Small Corrections To the Critical Density Calculation in MHCE8S Theory Produce Full Agreement With Planck Collaboration Data

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Abstract: An increase of 10 million years for the very hot period of the universe and increasing the universe's radius to be exactly c/fine-strucure constant alpha produce full 3- digit agreement with Planck Collaboration critical density data.

Four cyclic universes[1] have occurred in the universe and a total of 80 million years has been spent on very hot, dense phases, or 20 million years per universe instead of 10 million years. This is the 1st correction.

The 2nd correction is to the radius of the universe (calculated for 13.5 billion years of universe age). Previously I changed this value from the exact c/alpha data = **4.1082355** x 10^26 M (note[2] factor 10 error in viXra 1812.0264) to 4.1076555 x 10^26 M to bring the mc^2 for the top quark from 171.72424 to 171.7 GeV. Instead I should have followed my earlier (neutron) work and ignored the 2424 digits and kept the exact c/alpha data. Doing this now, and next calculating the holograhic[3] critical matter per galaxy = 13.36 x 1.782662 x 31.5576/**3** = 250.52909 x 10^-12 Kg. The universe volume = 4/3 x pi x R^3 = 1.3333333 x 3.1415926 = 4.18879 x (4.1082355 x 10^26 M)^3 = 4.18879 x 69.337147 = 290.43874 x 10^78 = 2.9043874 x 10^80 M^3. The critical fermion density = 250.52909 x 10^-12 Kg/2.9043874 x 10^53 M^3 = 86.258852 x 10^65 = 8.6258852 x 10^66 Kg/M^3 = **8.62** (1st 3 digits) and replacing 10^66 by the holographic[4] 10^-27, one gets **8.62 x 10^-27 Kg/M^3**.

In obtaining the holographic 10^-27, we first square the 10^-12 of the holographic critical matter, (leaving the 250.52909 untouched) producing 10^-24; we then multiply by **10^-3** to get 10^-27. Note that overall we apply the factor 3 twice, firstly as a magnitude divisor 3 and secondly as an exponent -3 to get the complete holograpic transfomation.

For universe radius R = **4.1082355** x 10^26 M, the derived (see p. 1) universe volume is 2.9043874 x 10^80 M^3. Now I earlier[5] found the volume of one active galaxy to average 10^-27 smaller, or ~ 2.90 x 10^53 M^3. I have neglected to show if this galaxy volume (and associated average active galaxy spacing) are reasonable. The diameter $2R_g$ of the average galaxy is $2R_g$ = 8.216 x 10^26-9=17 M. The andromeda galaxy[6] is ~ 2.54 x 10^6 Ly away or x 94.6 x10^14 M = 2.365 x 10^22 M. The galaxy spacing/galaxy diameter = 2.365 x 10^22/8.216 x 10^17 ~ 3 x 10^4, which I consider ample.

1. Paul J. Steinhardt, Neil Turok,"A cyclic model of the universe", ArXiv HEP-Th/0111030, (2001)

2. "Observable universe", Wikipedia, (2018)

3. George R. Briggs, " The critical fermion density of the universe revisited: role of holography in MHCE8S theory", Vixra 1812.0487, (2018)

4. "Holographic principle", Wikipedia, (2019)

5. George R. Briggs, "The critical fermion density of the universe found from cyclic universe E8 symmetry theory ", ViXra 1703.0310, (2017)

6. "Andromeda galaxy", Wikipedia, (2019)