Einstein's Teleportation of Masses on the Labdesk

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"If the theory agrees with the facts, radiation transfers inertial masses between emitting and absorbing bodies." (Einstein 1905). It works!

1. Introduction

After the transfomation of energy to light rays and the theory of ray pressure contained in the special theory of relativity [AE1905_1], Einstein asked three months later "Does the inertia of a body depend on its energy?" [AE1905_2]

In his short paper he developed the known formula $E = m c^2$. However, it is not very known that he wanted to prove theory and formula with a **teleportation** as follows:

- „This body sends... flat waves of light..."
- „If a body gives away the energy E in the form of radiation, its mass decreases by E / c^2. Here it is apparently irrelevant that the energy withdrawn from the body just passes over into energy of the radiation....."
- „If the theory agrees with the facts, radiation transfers inertial masses between emitting and absorbing bodies."

In the following work Einstein's teleportation on the Labdesk is carried out successfully. It succeeded to weigh the teleported inertial mass.

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2. Setup

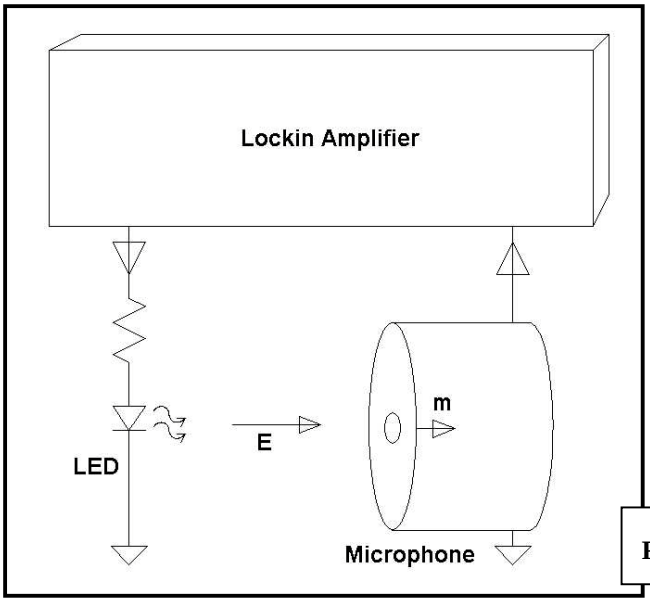

Fig. 1 : Setup

Photoacoustics is usual to detect light pressure. With a lockin amplifier picoforces can be measured [STU2021]. The amplifier controls the LED whose light energy resp. inertial mass presses on a distant microphone diaphragm for 50ms. Then the LED goes off, the membrane swings back and the amplifier can boost the synchronous AC voltage very high.

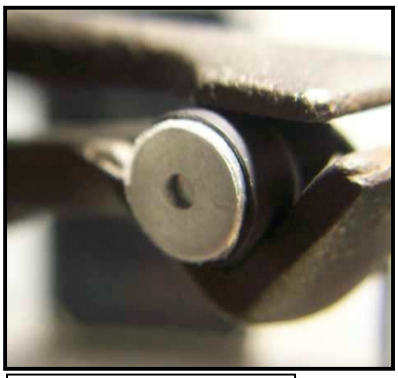

Fig. 2 : Microphone

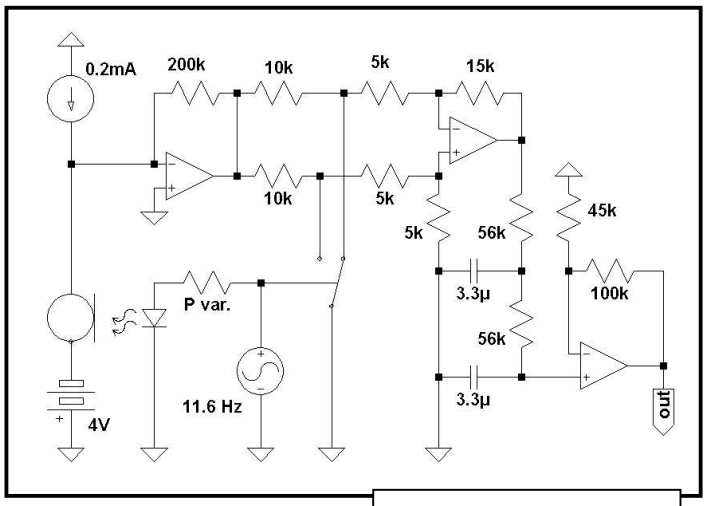

Fig. 3 : Lockin Ampl.

Fig. 4 : Labdesk

3. Measurements

Theoretically, photons with the following inertial mass come out of a 7 mW LED in 50 ms:
$m = E / c^2 = P\,t / c^2$ = $7\ 10^{-3}$[kgm²/s³] $50\ 10^{-3}$[s] / $9\ 10^{16}$ [m²/s²] = **$4\ 10^{-21}$ [kg]**

In contrast, the force of 47 pN measured at 7 mW in 50ms results in a inertial mass of:
$m = F\,t / c$ = $47\ 10^{-12}$[kgm/s²] $50\ 10^{-3}$[s] / $3\ 10^{8}$ [m/s] = **$8\ \ 10^{-21}$ [kg]**

The doubling of the measured mass results from the reflection at the membrane. The diagram shows the theoretical masses multiplied by 2 and the measured masses in direct comparison as a function of the light power.

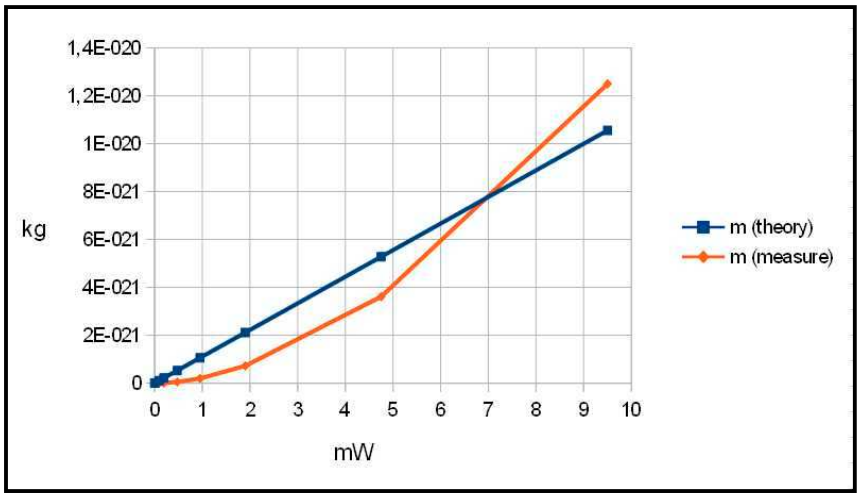

Fig. 5 : Measurements

4. Discussion

Einstein's teleportation of inertial masses could be carried out successfully. The fact that such small masses can be measured is fascinating and not common knowledge.

[AE1905_1] Einstein, Zur Elektrodynamik bewegter Körper, Annalen der Physik, 1905, S. 913-915

[AE1905_2] Einstein, Ist die Trägheit eines Körpers von seinem Energieinhalt abhängig?, Annalen der Physik, 1905, S. 639-641

[STU2021] Sturm, Measurement of Picoforces from Light, 2021, https://vixra.org/abs/2110.0011