higgs vacuum makes the spontaneous transition to 2 quantum fields with particle energies $E_l \sim 10^{-3} eV$ and $E_u \sim 10^{17}$GeV. The local inflaton field density dominating over the matter/dark matter density results in inflation which ends with the formation of the Big Bang state.

References

[1] Hickman P. *A Unified Field Theory vixra:1308.0095, 2013*

[2] Gross D, *Twenty Five Years of Asymptotic Freedom, arXiv:hep-th/9809060v1, 1998*

[3] Challinor Anthony et al, *Planck 2013 results. XVI. Cosmological parameters:arXiv:1303.5076v,2013*