Effect of light on gravitational attraction

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The original paper with that title was published in December 2011 by Physics Essays. Since they have the copyright for the paper, the only way to get the original is from them. Here are some notes that contain the findings of the paper plus what was done and found after 2011.

Special thanks to Professor Paul-Émile Legault from Laurentian University for his many suggestions; Professor Antti Saari, M.Sc., P.Eng. for his support and encouragement as well as for revising this text; Dr. Denis Haché; Dr. André Ferron; Daniel Landry, M.Sc; Dr Jacques Anihouvi for revising this text; and Collège Boréal for providing the laser.

In the original experiment, a very sensitive torsion pendulum about 23 cm long was built suspended by 2 fine 1 mm wires in diameter. A space of 1 mm is between the 2 wires. This gives a high sensitivity and most of the restoring force is done not by the torsion of the wires because there is almost no torsion but by the weight of the pendulum itself that tends to go to its lowest level after moving left or right.

At first, a 1 kg mass was placed close to the 100 g mass at one end of the pendulum arm. The mobile mass moved towards the 1 kg by gravity. Once the system was in equilibrium and the 2 masses were almost touching, a fine laser beam was passed between them. The light was not a point light but like a sheet of paper at an angle of 30^0 .

If light can block gravity, then the attraction between the 2 masses would decrease and the mobile mass would move away a little. But the opposite always happened: the mobile mass was getting closer as if the attraction was increased. Since that made no sense, the experiment was redone many times, checking if other factors were causing that movement.

- Ascending heated air movement. A sensitive arrays of silk threads could not detect any air movement.
- Brownian movement of air with decreasing temperature. There was no increase of temperature and the effect started when light was on and stop as soon as light was cut off.
- Laser light might have ionized air molecules causing the masses to move closer. Red light of that frequency cannot ionized air molecules.

- Coriolis force could cause them to move closer. Test during different time of the day and for 9 months demonstrate that was not the cause.

- External electromagnetic fields (e.g. from the laser module) affecting the two masses. The metal masses were replaced by non conductive rocks. The effect was the same as with metal masses.

If gravitational forces are blocked by light and if those forces are coming from all directions, it could be possible to verify that by removing the 1 kg mass and using only light.

Once the pendulum was at rest, the laser light was sent on the North side of the mobile mass. It moves towards the North. After many minutes, the light was transferred to the South side. The mobile mass moved towards the South also.

That was a final proof that light can block gravity. It also demonstrate that gravitational force is a pushing force, not an attractive force.

(The next results were not published.)

The next thing was to confirm that any kind of light should also block gravity. Infrared light was used and it showed the same effect but there was an increase of temperature so this was not evident.

If light does block gravity, that light does not need to be near the mobile mass. A simple test was done for that. A sheet of plywood half inch thick was placed between the mobile mass and a bright light. As soon as the light was on, the mobile mass was pushed towards the light even if that light was not visible to the mass.

Another test where the light was inside a stainless steel box. Neutrinos, hard x rays and gravity could pass through the stainless steel but not visible light. The effect of light on the mobile mass was still there. One has to accept the facts: light can block some of the gravitational force.

What causes that force? The experiment does not answer that. It showed that the force between the 2 masses did not come from the 1 kg brass mass. That would mean that the intensity of the gravitational force does not originate from the amount of mass of the of object. Wow….

It really seems that gravity is coming from all directions, even horizontally. We are lucky that the one coming from one side is almost 100% equal to the one coming from the other side, otherwise we would always be pushed from one side to the other.

Another test was done to compare the force blocked by light and by a one kg mass. When the pendulum was stable, 1 kg was placed near it and the angle of rotation was noted. The 1 kg brass was replaced by a 100 watt fluorescent lamp enclosed in aluminum foil. The volume of the lamp was almost the same as the 1 kg brass mass. The pendulum swing at almost the same degrees for the light and for the 1 kg. mass event if there was no light escaping the aluminum foil.

We are presently making precise measurements to find out the amount of force blocked by the 1.5 laser light. Dr Daniele Sasso from Italy is helping in these findings. Here is a simple drawing of the apparatus used.

Fig 1. Apparatus used

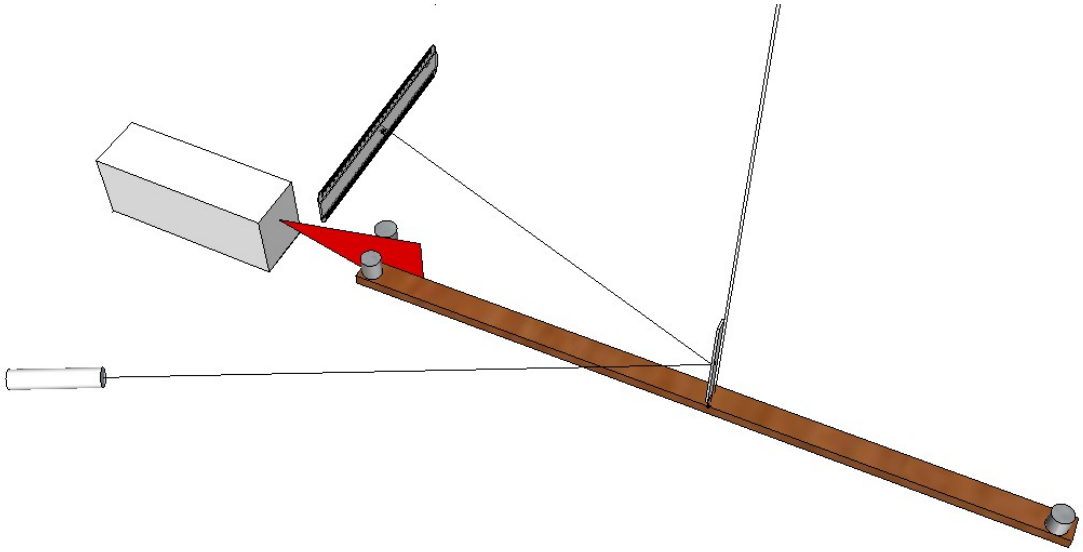
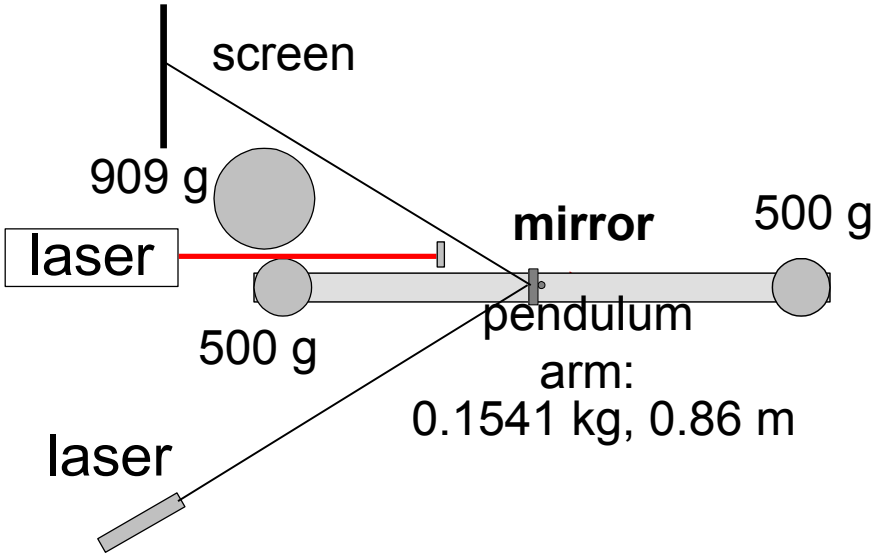
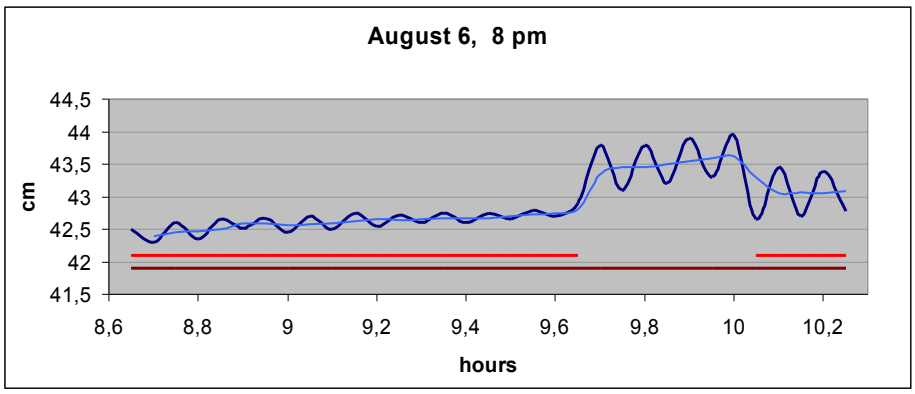


Fig. 2 : Overhead view



When a laminar light beam was passed between the two masses, they approached each other. The separation increased if the light beam was on the outer side of the moving mass.

In Figure 3a, the bottom brown line indicates where the two masses would touch one another. (Scale reading 41.8). The upper (blue) line is proportional to the distance between the masses, as explained in the calculations below. For the first hour the laser light was present between them (indicated by the red horizontal line), is turned off for 35 minutes and turned on again. When the laser light was absent, the distance between the masses increased.



August 6, two masses

Fig 3a: August 6 2008

The two masses would be touching at a scale reading of 418 mm. The 500g mass had a diameter of 40 mm, while the 909 g mass had a diameter of 50.3 mm This corresponds to a distance of 45 mm between the centres of mass of the two masses. To relate changes in the scale reading to changes in the absolute distance between the masses we can use basic trigonometry. Assuming small angles, the relationship between Δx, (the change in the position of the laser spot on the scale) and Δy (the change in distance between the centres of mass of the two masses) can be expressed as:

$$\Delta x = 2\Delta y \times \frac{d_2}{d_1}$$

where d_1 is the distance between the mirror and the mass, (430 mm)

and d_2 is the distance between the mirror and the scale. (480 mm)

This can be transformed as follows:

$$\Delta y = \frac{1}{2}\frac{d_1}{d_2}\Delta x$$

Using the graph of Figure 3a it is possible to calculate the force of attraction using

$F = G\, m_1\, m_2 / d^2$

for the two cases.

When the laser was on, the reading on the scale was approximately 425 mm. In this case Δx was 7 mm. Applying the formula derived above, this gives Δy of 3.13 mm. The absolute distance between the centres of mass was thus 48.1 mm.

With the laser off, the reading was near 435 mm, resulting in $\Delta x = 17$ mm, and $\Delta y = 7.6$ mm. The distance between the centres of mass was 52.6 mm in this case.

Using the standard formula for gravitational attraction between two objects:

$F = G\, m_1\, m_2 / d^2$

We obtain $6.67 \times 10^{-11} \times 0.5 \times 0.909 / (0.0481)^2 = 1.3 \times 10^{-8}$ Newton with light

and $6.67 \times 10^{-11} \times 0.5 \times 0.909 / (0.0535)^2 = 1.1 \times 10^{-8}$ Newton without light

The difference is 2.1×10^{-9} Newton for the deflecting force produced by the laser light.

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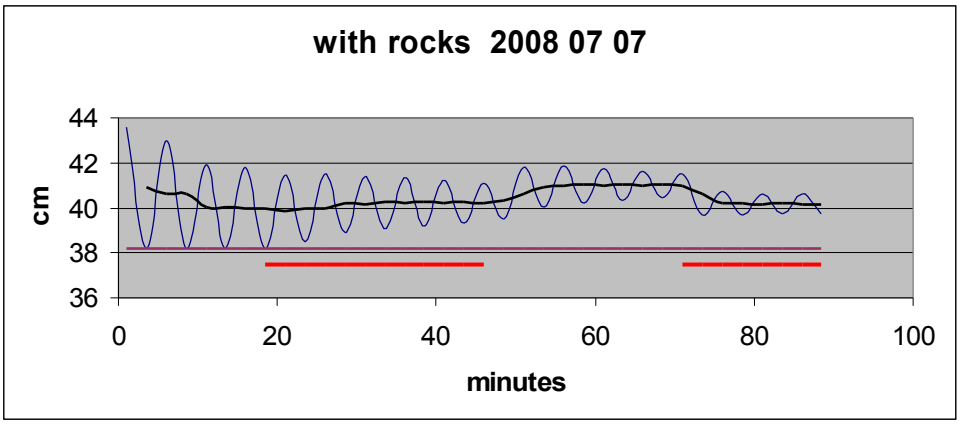
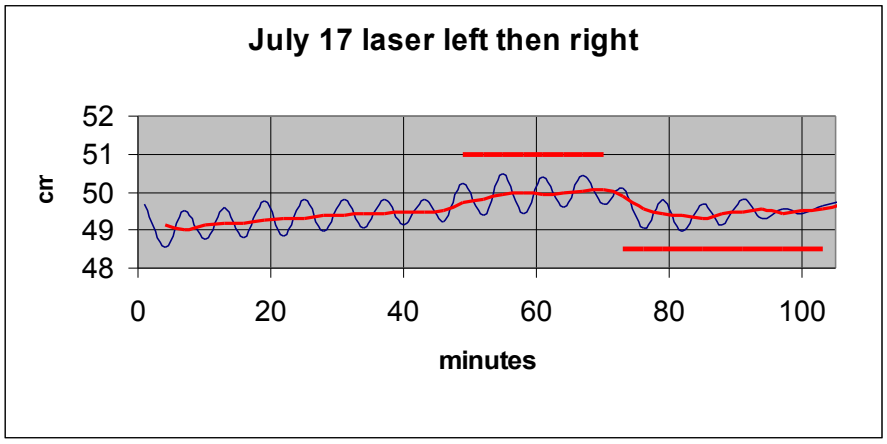
To verify that external electromagnetic interference (from the laser or other sources) was not responsible for the effect, an apatite crystal and a hematite mine core were used as the masses (fig. 4). The apatite was completely non conductive but the effect of the light beam was the same as with

the brass masses. When light was cut off, the separation increased. The red line indicates when laser light was on between the masses.



A further experiment on July 17, 2009 gave similar results (fig.7). For the first 80 minutes, the average rest position is at 48 cm and when the laser light was present on one side, the mass moved to about 50.5 cm. When the light was turned off, the mass returned to 48.5. The light was

turned on again on one side and the mass moved to 51 cm again.



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