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"How much lower is the frequency of a solid state oscillator when it is moving relative to the CMB (cosmic microwave background)"

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Abstract:
The postulates of special relativity or of the Lorentz ether theory could be tested by measuring the resonance frequency of a microwave resonator as it strongly depends on the phase velocities of the incoming and outgoing waves. If, for example, a signal is injected into a short-circuited transmission line a standing wave voltage distribution results as shown below by equation (1):

$$U(x,t) = e^{j\omega t}\cdot(e^{-j\omega x/(c-u)} + e^{+j\omega x/(c+u)}) = e^{j\omega(t+\frac{u\cdot x}{c^2-u^2})}\cdot 2\cos\frac{\omega\cdot x}{c(1-u^2/c^2)} \qquad (1)$$

The two waves travel at phase velocities c-u and c+u, with u being the absolute velocity of our solar system in the direction of constellation LEO, i.e., u = 390km/s. The wavelength λ of the standing wave is thus reduced according to the expression given by equation (2):

$$\lambda = \frac{c}{\omega}\cdot 2\pi\cdot(1-u^2/c^2) = \lambda_0\cdot(1-u^2/c^2) \qquad (2)$$

Clearly, the wavelength λ is largest when the resonator is at rest in the CMB, i. e., for u = 0:

$$\lambda = \lambda_0 = \frac{c}{\omega}\cdot 2\pi \qquad (3)$$

However, the decrease of λ for u = 390km/s is very small, so that probing the wavelength will not likely yield a measurable value for u. A more successful method should be to connect the resonator to an active element such as a bipolar transistor and build a solid state oscillator. A simple version of such an oscillator circuit is shown in Fig.1. It consists of a shorted transmission line of impedance Z_1, a bipolar transistor, a resistor R_2, two capacitors C_2 and C_3 and two batteries U_{B1} and U_{B2}.

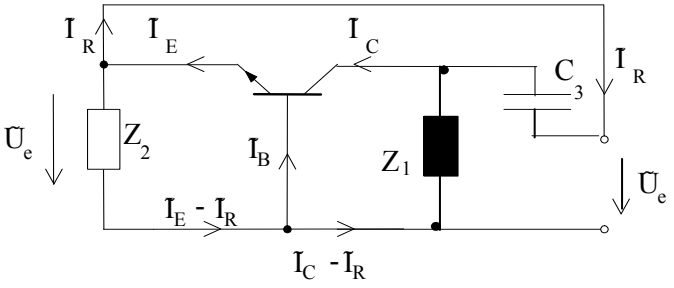

Fig. 1

Small signal equivalent circuit of a transistor oscillator. The two batteries (U_{B1} in series with Z_1 and U_{B2} in series with Z_2) are not shown

Z_1 is a shorted transmission line of length L (" resonator"), i.e.,

$$Z_1 = jZ_0 \tan\left[\frac{\omega}{c}\cdot\frac{L}{1-u^2/c^2}\right] \tag{4}$$

Z_2 is a parallel connection of an ohmic (load) resistor R_2 and a capacitor C_2
Z_3 is a capacitor C_3 for providing feed back, and
Z_0 is the characteristic impedance of the transmission line.

$$Z_3 = 1/\ j\omega C_3 \tag{5}$$

$$Z_2 = R_2\ /(1+\ j\omega R_2 C_2) \tag{6}$$

The condition for oscillations to occur is obtained by applying Kirchoff's laws yielding:

$$Z_1 + Z_2 + Z_3 + S\,Z_2 Z_3 = 0 \tag{7}$$

In equ. (7), S = transconductance of the bipolar transistor (with very large current gain β).

Substituting all quantities into equation (7) yields

$$Z_1 + R_2\ /(1+\ j\omega R_2 C_2) + 1/\ j\omega C_3 + S\cdot R_2\ /(1+\ j\omega R_2 C_2)\, j\omega C_3 = 0 \tag{8}$$

From equ. (8) two equations can be obtained by separating the real from the imaginary parts:

$$S\cdot R_2 = C_3 / C_2 \tag{9}$$

$$Z_0\cdot\tan\left[\frac{\omega}{c}\cdot\frac{L}{1-u^2/c^2}\right] = \frac{C_2 + C_3}{\omega C_2 C_3} \tag{10}$$

Stable oscillations thus occur if equations (9) and (10) are satisfied. The frequency of oscillation can be calculated from equ.(10) with equ.(9) being substituted into equ. (10).

Conclusion

It is interesting to note, that the frequency of oscillation does neither depend on $\sqrt{1-u^2/c^2}$ as special relativity predicts due to "time dilation", nor on $(1\text{-}u^2/c^2)$ as the Lorentz Ether Theory would predict. The calculation rather shows that all circuit elements will contribute to **some other dependence on u** which can be calculated numerically or determined experimentally. Thus a series of experiments with different oscillator circuits could be performed in order to measure the ticking rate of clocks at rest or in motion relative to the ether, to the cosmic microwave background (Smoot's New Aether) or relative to whatever.

When two different oscillator circuits would be operated in a common laboratory on earth during a 12 hours period of time (half a revolution of the earth) and different frequency readings would be observed after they had initially been tuned to the same frequency this would indicate that the Lorentz Ether Theory is the better explanation whereas equal frequency readings would be expected when special relativity is applicable.

Experimental results together with theoretical aspects of this method will be presented at the Conference.