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Dunbar's Number and Prime Structure of Observable Universe

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Abstract: *Dunbar's number and the prime structure of the observable universe have been related.*

Keywords: *Spinning of matter, Heraclitean dynamics, Dunbar's number, prime structure of the observable universe*

1. Introduction

To relate Dunbar's number and the prime structure of the observable universe is the subject of interest of this paper.

2. Dunbar's Number

Dunbar's number is the maximal number of relationships a person can maintain. It was first proposed in the 1990s by British anthropologist Robin Dunbar, who found a correlation between primate brain size and average social group size [1]. By using the average human brain size and extrapolating from the results of primates, he proposed that humans can comfortably maintain 150 stable relationships [2]. Let us see, if this number could mirror the prime structure of the observable universe, too.

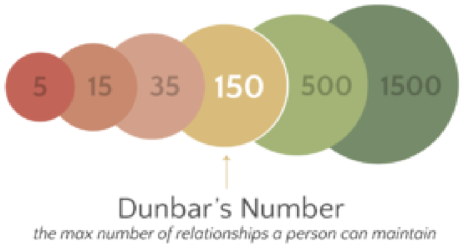

Figure1. *Dunbar's number [3]*

3. The Total Mass of the Observable Universe

The considered mass can be offered as the average of ten estimates of the total mass of the observable universe $m_{relativistic} = 2{,}9\,.\,10^{54} kg$ calculated by Henry K.O. Norman [4] and is presented in Figure 2 [5]:

Total Universe Mass Estimates	
Mass (kg)	**Source**
3.0×10^{50}	*arxiv.org*
3.0×10^{52}	*cornell.edu*
6.0×10^{52}	*umass.edu*
1.0×10^{53}	*hypertextbook.com*
1.5×10^{53}	*wikipedia*
1.8×10^{53}	*pragtec.com*
1.0×10^{54}	*arstechnica.com*
1.8×10^{54}	*hypertextbook.com*
1.0×10^{55}	*universetoday.com*
1.6×10^{55}	*hypertextbook.com*
2.9×10^{54}	Average

Figure2. *The estimates of the total mass of the observable universe [5]*

4. THE SPINNING OF MATTER AT THE LUMINAL SPEED

Let us propose that matter spins at the luminal speed $a = \frac{v}{c} = 1$ manifesting the relativistic mass $m_{relativistic}$ according to Heraclitean dynamics [6]:

$$m_{relativistic}^2 c^2 a^2 = e^{\frac{m_{ground}^2 c^2 - k(1-lnk) + m_{relativistic}^2 c^2 (a^2-1)}{k}}. \qquad (1)$$

Expressed in the simplified form for $a = 1$

$$m_{relativistic}^2 c^2 = e^{\frac{m_{ground}^2 c^2 - k(1-lnk)}{k}}. \qquad (2)$$

And explicitly for the ground mass

$$m_{ground}^2 c^2 = k\ln(m_{relativistic}^2 c^2) + k(1 - lnk). \qquad (3)$$

Then – knowing the dynamics constant k – the ground mass of any physical body could be calculated.

5. THE GROUND MASS OF THE SPINNING MATTER AT THE LUMINAL SPEED

For the relativistic mass $m_{relativistic}$ to be real the ground mass m_{ground} could be real, zero or even imaginary since the square of an imaginary number is real.

According to Eq. (2) the real relativistic mass belongs to zero ground mass if at the luminal speed holds (2):

$$m_{relativistic}^{zero} = \frac{e^{\frac{lnk-1}{2}}}{c}. \qquad (4a)$$

And for the ordinary matter where $k = hc$ we have (See appendix):

$$m_{relativistic}^{zero} = \frac{1}{\sqrt{e}} \cdot \sqrt{\frac{h}{c}} = 9{,}017\ 173\ 422\ 304 \,.\, 10^{-22}\text{kg} = 989\ 877\ 440{,}4646\ m_e. \qquad (4b)$$

The nature of ground mass according to the amount of the relativistic mass is presented in Table 1.

Table1. *The nature of ground mass according to the amount of relativistic mass*

$m_{relativistic}$	m_{ground}	
$> \frac{1}{\sqrt{e}} \cdot \sqrt{\frac{h}{c}}$	$\mathbb{R}$	Macro world
$\frac{1}{\sqrt{e}} \cdot \sqrt{\frac{h}{c}} = 9{,}017\ 173\ 422\ 304 \,.\, 10^{-22}\text{kg} = 989\ 877\ 440{,}4646\ m_e$	0	
$< \frac{1}{\sqrt{e}} \cdot \sqrt{\frac{h}{c}}$	$i\mathbb{R}$	Micro world

All particles of micro world are light enough to belong to the imaginary ground mass in Heraclitean dynamics. And all bodies of macro world are heavy enough to belong to the real ground mass. Let us calculate the ground mass of the total observable universe if it spins at the luminal speed.

6. THE GROUND MASS OF THE SPINNING TOTAL OBSERVABLE UNIVERSE AT LUMINAL SPEED

The ground mass of the total observable universe $m_{ground}^{universe}$ spinning at the luminal speed can be calculated with the help of the corresponding relativistic mass $m_{relativistic}^{universe} = 2{,}9 \,.\, 10^{54} kg$ (See section 2) and applying the equation (3) what gives:

$$m_{ground}^{universe} = 2{,}772266999426030 \,.\, 10^{-20} kg. \qquad (5)$$

And expressed in the units of the electron mass we have:

$$m_{ground}^{universe} = 30\ 433\ 090\ 649{,}9860\ m_e \approx 30\ 433\ 090\ 650\ m_e\ . \qquad (6)$$

7. The Prime Structure of the Observable Universe

Inside the integer number 30 433 090 650 Dunbar's number 150 is hidden as follows:

30 433 090 650 = 150 x 202 887271. (7)

And the number 202 887 271 is a prime.

8. Conclusion

Coincidence

Dedication

To John Green

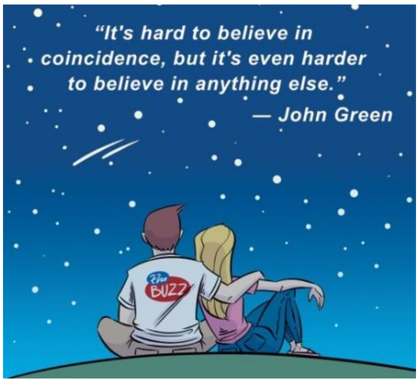

Figure3. *About coincidence [7]*

References

[1] Reisinger, Don (25 January 2010). "Sorry, Facebook friends: Our brains can't keep up". CNET.

[2] Purves, Dale (2008). Principles of Cognitive Neuroscience. Sunderland, Massachusetts: Sinauer Associates. ISBN 9780878936946.

[3] https://en.wikipedia.org/wiki/Dunbar%27s_number

[4]https://www.quora.com/profile/Henry-K-O-Norman-1

[5] https://www.quora.com/What-is-the-mass-of-the-universe

[6] Janez Špringer (2022) "Fine Structure Constant Deduced from Special Ground Mass in Heraclitean Dynamics" International Journal of Advanced Research in Physical Science (IJARPS) 9(9), pp.12-15, 2022.

[7] https://thebuzzmagazines.com/articles/2021/12/coincidence-and-connections

Appendix

We want to prove that $k = hc$ if the next equation is valid

$$\frac{e^{\frac{lnk-1}{2}}}{c} = \frac{1}{\sqrt{e}}.\sqrt{\frac{h}{c}}. \qquad (a)$$

We square the Eq.

$$\frac{e^{lnk-1}}{c^2} = \frac{h}{ec}. \qquad (b)$$

We abbreviate the Eq.

$$\frac{e^{lnk-1}}{c} = \frac{h}{e}. \qquad (c)$$

We transfer the factor c from the left to the right side of the Eq.

$$e^{lnk-1} = \frac{hc}{e}. \qquad (d)$$

We transfer the factor e from the right to the left side of the Eq.

$$e.e^{lnk-1} = hc. \qquad (e)$$

We multiply the factors on left side of the Eq.

$$e^{1+lnk-1} = hc. \qquad (f)$$

We rearrange the left side of the Eq.

$$e^{lnk} = hc. \qquad (g)$$

We take the logarithm of both sides of the Eq.

$$lnk = lnhc. \qquad (h)$$

Thus

$$k = hc. \qquad (i)$$

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