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# Relating of Tesla's Unified Resonance with Einstein's Coefficients of Stimulated Emission and with Universe Expansion

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## **Abstract:**

This article has two parts: the first part is investigated on Tesla's claims about unified resonance of alternated current, he said that he could magnify the electromagnetic radiation to that extent to shake and swing Brooklyn bridge in 1898, I reached in this investigation that Einstein has an evident to confirm tesla's demonstration, this evidence is his equation for stimulated emission.

The second part of this paper is investigated on the idea that crossed my mind about finding a connection between Einstein's stimulated emission and Einstein's cosmological constant to support my former postulation that Dark Energy is just photon pressure on ordinary matter<sup>1</sup>.

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<sup>1</sup> See my paper "The Repulsive Dark Energy is just Photons' Pressure" on [https://www.academia.edu/43782507/The\\_Repulsive\\_Dark\\_Energy\\_is\\_just\\_Photons\\_Pressure](https://www.academia.edu/43782507/The_Repulsive_Dark_Energy_is_just_Photons_Pressure)

In this investigation I found that Dark Energy density has direct relationship to Einstein's stimulated emission coefficients.

The argument of that is expressed like this: since photon is responsible for electron's jump down onto lower orbital in atom, and I postulate before that Dark Energy is photon pressure, so there is a connection between this phenomenon and that through Einstein's cosmological constant.

### **Tesla's assumption and experiment:**

In 1898 Tesla established an experiment, this experiment caused local earth shake on Brooklyn Bridge. He said then that he could magnify the electromagnetic radiation by using High Frequency Alternate Current to produce radiation in radio wave region, and then by adjusting the resonance of the mechanical device to produce the alternate current to match earth resonance he could make Earth-shake in Brooklyn bridge region. He called it Unified Resonance<sup>2</sup>.

### **Einstein's spontaneous-stimulated emission ratio and Tesla's assumption:**

Einstein coefficients are mathematical quantities which are a measure of the probability of absorption or emission of light by an atom or molecule. The Einstein  $A_{21}$  coefficients are related to the rate of spontaneous emission of light when the electron jump up to higher orbital (2) by absorbing photon energy and then jump down spontaneously to lower orbital (1) by emitting photon, and the Einstein  $B_{21}$  coefficients are related to the stimulated emission of light and that happens when photon enforce electron to jump down to orbital (1) from higher (2). Einstein invented these coefficients<sup>3</sup> when he treated the quantum behavior of light in 1917.

The ratio between  $A_{21}$  and  $B_{21}$  is given by this equation:

$$\frac{A_{21}}{B_{21}} = \frac{8\pi h\nu^3}{c^3}$$

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<sup>2</sup> See my article "1\ Ali's Principle of Mass and Radiation Equivalence. 2\ Using of Ali's Equation for Explanation of Tesla's Earth Resonance Experiment in 1894" on: [https://www.academia.edu/44361191/Alis\\_Principle\\_of\\_Mass\\_and\\_Radiation\\_Equivalence\\_2\\_Using\\_of\\_Alis\\_Equation\\_for\\_Explanation\\_of\\_Teslas\\_Earth\\_Resonance\\_Experiment\\_in\\_1894](https://www.academia.edu/44361191/Alis_Principle_of_Mass_and_Radiation_Equivalence_2_Using_of_Alis_Equation_for_Explanation_of_Teslas_Earth_Resonance_Experiment_in_1894)

<sup>3</sup> For more information see <https://en.wikipedia.org/wiki/Laser#History>

$B_{21}$  = stimulated coefficient,  $A_{21}$  = Einstein's spontaneous coefficient,  $h$  = Planck's constant,  $\nu$  = photon's frequency comes out from electron slip down,  $c$  = light speed.

Notice that this formula relates to Black Body Radiation:

$$I(\nu) = \frac{2h\nu^3}{c^3} \frac{1}{e^{h\nu/kT} - 1}$$

From this equation  $\frac{A_{21}}{B_{21}} = \frac{8\pi h\nu^3}{c^3}$  we can notice that the stimulated coefficient  $B_{21}$  will increase according to the decreasing of photon frequency, and we know that  $B_{21}$  is responsible of light amplification and that because of electrons could stay on the orbital longer time and then jump down, so this orbital has a characteristic to accumulate electrons before release them and then gives off unified-magnified photons' number and energy. The reason of the discovery of MASER (Microwave Amplification by Stimulated Emission Radiation) before LASER (Light Amplification by Stimulated Emission Radiation) return to this behavior of this equation that making  $B_{21}$  very huge when frequency very low.

So from this point I can say that the lesser the photon's frequency, the higher amplification of unified photons and that what Tesla said. In Tesla's experiment he could magnify radiation frequency to Mega Hertz and then obtained a huge numbers of photons have radio wave frequencies and then by adjusting the frequencies to resonate with earth mechanical shake frequencies, he achieved his experiment. Nevertheless Tesla's experiment has different scientific origin than Einstein's, but it is Nature tendency to keep  $B_{21} > A_{21}$  in low frequencies, and that confirmed by Einstein's equation.

## **Part 2: Einstein's Cosmological Constant and Einstein Stimulated Emission:**

In this part, I will show you there is relationship between cosmological constant and stimulated coefficients and then I will use it as evidence to approve that the cosmological constant is related to photons pressure as I investigated in my former paper<sup>4</sup>.

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<sup>4</sup> "The Repulsive Dark Energy is just Photons' Pressure" on [https://www.academia.edu/43782507/The\\_Repulsive\\_Dark\\_Energy\\_is\\_just\\_Photons\\_Pressure](https://www.academia.edu/43782507/The_Repulsive_Dark_Energy_is_just_Photons_Pressure)

In this investigation I will relate Einstein's stimulated-spontaneous ratio to radiation density from Einstein's field equation trying to estimate the frequency of this radiation. So from this equation:

$$R^{uv} - \frac{1}{2}g^{uv}R - g^{uv}\Lambda = \frac{8\pi G}{3}\rho_0$$

If we take small scale of space about centimeter cube, we can consider it as flat, so this equation becomes:

$$0 - \frac{1}{2} \times 1 \times 0 - 1 \times \Lambda = \frac{8\pi G}{3}\rho_0$$

So

$$|\Lambda| = \frac{8\pi G}{3}\rho_0$$

$\Lambda$  is Einstein's cosmological constant,  $\rho_0$  is radiation density,  $G$  is Newton's universal constant.

Substitution for radiation density  $\rho_0$ :

$$\rho_0 = \frac{3\Lambda}{8\pi G}$$

And by equalizing the spontaneous- stimulated ration with radiation density:

$$\rho_0 = c^2 \left( \frac{A_{21}}{B_{21}} \right)^2$$

The existence of the second power on the right hand side is due to universe expansion equation<sup>5</sup>:

$$\left( \frac{\dot{a}}{a} \right)^2 + \frac{A}{a^3} + \frac{b}{a^4} + \frac{k}{a^2} + \Lambda = \frac{8\pi G}{3}\rho_0$$

This equation<sup>6</sup> relates Hubble constant  $H^2 = \left( \frac{\dot{a}}{a} \right)^2$  or expansion of universe with cosmological constant and matter/radiation density. So I expected that

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<sup>5</sup> See Leonard Susskind's lectures titled cosmology- Stanford University. on <https://www.youtube.com/channel/UC-EnprmCZ3OXyAoG7vjVNCA>

<sup>6</sup> For more information about this equation watch the lectures on footnote 5.

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$$c \frac{A_{21}}{B_{21}} = \frac{\dot{a}}{a}$$

Another argument to this equation  $\rho_0 = c^2 \left( \frac{A_{21}}{B_{21}} \right)^2$  is by using units' analysis, we see that:

$$\rho_0 = \frac{erg}{cm^3 \cdot sr}$$

$$c \frac{A_{21}}{B_{21}} = \frac{8\pi h \nu^3}{c^2} = \frac{erg}{cm^2 \cdot sr}$$

These are two ways.

Now return to density equation

From this equation:

$$\rho_0 = \frac{3\Lambda}{8\pi G}$$

Then by substitution:

$$\rho_0 = \frac{3\Lambda}{8\pi G} = c^2 \left( \frac{A_{21}}{B_{21}} \right)^2$$

And then:

$$\rho_0 = \frac{3\Lambda}{8\pi G} = \left( \frac{8\pi h \nu^3}{c^2} \right)^2$$

By substitution in favor of frequency:

$$\nu = \left( \frac{c^2}{8\pi h} \sqrt{\rho_0} \right)^{\frac{1}{3}} = \left( \frac{c^2}{8\pi h} \sqrt{\frac{3\Lambda}{8\pi G}} \right)^{\frac{1}{3}}$$

By using numbers and constants:

$$\nu = \left( \frac{(3 \times 10^8)^2}{8 \times \pi \times 6.626 \times 10^{-34}} \sqrt{\frac{3 \times 1.105 \times 10^{-52}}{8 \times \pi \times 6.67 \times 10^{-11}}} \right)^{\frac{1}{3}}$$

$$= \left( \frac{(3 \times 10^8)^2}{8 \times \pi \times 6.626 \times 10^{-34}} \times 4.4 \times 10^{-22} \right)^{\frac{1}{3}} = (2.398 \times 10^{27})^{\frac{1}{3}} \\ = \mathbf{1.34 \times 10^9 Hz}$$

Substituting for wavelength:

$$\lambda = \frac{c}{\nu} = \frac{3 \times 10^8}{1.34 \times 10^9} = \mathbf{20cm}$$

## Discussion

- We can notice that the value 20 cm is laying in microwave region, it is bigger than Cosmic Microwave Background (CMB) estimated value.
- This bigger value is agrees with the facts because the dark energy now has lesser effect on expansion than curvature and getting bigger with time, and hence the wavelength of CMB be bigger ( from 2 cm to 20 cm).
- It is also agrees with Ali's equation (mentioned on footnote 4) that on these circumstances the photon energy is not enough to activate photochemical reaction, and then it will exert a pressure on matter and this pressure increase with the photon intensity increasing.

## References:

- Leonard Susskind's lectures, cosmology- Stanford University.
- The Repulsive Dark Energy is just Photons' Pressure  
[https://www.academia.edu/43782507/The\\_Repulsive\\_Dark\\_Energy\\_is\\_just\\_Photons\\_Pressure](https://www.academia.edu/43782507/The_Repulsive_Dark_Energy_is_just_Photons_Pressure)
- Ali's Principle of Mass and Radiation Equivalence. 2\ Using of Ali's Equation for Explanation of Tesla's Earth Resonance Experiment in 1894" on:  
[https://www.academia.edu/44361191/Alis\\_Principle\\_of\\_Mass\\_and\\_Radiation\\_Equivalence\\_2\\_Using\\_of\\_Ali's\\_Equation\\_for\\_Explanation\\_of\\_Tesla's\\_Earth\\_Resonance\\_Experiment\\_in\\_1894](https://www.academia.edu/44361191/Alis_Principle_of_Mass_and_Radiation_Equivalence_2_Using_of_Ali's_Equation_for_Explanation_of_Tesla's_Earth_Resonance_Experiment_in_1894)
- Wikipedia.

**Correction (Saturday, November 14, 2020)**

The equation  $\rho_0 = \frac{3\Lambda}{8\pi G} = c^2 \left(\frac{A_{21}}{B_{21}}\right)^2$  is not really correct, it should be like this:

$$\rho_0 e^{hv/kT} = \frac{3\Lambda}{8\pi G} = c^2 \left(\frac{A_{21}}{B_{21}}\right)^2$$

But in CMB radiation (wavelength = 0.02 cm) the exponential term becomes:

$$e^{hv/kT} = e^{\frac{6.626 \times 10^{-34} \times 1.5 \times 10^{10}}{1.380 \times 10^{-23} \times 3}} = 0.2$$

So the equation must become:

$$0.2 \times \rho_0 = \frac{3\Lambda}{8\pi G} = \left(\frac{8\pi h v^3}{c^2}\right)^2$$

And then the frequency becomes:

$$v = \left(\frac{c^2}{8\pi h} \sqrt{0.02 \rho_0}\right)^{\frac{1}{3}} = \left(\frac{c^2}{8\pi h} \sqrt{\frac{0.02 \times 3\Lambda}{8\pi G}}\right)^{\frac{1}{3}}$$

$$= \left(\frac{(3 \times 10^8)^2}{8 \times \pi \times 6.626 \times 10^{-34}} \sqrt{\frac{0.02 \times 3 \times 1.105 \times 10^{-52}}{8 \times \pi \times 6.67 \times 10^{-11}}}\right)^{\frac{1}{3}} = 7 \times 10^8 \text{ Hz}$$

$$\lambda = \frac{c}{v} = \frac{3 \times 10^8}{7 \times 10^8} = \mathbf{40 \text{ cm}}$$

This correction I did after 3 day of publishing. So to be honest I write down here.