Deriving Total Energy of the Universe with the Brownie Worldview

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Abstract

The Brownie Worldview was recently developed by OHS student H. Lu. It has gained prominence as a promising framework for explaining natural phenomena. In this paper, we attempt to analyze fundamental properties of the universe with respect to the Brownie worldview. We derive the total energy of the universe and show that it matches that of a classical derivation, further establishing the Brownie Worldview as a viable scientific framework.

Contents

1 Introduction

1.1 Laws of Brownie

The original paper by Lu (hereafter referred to as the "Brownie Worldview Paper" or simply "BWP"), while succint, allows for several important conclusions to be made. We distill our observations into the 3 Laws of Brownie listed below: [3]

1. The power of cuteness frees Brownie from the usual constraints of physics.
2. Every concept that currently exists in the universe originates from Brownie, whether directly or indirectly.
3. In any conflict with classical physics, the Brownie Worldview must remain supreme.

We may now use these laws to derive certain properties of the universe.

2 A Rough Model of the Universe

2.1 Brownie as a Thermodynamical System

Per the Second Law of Brownie, it can be deduced that all energy that exists in the universe originates from Brownie. The exact method for this generation of energy is uncertain. However, we may gain a fairly accurate model by introducing the Pink Toy into the picture.

Figure 1: Brownie and the Pink Toy

Assume that work done by chomping the Pink Toy does work through the temperature gradient.

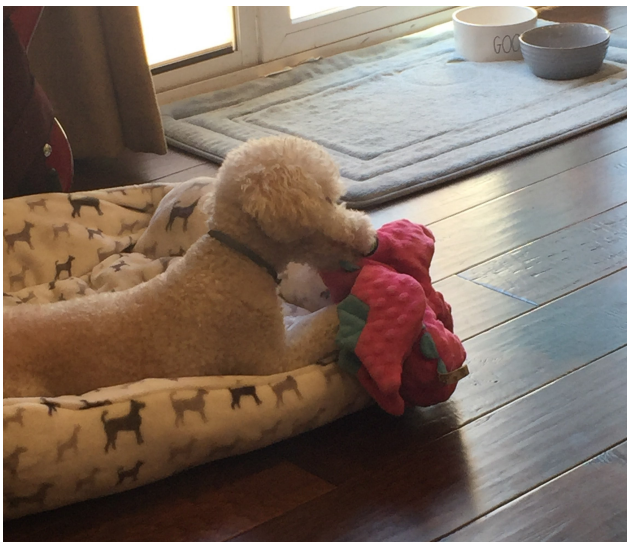

Figure 2: Brownie generating energy by chomping the Pink Toy

We may crudely estimate the work done per a single "cycle" of chomping and releasing the Pink Toy. Let the temperature of Brownie to be 101.5 °F $\approx$ 312 K, the average temperature of a dog. [4] Additionally, consider the temperature of the Pink Toy to be the current temperature of the universe, estimated to be 2.7 K by Wilson and Penzias in 1965. [5]

In each cycle, Brownie will chomp the Pink Toy and transfer heat to it, reducing his body temperature to that of the Pink Toy in a split second. Then he will regenerate energy by sleeping and restore his body temperature to that of a normal dog. This process happens isothermally and isochorically with respect to the Pink Toy — possible because Brownie's power of cuteness is not constrained by Conservation of Energy, per Laws 1 & 3.

Let Brownie by a thermodynamical system with internal energy $E = \frac{3}{2}NkT$. Additionally, let N be the number of Brownieballs, the fundamental unit of the Brownie Worldview, that makes up 1 particle. As of November 17, 2024, that number is 43. [1]

Let Brownie be a frictioness sphere with radius 0.25 m. Then the number of Brownieballs within Brownie is

$$N = 43 \cdot \frac{V_{Brownie}}{h^3} = 43 \cdot \frac{\frac{4}{3}\pi \cdot 0.25^3}{(1.6 \times 10^{-35})^3} = 6.87 \times 10^{104}$$

where h is the Planck distance.

[1] Take my word for this. I counted twice.

Therefore, the total work done by Brownie in a single cycle is

$$\begin{aligned} W = \Delta E &= \frac{3}{2} Nk\Delta T \\ &= \frac{3}{2} \cdot (6.87 \times 10^{104}) \cdot (1.380 \times 10^{-23}) \cdot (312 - 2.7) \\ &= 4.40 \times 10^{84} \text{ J} \end{aligned}$$

2.2 Energy in the Universe

We now derive the total energy present in the universe as of today. Time can be divided into two parts: pre-Brownie and post-Brownie. The total energy in the pre-Brownie universe (before Brownie was born) is obviously 0, as Brownie supplies all the known forms of energy. Post-Brownie, we use the Pink Toy model.

Assume that Brownie chomps the Pink Toy approximately once per day, starting from 5 years ago to now. Then the total energy of the universe is

$$E_{today} = (5 \cdot 365) \times (4.40 \times 10^{84} \text{ J}) = 8.03 \times 10^{87} \text{ J}$$

To convert to Classical notions of work and energy, we use the First Despacito constant $D_1 = 1.0 \times 10^{13}$ and the Second Despacito Constant $D_2 = 2017$. [1] The proof of these conversion factors is trivial and left as an exercise for the reader.

$$W_{classical} = \frac{1}{D_1} \cdot \frac{1}{D_2} \cdot (8.03 \times 10^{87} \text{ J}) = 3.98 \times 10^{71} \text{ J}$$

2.3 A Classical Derivation

We now derive the total energy of the universe following a Classical derivation.

Approximate the radius of the observable universe as 46.5 billion light years. Since 1 light year is equivalent to 9.461×10^{15} m, the volume of the universe is

$$V_{universe} = \frac{4}{3}\pi \cdot \left(46.5 \cdot 10^9 \cdot 9.461 \cdot 10^{15}\right)^3 = 3.57 \times 10^{80} \text{ m}^3$$

The mass density of the universe is assumed to be 9.9×10^{-30} g/cm^3, per the Wilkinson Microwave Anisotropy Probe. [2] We can now find the total energy in the universe.

$$m_{total} = \frac{9.9 \times 10^{-31} \text{ g}}{\text{cm}^3} \cdot \frac{(100 \text{ cm})^3}{(1 \text{ m})^3} \cdot \left(3.57 \times 10^{80} \text{ m}^3\right) = 3.53 \times 10^{56} \text{ g}$$

$$E_{total} = mc^2 = \left((3.53 \times 10^{56} \text{ g}) \cdot \frac{1 \text{ kg}}{1000 \text{ g}}\right) \cdot (3 \times 10^8 \text{ m/s})^2 = 3.17 \times 10^{70} \text{ J}$$

We find the total energy found in the Classical derivation (3.17×10^{70} J) is extremely close to the total energy found in the Brownie derivation (3.98×10^{71} J), corroborating that the Brownie worldview is a viable framework consistent with Classical physics.

3 Acknowledgements

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