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Expression of Concern

Expression of Concern on “Antigravity, an Answer to Nature’s Phenomena including the Expansion of the Universe”

Advances in High Energy Physics

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Advances in High Energy Physics would like to express concern with the article titled “Antigravity, an Answer to Nature’s Phenomena including the Expansion of the Universe” [1], which reviews the author’s previous studies.

Following the publication of the review article, concerns have been identified that the discussion is qualitative and without any concrete model supporting the ideas presented. The concept that clouds experience anti-gravity proportional to the temperature of water droplets appears unsustainable, as well as the idea that thermal energy produced by the stars can explain the accelerating universe. Both ideas lack a concrete model, and it is unlikely that such a model can exist. If the observations presented in the article are assumed to be correct, a model would be required to test the hypothesis. The possibility of such testing is doubtful. We additionally note that the author’s previous work, reviewed in the article, has not been cited by other researchers.

References

[1] C. K. Piyadasa Gamini, “Antigravity, an answer to Nature’s phenomena including the expansion of the universe,” *Advances in High Energy Physics*, vol. 2020, Article ID 9315491, 5 pages, 2020.

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Review Article

Antigravity, an Answer to Nature's Phenomena including the Expansion of the Universe

C. K. Gamini Piyadasa

Electrical and Computer Engineering, University of Manitoba, 75, Chancellors Circle, Winnipeg, MB R3T 5V6, Canada

Correspondence should be addressed to C. K. Gamini Piyadasa; gaminickg@gmail.com

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The gravitational attraction force being proportional to the mass has been experimentally shown for several hundred years now, but no gravitational repulsion has been identified within the accepted scientific reasoning. Here, we show that the gravitational repulsion force, similar to the gravitational attraction among particles has also been in existence in nature but, yet to be recognized. The results of experiments are shown in detail and are discussed in the recent series of-publications. It is also shown here that this gravitational repulsion force is proportional to the temperature which is an indicator of thermal energy of the particle, similar to the gravitational attraction that is proportional to the mass of the particle. The situations where heavy particles such as iodine, tungsten, and thorium in vacuum move against gravitational force have already been shown qualitatively. The increase in time-of-fall of water droplets (slowing down of fall) with rise in temperature is also quantitatively discussed. This article discusses two major phenomena observable in nature, clouds and the expansion of universe, which could be more preciously explained by the concept of antigravity.

1. Introduction

Gravity is a one of the fundamental forces identified in nature, formulated by Sir Isaac Newton in 1728 as: The law of universal gravitation [1]. However, the concept of gravitational repulsion has neither been discerned nor identified within the prevailing scientific laws and concepts until recent past [2–5]. The gravitational attraction is proportional to the mass which has been experimentally proved for several hundred years.

The idea of this short communication is to discuss observations and results published in three consecutive journal articles published by the author and extend its manifestation to explain two major physical processes in nature.

Manuscript 1 has shown [2] the upward movement of heavy particles in vacuum, in a situation where, all factors which are believed to be causing the upward movement of particles against the gravitational pull in air: viz—buoyancy and the lift force, are eliminated by experimental design. Manuscript [2] shows that iodine particles move against gravitational pull when they get heated in a vacuum as shown in Figure 1. It also cites an example from electronic vacuum tubes (also called electronic valves) where evaporated tungsten and thorium particles from the heater moves upwards, despite the gravitational pull and the strong radial electric fields and deposits in the top of the glass container.

Manuscript 2 discusses [3] the movement of heated water droplets in still air against the gravitational pull. Thermal image (Figures 2(a) and 2(b)) of the path of heated condensed water droplets reveals that, even though the temperature gradient does not support (Figure 2(c)) the formation of convection air currents, the condensed water droplets slow down its motion, turn around, and then move upward against gravitational pull.

Manuscript 3 [4] shows the upward movement of heated water droplets inside an ice cylinder (Figure 3(a)) which intentionally inhibits air convection. Secondly, the manuscript also shows the measurements related to the time-of-fall of a heavy water droplet (Figure 3(b)). Two droplets with mass 4 mg and 9 mg were used in the temperature range of 10°C–60°C.

In considering the equilibrium of the rising and falling water-droplet in still air, attention has been given to all relevant factors—force of gravity, buoyancy, surface evaporation [6, 7] and force due to the temperature profile in air [8, 9].

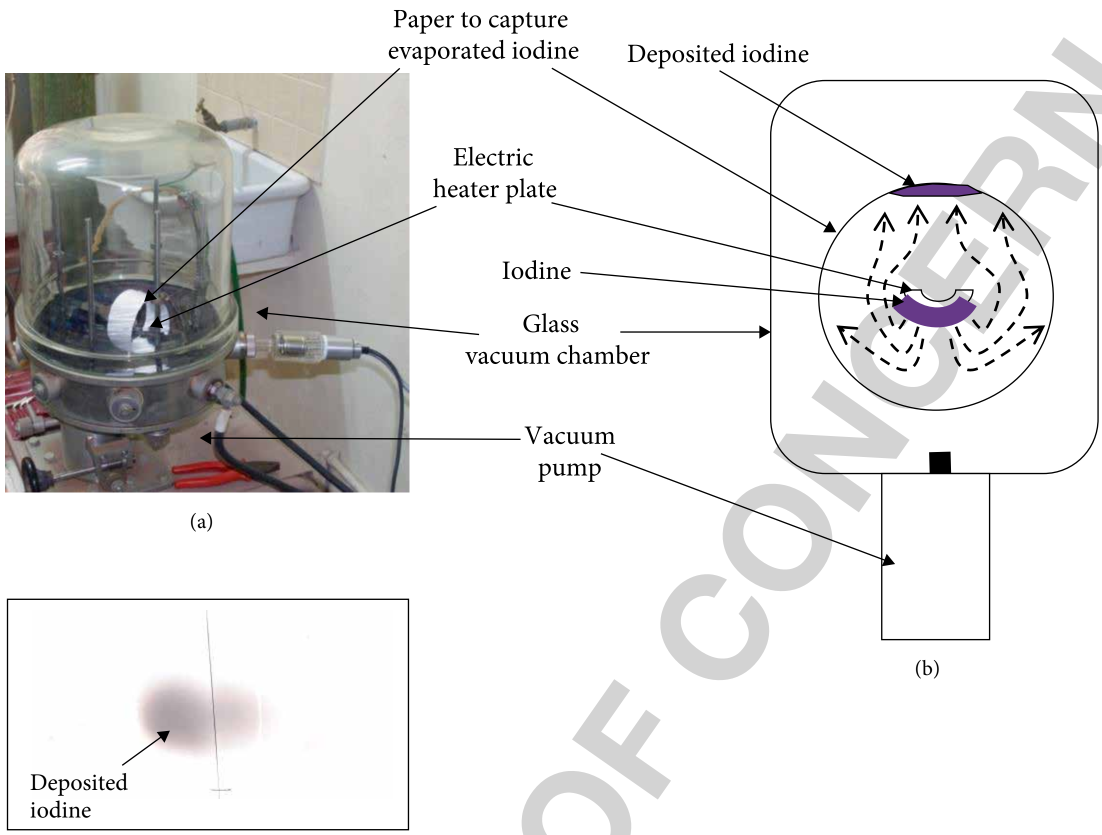

Figure 1: Figure extracted from reference [2]—Experimental set-up to observe movement of heat-evaporated iodine vapor in vacuum. (a) Vacuum deposition chamber. (b) A layer of iodine was gradually heat evaporated (ejected downward direction) inside the vacuum chamber. The electrical heater plate itself covers the iodine particles moving directly in upward direction. The iodine source was surrounded with a paper jacket in order to capture the deposition geometry of iodine. The paper was placed 50 mm radially away from the iodine source. Pressure in the chamber was $\sim 1 \times 10^{-5}$ mbar, average mean free path is greater than 6.6 m, and air density was approximately 12.6 ng m^{-3}. Pressure at the top (P_{top}) of the chamber was higher than at the bottom (P_{bottom}), $P_{\text{top}} > P_{\text{bottom}}$. (c) Photograph of deposited iodine on the inner top part of the paper. Reprinted from "Antigravity—Is it already under our nose?" by C. K. G. Piyadasa, 2011, Canadian Journal of Pure and Applied Sciences, Vol. 5, No. 2, pp. 1586, Reprinted by permission of SENRA Academic Publishers, 5919 129 B.

Here, it is experimentally demonstrated that there exists a cryptic force (upward force) which increases with temperature where a linear increase in time-of-fall (slowing down) is observed.

2. Discussion

As a summary of the content of these publications (Figure 4), it is concluded that there is a repulsion force, against the direction of gravitational pull, and further that this repulsion force is proportional to the temperature which is a parameter of the thermal energy of the particle, similar to the gravitational attraction that is proportional to the mass of the particles.

Referring to the results shown in the three manuscripts, Figure 4 summarizes the following relationship between two arbitrary particles with masses m_1, m_2, temperatures T_1, T_2 and specific heat capacities C_1, C_2.

Conventional gravitational law reveals that

$$\text{Attraction force} \propto \text{mass}\,(m_1, m_2). \tag{1}$$

The findings in experiments state that

$$\text{Repulsion force} \propto \text{thermal energy}\,(H_1, H_2). \tag{2}$$

Thermal energy, H is expressed in the following expression

$$H = m \times C \times T. \tag{3}$$

Therefore, resultant forces acting on an object (as in water droplet in manuscript 2, Expe. 2) are proportional to the mass and heat energy of objects. Generalizing expressions 1 and 2.

$$\begin{aligned} &\text{Resultant force between any two arbitrary objects} \\ &\quad = F_{att} \sim F_{rep} \propto f(\text{mass, heat energy}). \end{aligned} \tag{4}$$

For the objects with mass m_1, m_2 and thermal energy H_1, H_2 respectively, the above expression can be rewritten as

$$\text{Resultant force} = F_{att} \sim F_{rep} \propto f(m_1, m_2, H_1, H_2). \tag{5}$$

Similar to gravitational acceleration g, due to the attraction force of earth, a gravitational deceleration can also be proposed due to thermal energy.

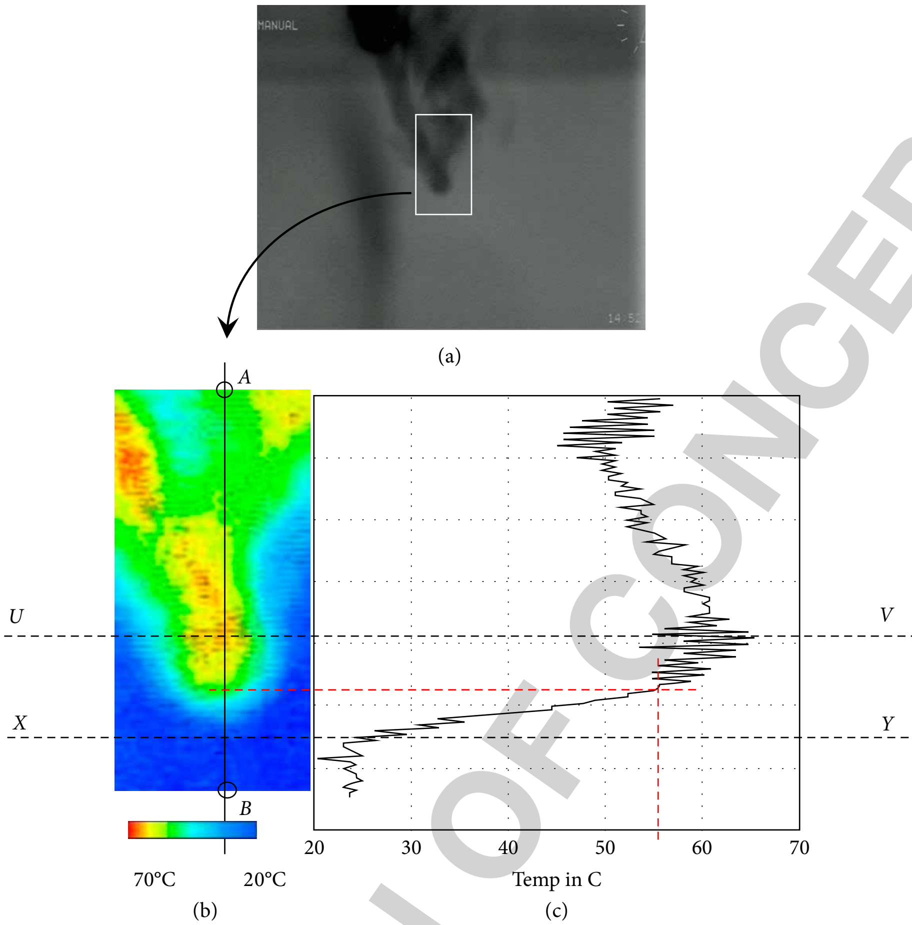

Figure 2: Figure extracted from reference [3]—Thermal image of the turnaround point (TAP) of the stream of the condensed steam droplets (CSD) and the vertical temperature distribution of the middle of TAP area. (a) Thermal image of downward projected CSD taken from the cryogenically cooled third generation forward looking infrared (FLIR) thermal camera (3–5 μm). (b) Temperature distribution at the droplet turning around area. Color gradient is proportional to the temperature as shown in the plate below (c) temperature distribution along the line AB in (b). Reprinted from "Will rising water droplets change science?" by C. K. G. Piyadasa, 2011, Canadian Journal of Pure and Applied Sciences, Vol. 6, No. 2, pp. 1995, Reprinted by permission of SENRA Academic Publishers, 5919 129 B Street Surrey, British Columbia, Canada V3X 0C5.

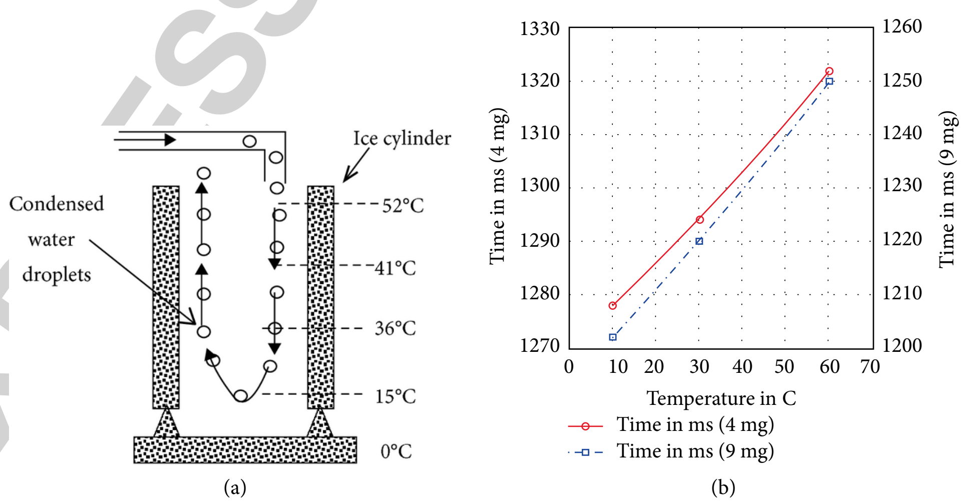

Figure 3: Results from the Manuscript 3 [4]. (a) Motion of condensed water droplets in the ice cylinder where the environment supports no convection currents. (b) Time-of-fall of water droplet increases with the increase in droplet temperature. Time-of-fall of two water droplets in a 5.913 m long metal tube was measured. Temperature of droplets was changed from 10°C to 60°C. Time delays of 44 ms and 48 ms were measured for 4 mg and 9 mg droplets for the temperature range of 10°C–60°C, respectively.

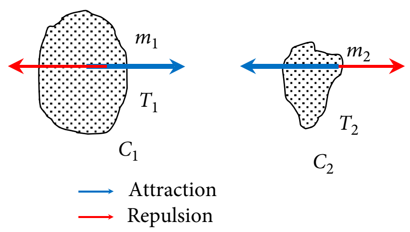

Figure 4: Forces acting in between two arbitrary particles with masses m_1, m_2, temperatures T_1, T_2, and specific heat capacities C_1, C_2. There exist attraction (blue arrows) and repulsion forces (red arrows) between them.

The gravitational force is considered a weak force in classical physics. Any gravitational interaction could be considered the resultant effect of the gravitational and antigravitational forces inherent in the two bodies under consideration; hence, the gravitational force manifests itself as a weak force.

In this proposal, repulsive force depends not only on C and T but also on mass (Equation 3). Thermal energy is stored in mass/matter and therefore the repulsive force is invariably linked with the mass. Therefore, it is reasonable to connect this repulsive force with "gravitational repulsion" or "anti-gravity". Further, what we have witnessed here is a "rising up" against gravity, it is logical to bring in this antigravity factor. It is also worthwhile noting that no other concept of general physics could explain the observations, upward motion of iodine molecules (nm scale) in vacuum, rise of water-droplets (in μm scale) and the delay of fall of water-droplets (in mm scale) with the rise in temperature against the direction of gravitational pull (i.e., this force acts on against the gravitational pull).

A detailed mathematical analysis will follow this conceptual paper in the time to come.

Concept of antigravity can be used to effectively interpret many phenomena. In this manuscript, the following two natural phenomena that represent two different scopes clouds and the expanding universe are selected for discussion. A cloud represents a relatively small system compared to the expanding universe.

2.1. Clouds. Clouds are floating even though they contain water-droplets [10] (condensed water-droplets) which are 899 times denser than the surrounding air at the altitude 1000 m and at temperature 8.5°C. This ratio (density of water and air) becomes 1667 times at altitude of 7000 m (Physics fact book https://hypertextbook.com/facts/2007/AllenMa.shtml, The Engineering tool box https://www.engineeringtoolbox.com/standard-atmosphere-d_604.html) where temperature is around −40°C.

The main argument here, in cloud-physics, is that it is only because the updraft (convection currents) in the cloud counteracts the fall of the cloud particles [11–13]. It is also worth mentioning that there exists a down draft similar to updraft in clouds [14, 15].

However, the mist and the fog forming at the ground level, in still (or undisturbed) air where no updraft (convection currents) exists, have the same composition as in a cloud. Mist and fog usually form on a calm night when the air is too cold to hold all its moisture. Volume mean diameter (VMD) of fog droplets are observed up to about 65 μm [16, 17] and in mist the VMD tends to be a little higher than fog. In another words, mist is heavier and lies closer to the ground. The separation among these droplets is relatively large compared to their size. The number density of these droplets is around 25 droplets per cubic centimeter [16]. In these situations, no updraft exists even though they (mist & fog) have the same composition as in a cloud. This is further observable in still or in slowly moving clouds on a high mountain, especially in the morning where the ground is nearly frozen where no convection or updraft exists.

The repulsive force against the gravitational pull of the water droplets is shown in the second and third manuscript. This repulsive property of water droplets against the earth's gravitational pull is also shown in Figures 2 and 3. This concludes that there exists a repulsive force (with earth) as well as gravitational attraction force to the particle depending on their thermal energy and the mass where the water droplets are in equilibrium.

In addition to attractive and repulsive forces of water-droplets of a cloud with earth, there exist attraction and repulsive forces among water droplets within the cloud. These forces acting inside the cloud explain the accumulative (flocking together) nature of the cloud which has not been explained by the classical theories. The equilibrium of these two forces will confine the droplets to a certain area as a floccule. The repulsiveness does not allow shrinking and finally collapsing the cloud. The attractive force keeps the droplets together without dispersion.

Some other observations can be spotted if we think very carefully.

For example, the high concentration of Chlorofluorocarbon (CFC—120.9 amu) molecules observed in high altitudes (17–50 km) could also be attributed to the antigravity force, although it is generally explained as a result of diffusion. CFC is four times heavier than average air (average air molecule is 28.84 amu).

Another similar phenomenon in which the classical theories fail to explain is the rising of water droplets when hot water is thrown horizontally in the air in extremely cold weather. The hot water breaks in to tiny droplets as soon as it gets in to free air, and these tiny droplets move upwards against the gravitational attraction (see video in Supplementary Materials (available here)). The repulsion among hot water molecules in the water breaks up the water masses. These particles then move against earth's gravitational field due to its thermal energy (antigravity force) as experimentally shown by the author in his second and third manuscripts.

2.2. Expanding Universe. Further, even in the observation of an "expanding/accelerating universe", the galaxies are moving apart from each other despite the strong gravitational forces among massive systems. At present two main theories, big bang theory and dark energy, try to interpret this expansion of the universe but these interpretations are not very promising. If only attraction force due to the gravitational force exists, the universe must shrink together and finally collapse. Instead, it is expanding and the galaxies are repelling each other. Hence, it is logical to sense a repulsive force among celestial bodies in the universe. This idea was recently published elsewhere [18] as "Antigravity could replace dark energy as cause of universe's expansion" (https://phys.org/news/2011-04-antigravity-dark-energy-universe-expansion.html). The universe and galaxies are analogous to clouds and cloud particles. However, in a cloud, cloud particles are confined to a relatively stationary volume, while the elements in the universe are continuously accelerating among each element. This could be easily explained by the thermal energy that every star produces continuously, due to mass energy conversion $\left(E = mc^2\right)$ [19, 20]. A reduction in mass together with an increase in the heat energy certainly creates anti-gravity grounds for a realistic explanation of the expansion of intergalactic distances (expanding universe) with an acceleration. Conversion of mass to energy in a galaxy amounts to a lessening of the attracting gravitational force (loss in mass) and conversely an increase in the repulsive gravitational force—which is the antigravity force.

Therefore, it is reasonable to think that there exist both decreasing attractive and increasing repulsive forces in the universe in order to maintain the dynamic nature of the system.

3. Conclusion

The objective of this endeavor has been to establish the presence of an anti-gravity force which has also been in existence in nature but, yet to be recognized in the realm of science. The forgoing analysis using rising iodine molecules in vacuum and rising/falling water-droplets in still air affords clear evidence to speculate the existence of the duality in gravitation. All the above experimental observations call for a hither to unraveled force "the antigravity force" which had been evading science all the time. Also, the concept of dark-energy-an elusive idea, may also encompass antigravity while explicating it.

Conflicts of Interest

The author declares that there is no conflict of interest regarding the publication of this paper.

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Supplementary Materials

Video 1: Upward motion of water droplets in −50°C. (*Supplementary Materials*)

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