THE FATE OF OUR AND OTHER SURROUNDING UNIVERSES

(Concepts regarding the consequence of the universes)

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Abstract: This study of the universes and its consequent fate in the future is undertaken not only to analyze the possible outcomes but also to give an idea about the nature in which the other universes apart from ours differ.

INTRODUCTION

To start with a few propositions given by the great theoretical physicist Stephen Hawking about the possibility of creation of everything from "nothing" leads to the formation of universe in which we are a part of. A second and one of the most demanding propositions made by him include that "there are not one but many universes".

The above statement leads to the pile of questions as to whether these other universes are similar to us? Or they are different? How do they behave? What is the content of those universes? And many such other reasonable questions to be answered to.However in my hypothetical analysis I will provide some of the possible outcomes regarding the future of these universe which will as well include the touch of the nature or behavior of these universes ,further referred to as U ,wherever necessary.

With our present knowledge which claims our universe to be ever expanding brings us to the thought about whether other universes are ever expanding constricting or stationary. These givens situations are derived from our preliminary knowledge of Alexander Friedmann's given models regarding the universes. Considering these three models to be applicable to the universes we further proceed to determine their nature and fate.

HYPOTHETICAL CASES:

Case 1: If the universes are ever expanding,

Let U_1 be the universe where we exist, it is ever expanding. Thus we can say if for all the other universes are simultaneously expanding then for any two universes at a particular instant of time t' which is greater than the time initially t (i.e. t'>t) the horizons or the boundary of the two universes collide or merge with each other. Here collision and merging are two different phenomena.

Case 2: If the universes are ever constricting with respect to time,

The above mentioned condition is highly unstable because the universes, as they get constricted gradually, become a mass of highly concentrated energy which may ultimately lead to a singularity if it reaches the condition of infinite density.

Case 3: If the universes are stationary,

Keeping the fact constant that our universe is expanding, the other universes are stationary with one of those universes as the reference frame. So as the case looks like we see that our universe gradually expands to collide or merge with those fixed universes and thus making them a part of ours, if we consider merging as most probable phenomena, the reasons of which has been discussed further .

Case 4: The fourth and the final case corresponds to the most interesting phenomena which comprises of all the above 3 cases. Let us consider 6 universes to be present (in general $U_{n\ \text{number}}$ of universes can be present where n belongs to natural number). Suppose 2 of these universes are ever expanding, 2 of them are constricting and 2 of them are stationary. There can be several permutations and combinations to the mentioned consideration but I am considering an easy one.

Time plays an important role over here. The time in which two universes are expanding and the time in which two universes are constricting may or may not be the same, depending on which the consequences may be different. If we consider the 2D geometry of these universes and suppose them to be an ellipse with the general equation $\left[\left(\frac{x^2}{a^2}\right) + \left(\frac{y^2}{b^2}\right) = 1\right]$ thus we can conclude that a single universe can simultaneously merge with two (in this case) or more than 2(in other cases).

RESULTS AND DISCUSSIONS:

If we head back to case 1 I talked about collision and merging to be of different phenomena and merging to be of more probable phenomena.

Collision: The phenomena includes release of energy which indicates it being an exothermic process with a negative enthalpy and according to Gibb's free equation $\Delta G = \Delta H - T\Delta S$,the process is spontaneous due to resultant negative Gibbs free energy.

Merging: The phenomenon involves not only the above case of negative enthalpy but also a resultant increase in entropy. The resultant entropy is greater than the summation of the individual entropies of the universes ($S_1+S_2<S$, if S is the final entropy). Thus the Gibb's free energy becomes more negative than the previous case and the process becomes much more feasible than the previous one.

During the expansion of the universe if we consider the initial position of the universe horizon or boundary as r(t=0)=xi+yj+zk, where i,j,k are unit vectors along the positive x,y,z coordinates, then for time interval ∂t the rate of change of position with time of the boundary or in other terms the velocity of the boundary expansion is subject to Heisenberg's uncertainty principle

$$\Delta r * \Delta p = \hbar/2$$

Thus making it impossible to determine the exactness of position as well as velocity at the same time.

The final limit thus becomes $\lim_{\Delta r \to 0} \int_0^{infinity} dr = \lim_{\Delta p \to 0} \int_0^{infinity} \hbar/2dp$

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