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Experimental Confirmation of the Aetherometric Theory of Temperature and the Conversion Equivalence of Electric and Thermal Energies

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Abstract

A simple experiment shows that the true-rms AC voltages measured at the cold and hot plates of a Stirling heat engine are fully predicted by the aetherometric theory of electro-thermodynamics, as the potentials corresponding to the absolute temperatures of the modal photons of state in the hot and cold engine reservoirs. The implications for quantum-mechanics and thermodynamics are dire and succinctly stated.

Introduction

Aetherometry has defined [1] absolute temperature by

$$T = PV/(N_A\ k) = Q/(N_A\ k)$$

where the dimensionality of T is that of length and the heat equivalent of work is solely an electromagnetic heat of state. Its natural fine granulation corresponds to the (electromagnetic) energy of an optothermal photon, as per the aetherometric discovery:

$$Q_{micro} = kT = h\upsilon = \lambda_o\ c^2$$

where λ_o is the length of the photon's path (which is different from the wavelength of light [2]). A photon with the temperature of 1°K has an energy of

$$kT_{1^\circ} = h\upsilon = 83.143869\ m^3\ sec^{-2}$$

where $\upsilon = 2.08364*10^{10}\ sec^{-1}$. But, in a mole of every substance in any phase of matter, a molar quantity of such (primary) photons only has 1°K temperature when all the photons (i.e. an Avogadro number) have the same corresponding energy. A mole of such photons at *any* temperature is thermally described by the total energy of

$$N_A\ h\upsilon = N_A\ kT = RT$$

The aetherometric approach permits the definition of *a new constant* [1], expressed in meters per degree kelvin - and thus, ultimately, the determination of the length equivalency of the degree kelvin. Irrespective of the size of λ_o and the temperature T, the new constant is

$$\lambda_o/T = k/c^2 = 9.25100305*10^{-16}\ m\ °K^{-1}$$

where k is Boltzmann's constant. Since the aetherometric theory of photon production from electrons holds that the energy of the former is a regular, fine-structural fraction of the electrokinetic energy ($p_e\ W_v$) of the latter

$$h\upsilon = p_e\ W_v/\alpha^{-2}$$

one may *aetherometrically* determine both the voltage potential W_v of the photon emitters

$$W_v = \alpha^{-2}\, h\upsilon/p_e = \alpha^{-2}\, kT/p_e$$

(where α is the fine structure constant and p_e is the universal charge constant expressed in the meter-second aetherometric system of units [3]) and the corresponding voltage V_{photon} (and just as well the energy in electronvolts) of the resulting optothermal photons, as per

$$V_{photon} = h\upsilon/[p_e\ (69{,}065.20829\ m\ sec^{-1}\ volt^{-1})] = kT/[p_e\ (69{,}065.20829\ m\ sec^{-1}\ volt^{-1})]$$

- since it is associated with the temperature T

$$T = h\upsilon/k = \lambda_o\, c^2/k = (p_e\, W_v/\alpha^{-2})/k = p_e\, W_{photon}/k$$

For this purpose we tested the operation of a miniature Stirling heat engine heated passively by convection air currents in a closed chamber capped by the engine's hot plate. We ran a continuous heating experiment with a steadily increasing ΔT between the engine plates, in order to make true-rms AC measurements of the voltage oscillation between them at different time intercepts, and compare the results with the aetherometric prediction of the voltage oscillations corresponding to the modal photon energies responsible for the absolute temperatures of the hot and cold plates.

Methods and Materials

The entire apparatus is shown in **Figure 1**. The cold plate of the Stirling engine faced upward and was passively cooled by the surrounding room environment (no fans employed). The heat engine was heated at its base plate by a 5cm-deep, 4cm-thick styrofoam-insulated air chamber sitting on top of an inverted, 30cm-tall stainless steel cup suspended at a fixed distance of 5 cm from an electric hot plate. The total air-gap distance of 10 cm did not fully prevent induction by the hot-plate of secondary AC 60 Hz potentials on the plates, on the order of 11 to 18 mV.

Two engines were modified as follows: the conductive screws and their posts placed across the cold and hot plates were replaced with high-density marine epoxy to seal each plate tightly to the chamber body, and cured under high mechanical tension. In this manner, both electric and thermal conduction between the plates was made negligible. One of the engines was rejected in preliminary tests for poor performance caused by deficient construction of the shaft and regenerator assembly.

Engine wheel rotation was read with a high resolution photocell tachometer.

Temperatures of the hot and cold plates were taken with a set of identical, calibrated high-temperature long-stem thermistors, the cold plate readings being confirmed by a hand-held dual laser thermometer. The temperature of the white, non-reflective regenerator body was read with a fixed dual laser thermometer aimed orthogonally at the center of the transparent chamber.

True-rms measurements were made with a Beckman Tech 330 (input impedance of 2.2 megohms shunted by less than 75 pF) in the lowest scale of 1 to 200 mV (2,000 samples at 100% of range) and using a capacitance filter to block the DC component. The rms value of the signal depends on its wavecrest factor and the sample frequency. We found that the instrument failed to register the true-rms AC potential if the sampled frequency was less than 3 cps.

Results

The time course of the experiment is shown in **Table 1**. The handheld engine is not very sensitive or efficient, since it requires a $\Delta T \approx$ 14 °K (with a cold plate temperature of 29 °C = 302.15 °K, very near room temperature of 27.5 °C), in order to rotate at 1 cps. We were able to drive its ΔT up to ~85 °K, with the engine clocking 350 rpm (5.83 cps), when the hot plate reached 125 °C = 398.15 °K (at t = 74'), a very high temperature that, a few minutes later, proved to be destructive of the engine's regenerator. The latter became soft and loose around its vertical axis and shrank visibly away from the chamber walls. Later examination showed melting-induced smoothing of its porous cell structure. This outcome strongly suggests that the unexpected low regenerator temperatures registered by our arrangement (see last column of **Table 1**) may not reflect its actual internal temperatures, likely due to interference by the transparent, round chamber walls.

TABLE 1 - Time course of heating a miniature Stirling heat engine

Time (min)	Hot plate (°C)	Cold plate (°C)	ΔT (°C)	RPM	Reg. T (°C)
0	26.6	27.5	-0.9	0	27.4
24	41.4	28.8	12.6	0	31.1
26	44.0	29.2	14.8	62	31.9
36	49.9	31.0	18.9	94	34.7
39	58.6	31.5	27.2	133	34.9
49	74.6	33.6	41.0	158	42.7
61	79.5	35.1	44.4	196	44.0
63	84.2	35.8	48.4	228	44.8
66	94.7	37.9	56.8	262	48.6
69	121.0	39.3	81.7	308	55.2
72	125.0	39.9	85.1	346	59.1
74	124.5	41.5	83.0	351	ND

Once the heat engine reached 3.2 rotational cycles per second, it became possible to test our proposed prediction. This occurred at t = 61', with a ΔT = 44.4°K when the hot plate reached 352.65°K (and the cold plate was only ca. 8°K above room temperature). The results are shown in **Table 2**, where the aetherometrically-predicted voltages (or equivalent electronvolts) of the primary or modal photons of state in each thermal reservoir (the hot chamber and the surrounding air) are compared to the measured true-rms AC voltages between the plates of the Stirling engine and to the absolute temperatures of the engine plates. The observed AC potentials visibly varied between minima and maxima that we suggest match the absolute temperature of, respectively, the cold (C) and hot (H) plates. In the span of 3.3 to 5.8 cps, the observed minimum and maximum AC potentials tally close to the predicted aetherometric values for the hot and cold reservoirs of the engine, when taken as a function of absolute temperature. The last three entries in **Table 2** present a Carnot efficiency of

$$[1-(T_C/T_H)] *100 = 20.7\%$$

TABLE 2 - Comparison of the temperature-based aetherometric predictions of the electromagnetic heats of state of the two engine plates (H and C) and reservoirs, with the observed maximum and minimum AC potentials registered at cps>3.

Time (min)	Predicted V_{photon} (mV)	Observed ACV (mV)	Observed Plate T (°K)	Rotary cps
61	H: 30.4	31	352.65	3.3
	C: 26.6	25	308.25	3.3
63	H: 30.8	32	357.35	3.8
	C: 26.7	25	308.95	3.8
66	H: 31.7	33	367.85	4.4
	C: 26.8	26	311.05	4.4
69	H: 34.0	34	394.15	5.1
	C: 26.9	27	312.45	5.1
72	H: 34.3	35	398.15	5.8
	C: 27.0	29	313.05	5.8
74	H: 34.3	35	397.65	5.8
	C: 27.1	27	314.65	5.8

Conclusions

Though a preliminary finding, the results strongly indicate that the observed AC oscillation between the plates is caused by the thermal ΔT differential inside the engine chamber, and that the experimentally measured plate voltages correspond to the voltages - of the plates and their respective thermal reservoirs - that are aetherometrically predicted on the basis of their measured absolute temperatures. The experiment may be improved by using a suitable propane or acetylene heater, instead of an electric plate heater, and a more sensitive AC millivoltmeter. Nevertheless, the fact that the minima and maxima true-rms AC voltages measured between the plates of the Stirling engine appear to correspond entirely to the aetherometrically-predicted voltages and electronvoltages of the primary or modal photons of state in the two heat reservoirs of the Stirling engine - and thus at the engine's hot and cold plates - is *a stark, simple and "peer-review-independent" confirmation of the scientific validity and accuracy of a basic, heretofore unknown, tenet of the aetherometric theory of electro-thermodynamics*: that absolute temperature has a natural (physical) quantum basis, succinctly expressed [1] as:

$$T = h\upsilon/k = \lambda_o c^2/k = (p_e W_v/\alpha^{-2})/k = p_e W_{photon}/k$$

This applies to all optothermal photons, whether of state or not.

Even though the Carnot ideal engine led to Kelvin's and Clausius' discovery of an absolute scale of temperature, the emergence of a statistically-dependent quantum theory of heat failed to provide the linear relationship of absolute temperature to thermal energy - in particular, to photon (electromagnetic) energy. The mistake harks back to Planck's law and his second radiation constant

$$c_2 = hc/k$$

that yielded a "kind" of wavelength of temperature which, at 1 °K, had the value of

$$\lambda_m = c_2/(4.965\ T) = 2.8978*10^{-3}\ m$$

The present findings abrogate the role of this erroneous constant, which has generated uncertainties in the absolute temperature scale that are exacerbated at low-cryo temperatures, in transition states and even in the determination of the mCBR. They are caused by erroneous quantum-statistical determinations that failed both to identify the real photon wavelength of thermometric interest [2] -

$$\lambda_o = kT/c^2 = p_e W_{photon}/c^2$$

- and to distinguish electromagnetic from thermokinetic heats. Effectively, conventional thermodynamics and its various quantum elaborations have, to this day, been objectively falsified.

References

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Figure 1

Stirling Engine Arrangement
(tachometer and laser thermometer not drawn)