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#### Paper 8

# Either the accelerating expansion of the Universe is an illusion or $T_0 = \frac{1}{H_0}$ the age of the Universe being the inverse of the Hubble constant is not valid any longer.

### Abstract

Controversy will result in the Age of the Universe as  $T_0 = \frac{1}{H_0}$ , ( $T_0$  is the age of the

Universe at the present epoch and  $H_0$  the Hubble constant at present) due to accelerating expansion of the Universe.

If at any time the universes expansion starts to accelerate then the age of the Universe as the inverse of the Hubble constant will start to go backward and the Universe will become younger. This implicates the idea that the time cannot travel backward or the Universal clock has only forward direction.

### <u>Text</u>

The age of the Universe being the inverse of the Hubble constant has been well stablished<sup>[1]</sup> throughout the evolution of the Universe as:

$$H_{0m} = \frac{V_{0m}}{CMD} = \frac{\frac{2Zc}{3(Z+1)}}{\frac{2ZT_0}{3(Z+1)}} = \frac{1}{T_0}$$

 $T_0$ 

Where  $H_{\rm 0m}$  is the Hubble constant for matter in the Universe at the present epoch.

 $V_{0m}$  is the velocity of the recession of the galaxies.

CMD is the comoving or the proper distant of the galaxies.

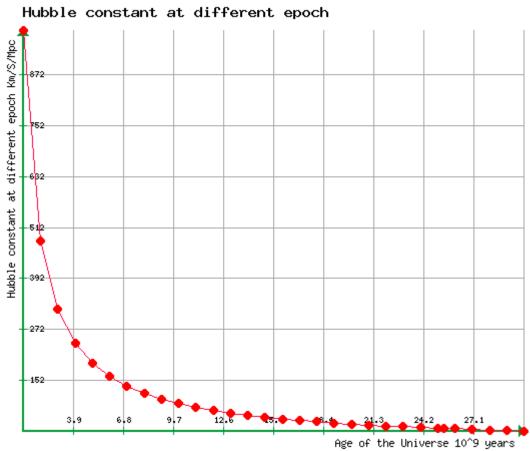
 $T_{\rm 0}\,$  is the present age of the Universe and Z the red-shift.

The accelerating expansion of the Universe  $(Riess \ et \ al)^{[2]}$  will increase the value of the Hubble constant and causes the decrease in the age of the Universe rather than Universe getting older.

The table 1 is the values of the Hubble constant at different epoch of the universes evolution verses the age of the Universe and the plots in figs 1&2.

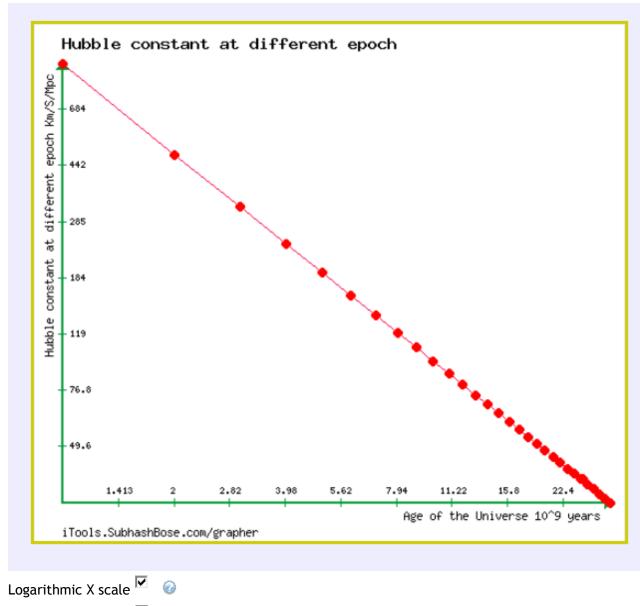
1       1 $978$ 2       2 $480$ 3       320 $4$ 4       4 $240$ 5       5 $192$ 6       6 $160$ 7       7 $137$ 8       8 $120$ 9       9 $107$ 10       10 $96$ 11       11 $87.2$ 12       12 $79.9$ 13       13 $73.8$ 14       14 $68.5$ 15       15 $64$ 16       16 $60$ 17       17 $56.4$ 18       18 $53.3$ 19       19 $50.5$ 20       20 $48$ 21       21 $45.7$ 22       22 $43.6$ 23       23 $41.7$ 24       24 $40$ 25 $25.3$ $38.37$ 24       24 $40$ 25 $36.9$ $47.6$		х	Y	÷
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17       17       56.4         18       18       53.3         19       19       50.5         20       20       48         21       21       45.7         22       22       43.6         23       23       41.7         24       24       40         25       25       38.37         26       25.3425       38.565         27       26       36.9         28       27       35.53         29       28       34.26         30       29       33.08	15	15	64	÷
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20       20       48         21       21       45.7         22       22       43.6         23       23       41.7         24       24       40         25       25       38.37         26       25.3425       38.565         27       26       36.9         28       27       35.53         29       28       34.26         30       29       33.08	18	18	53.3	_
21       21       45.7         22       22       43.6         23       23       41.7         24       24       40         25       25       38.37         26       25.3425       38.565         27       26       36.9         28       27       35.53         29       28       34.26         30       29       33.08	19	19	50.5	
22       22       43.6         23       23       41.7         24       24       40         25       25       38.37         26       25.3425       38.565         27       26       36.9         28       27       35.53         29       28       34.26         30       29       33.08	20	20	48	÷
23       23       41.7         24       24       40         25       25       38.37         26       25.3425       38.565         27       26       36.9         28       27       35.53         29       28       34.26         30       29       33.08	21	21	45.7	-
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25     25     38.37       26     25.3425     38.565       27     26     36.9       28     27     35.53       29     28     34.26       30     29     33.08	23	23	41.7	-
26     25.3425     38.565       27     26     36.9       28     27     35.53       29     28     34.26       30     29     33.08	24	24	40	÷
27       26       36.9         28       27       35.53         29       28       34.26         30       29       33.08	25	25	38.37	÷
28     27     35.53       29     28     34.26       30     29     33.08	26	25.3425	38.565	÷
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Fig 1



Logarithmic Y scale  $\mathbf{\overline{V}}$ 

Fig 2

To see how the values for accelerating expansion would affect the age of the Universe.

We will consider a galaxy a distant of about 1 MPC away moving away with the velocity of  $V = 60 KmS^{-1}$  will result in a Hubble constant of.  $H_0 = 60 KmS^{-1}Mpc^{-1}$ 

If after a time period of 1 billon years  $(1 \times 10^9 \text{ Years})$ , the expansion of the Universe accelerate to a velocity of  $V = 70 \text{ KmS}^{-1}$ , the galaxy would have moved a further distance of d = 0.06646216769 Mpc taking the average velocity at  $v = 65 \text{ KmS}^{-1}$ .

This would make the Hubble constant from

 $H_0 = 60 KmS^{-1}Mpc^{-1}$  to  $H_0 = 65.63758 KmS^{-1}Mpc^{-1}$ 

The inverse of the Hubble constant will give the age of the Universe and at the start prior to the acceleration  $T_0 = 16.3 \times 10^9 Years$  to  $T_0 = 14.9 \times 10^9 Years$  in which by adding 1 billon years the age of the Universe after the acceleration should be about  $T_0 = 17.3 \times 10^9 Years$ . This implies that the Universe is 2.4 billon years younger than it should be.

### **Conclusion**

The calculation and the argument above shows that the expansion of the Universe cannot be accelerating and as the Hubble constant is the inverse of the age of the Universe throughout the evolution of the Universe which has been well stablished, proofs the inconsistency of the accelerating expansion.

#### **References**

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