$$\frac{1}{4π}\left(\frac{H\_{t^{4}}}{t^{4}}\right)^{\frac{1}{2}}$$

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The cosmological constant is remarkably close to $T^{-2}$ where $T$ is the currently measured age of the universe. This has led to the introduction of models with a time dependent cosmological constant. (citations). The existence of such models raises the question: is there a time dependent formula that predicts the exact value of the cosmological constant? In this short note, I first present such a formula. I then suggest a physical interpretation of it. I do not try to derive the formula from known physics. Rather, my aim is much more modest. It is to present a simple formula that has a natural physical interpretation and that yields the exact measured value of the cosmological constant. How such a formula is related to other theories of cosmological expansion is a matter for another much more extensive inquiry.

Let $t\_{p}$be a Planck moment. Then $t={T}/{t\_{p}}$is the number of Planck moments since the Big Bang. Let $H\_{n}$be the $n^{th}$ harmonic number. Now consider the following formula.

 $\frac{1}{4π}\left(\frac{H\_{t^{4}}}{t^{4}}\right)^{\frac{1}{2}}$

When $t=8.08×10^{60}$, this formula yields an exact match with the measured value of the cosmological constant: $2.888×10^{-122}$. This is a striking mathematical fact. The Harmonic function is one of the simplest and most beautiful mathematical functions, one that is implicated in many physical structures. That such a simple time dependent formula involving the harmonic function yields an exact match of the cosmological constant is either a notable coincidence or is an indication of the structure of physical reality. As I haven’t derived the formula from specific physical assumptions, the physical interpretation of this fact remains unclear. So, it must be acknowledged that this intriguing mathematical alignment might be a mere curiosity. Nevertheless, one can entertain a physical interpretation through a bit of reverse engineering, starting from the formula’s structure.

 Note first that the formula has the form:

$$\frac{X^{\frac{1}{2}}}{4π}$$

If X is defined as the square of the B field, and the magnetic constant μ is set to 4π, this formula simplifies to $B⁄μ$, representing the strength of the magnetic field in a vacuum. Therefore, I suggest that$\frac{H\_{t^{4}}}{t^{4}}$ is the appropriate expression for the square of the B-field in observable spacetime, and the cosmological constant corresponds to the strength of the magnetic field in a vacuum within observable spacetime. Recent findings indicate that the universe's expansion closely aligns with the expansion expected from a magnetic force generated by dark matter particles, rather than dark energy. (citation) To understand particles that might yield energy according to this formula, consider $H\_{t^{4}}$ as the energy of $t^{4}$ particles subject to the Einstein-Planck relation, with wavelengths ranging from 1 to$t^{4}$. It is conceivable that the existence of such particles imposes an intrinsic quantum structure on 4-dimensional spacetime, resulting in a vacuum magnetic field strength equal to the square root of the average energy of all such particles divided by the magnetic constant.