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The electron propelled space-craft applications of gamma rays

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Abstract

Travelling in a vehicle at the velocity of light that is considered to be impossible at any moment of time has now got a possibility by the application of gamma rays in vacuum. It is familiar to us that there is no friction to heat when gamma rays is passed through vacuum. When we project this gamma ray on to a thin film of graphene, we see that the electrons are excited and the electrons are pushed at the velocity of gamma ray photon which actually follows Newton's third law of motion. Now, it is observed that the electrons in turn move in the direction of the incident gamma ray and collide with surface of the space vehicle that is to be set into motion. Now the electrons move backward after pushing the vehicle forward and as there is no damping factor to stop or slow down the motion. Moreover it is noticed that there is negligible friction and so it keeps on moving until stopped by some other means.

Keywords: gamma rays, travel at velocity of light, graphene in vacuum.

1. Introduction

Gamma rays has got many applications today. And it is known for decades that there is no friction or any damping factors in vacuum. So, why not we use gamma rays in vacuum? Here lies an unexplored concept of modern science. It is believed that travelling in any kind of vehicle in any condition at the velocity of light is impractical. Now what we are going to say you is quite interesting and really astonishing. It is known from the law conservation of momentum that when a body collides with another body, the momentum before the collision taking place and the momentum after the collision taking place are equal to each other [1]. Also it is known that vacuum is the perfect condition for such laws to be demonstrated as there is very less friction and no significant damping factors like air, so what exactly takes place in vacuum is motion without being stopped or otherwise called continuous motion. [2] There is matter spread all through the Universe; it is just spread very thin. The average density of gas in our Milky Way galaxy is about one atom per cubic centimeter. This is a much better vacuum than is obtained in a laboratory, but when integrated over the Galaxy, comes out to quite a lot of mass. This gas is mostly hydrogen (~90%), and helium (~9%), and less than one percent everything else. The gas between galaxies is even thinner, but there is probably something there (it hasn't been measured, though). These elements are in the Earth because they were present when the gas cloud that formed our solar system collapsed to form the Sun and the planets. The amount of dark matter is very much in question. From the effects of its gravity, it appears that dark matter is associated with galaxies, but extends further than the visible matter (stars). From the dynamics of galaxies in galactic clusters and super clusters, it looks like there is dark matter between the galaxies as well. The speed of an object is how much its position changes in a given amount of time. As long as we can measure a position and a time, we can define a speed, whether the object is on the Earth or far out in space. Distance and time do exist outside the Earth; in fact, they are a fundamental part of the "fabric" that makes up the Universe. Humans have personally studied the motion of objects (including themselves) in Earth orbit and on the Moon. Spacecraft have been to the surface of Mars, Venus, asteroids, comets, and have flown by all but one of the nine planets. The Voyager spacecraft are now outside the solar system and are still being tracked to monitor their positions and speed. With large arrays of telescopes we have detected planets orbiting other stars, the motion of other galaxies swirling around their cores, and clustering of galaxies together. In every case, right out to the very edge of what we can observe, distance, time, and speed seem to work everywhere in the Universe just the way they do here on Earth. The units we use to measure distance and time are made up (an inch could have been defined twice as long, for example) but the distance or time itself does not depend on us.

So can we "reach zero speed"? The speed of an object is always measured "relative to" the speed of something else (hence the term "relativity"). Einstein's "special" relativity. The point is that we always measure speed with respect to some particular frame of reference. As it turns out, there doesn't seem to be any absolute frame of reference in the Universe. Earth moves around the Sun, the Sun moves through the arm of the Milky Way galaxy, the arm spirals around the core of the Galaxy, our galaxy moves inside our local group, and so on. A few theorists may argue that there is some frame of reference against which all motion can be measured, but even that should tell you that if such a frame exists, it is not obvious. So for our purposes, if you want to watch the Earth fly by, all you have to do is get yourself moving the other way at whatever speed you want to see the Earth go by. One thing you could imagine doing is to launch a spacecraft to orbit the Sun in the opposite direction that the Earth goes around. If you got the spacecraft going the other way at the same speed as the Earth, you would be "at rest" from the point of view of the solar system.

Then you could sit there and watch the Earth go around the Sun and come back to you every year (you'd want to move over a little so it doesn't run into you when it comes around again). So that might be "zero speed" with respect to the Earth's motion around the Sun, but not compared to another planet's motion or the Sun's motion through the galaxy Their trajectories were affected by gravity during their swings past the planets, but they continue to coast ever outward. Today they are nearly 90 times as far from the Sun as is the Earth and probing the region where space dominated by our Sun meets interstellar space. And on they coast, not burning any fuel. They move at a constant velocity, looking, recording, and teaching us more every day. Newton when he concluded that acceleration (and not velocity) was proportional to the force applied to an object. Another of his laws was that once set in motion (such as when a spacecraft is coasting after burning its fuel), the object travels in a straight line at a constant speed unless acted upon by another force. Probably the greatest reason for misunderstanding this aspect of classical physics is the modern car. We know that to drive at a constant speed we need to burn fuel. What we forget is that a moving car experiences friction in the form of air resistance. The soft tires also consume energy as they flex and turn. The fuel burned in the engine is overcoming those forces to allow the car to move at a constant speed. Newton would have loved space. There is no air resistance. There is only gravity. Once a spacecraft is accelerated to a given speed, the engine is turned off and the craft coasts forever with its trajectory affected only by the force of gravity. The best example of this I know is the Voyager 1 & 2 spacecraft. They were launched in 1977 and went to Jupiter and Saturn. Voyager 2 went on to Uranus and Neptune. Their trajectories were affected by gravity during their swings past the planets, but they continue to coast ever outward. Today they are nearly 90 times as far from the Sun as is the Earth and probing the region where space dominated by our Sun meets interstellar space. And on they coast, not burning any fuel. They move at a constant velocity, looking, recording, and teaching us more every day. [3]

2. Gamma rays

Gamma radiation, also known as gamma rays, and denoted by the Greek letter γ, refers to electromagnetic radiation of an extremely high frequency and are therefore high energy photons. Gamma rays are ionizing radiation, and are thus biologically hazardous. They are classically produced by the decay of atomic nuclei as they transition from a high energy state to a lower state known as gamma decay, but may also be produced by other processes. Paul Villard, a French chemist and physicist, discovered gamma radiation in 1900, while studying radiation emitted from radium. Villard's radiation was named "gamma rays" by Ernest Rutherford in 1903. Natural sources of gamma rays on Earth include gamma decay from naturally occurring radioisotopes, and secondary radiation from atmospheric interactions with cosmic ray particles. Rare terrestrial natural sources produce gamma rays that are not of a nuclear origin, such as lightning strikes and terrestrial gamma-ray flashes. Additionally, gamma rays are produced by a number of astronomical processes in which very high-energy electrons are produced, that in turn cause secondary gamma rays via bremsstrahlung, inverse Compton and synchrotron radiation. However, a large fraction of such astronomical gamma rays are screened by Earth's atmosphere and can only be detected by spacecraft. Gamma rays typically have frequencies above 10 exahertz (or $>10^{19}$ Hz), and therefore have energies above 100 keV and wavelengths less than 10 picometers (10^{-12} meter), which is less than the diameter of an atom. However, this is not a hard and fast definition, but rather only a rule-of-thumb description for natural processes. Gamma rays from radioactive decay are defined as gamma rays no matter what their energy, so that there is no *lower* limit to gamma energy derived from radioactive decay. Gamma decay commonly produces energies of a few hundred keV, and almost always less than 10 MeV. In astronomy, gamma rays are defined by their energy, and no production process need be specified. The energies of gamma rays from astronomical sources range to over 10 TeV, an energy far too large to result from radioactive decay. [4] A notable example is extremely powerful bursts of high-energy radiation referred to as long duration gamma-ray bursts, of energies higher than can be produced by radioactive decay. These bursts of gamma rays, thought to be due to the collapse of stars called Hypernovae, are the most powerful events so far discovered in the cosmos.

3. Graphene

Graphene, unlike carbon–nanotubes, has edges that can react chemically. These exposed carbon molecules have special reactivity, as do any imperfections in the graphene sheets. Not surprisingly, because of its 2 dimensional structure and the lateral availability of the carbon, graphene is now known to be the most reactive form of carbon. In addition scientists at Stanford University have reported in 2013 that sheets of graphene one atom thick are a hundred times more chemically reactive than thicker sheets. Consequently controlling the functionalization of graphene sheets will be difficult but may still be the source of even more specialised properties and uses that are still unknown to us today. There are currently several methods to produce graphene described in the scientific and commercial literature showing the intensity of development work globally. One is mechanical cleavage, that is taking layers off multi-layered graphite or by depositing one layer of carbon onto another material. The former is clearly how it was done using adhesive tape, but it is reported that the latter is more capable of making a mono-layer with the fewest defects. Graphene platelets can also be created by chemically cutting open carbon nanotubes, one method describing how the nanotubes are cut open in solution by action of potassium permanganate and sulfuric acid. Chemical, solvent or sonic exfoliation (separation) of graphene layers from graphite has also been developed. Plasma deposition techniques, the reduction of graphene oxides (RGO) and other synthetic methodologies are being introduced as route to scale up manufacture. After the initial isolation of graphene occurring at The University of Manchester, the university is aiming to strengthen its position as 'The home of graphene' through furthering fundamental research into graphene and other two dimensional materials and seeking to develop commercial applications of these materials. The new £60m National Graphene Institute will be a research centre whilst the £60m Graphene Engineering Innovation Centre (GEIC) has been announced to allow for the acceleration of applied research and development in partnership with other research organisations and industry. Large scale manufacture of graphene is beginning to take place in locations where the chemistry based process industries have the infrastructure needed and can manage the materials, processes and technologies. The processes are moving out of laboratories into locations such as that in North East England where the North East of England Process Industry Cluster already have two commercial manufacturers Applied Graphene Materials & Thomas Swan Limited. The UK Government has also chosen this chemistry based industrial manufacturing cluster to be the base of the UK's National Graphene Applications Centre. [5]

4. Massless Electrons in Graphene

Electrons moving in graphene behave in an unusual way, as demonstrated by 2010 Nobel Prize laureates for physics A. Geim and K. Novoselov, who performed transport experiments on this one-carbon-atom-thick material. The present review explores the theoretical and experimental results to date of electrons tunnelling through energy barriers in graphene. What could partly explain graphene's properties is that electrons travelling inside the material behave as if they were massless. Their behaviour is described by the so-called Dirac equation, which is normally used for high-energy particles such as neutrinos in vacuum moving at a velocity 300 times greater than that of electrons, nearing the speed of light. In this review, the authors focus on the tunnelling effect occurring when Dirac electrons found in graphene are transmitted through different types of energy barriers. Contrary to the laws of classical mechanics, which govern larger scale particles that cannot cross energy barriers, electron tunnelling is possible in quantum mechanics - though only under restricted conditions, depending on the width and energy height of the barrier. However, the Dirac electrons found in graphene can tunnel through energy barriers regardless of their width and energy height; a phenomenon called Klein tunnelling, described theoretically for 3D massive Dirac electrons by the Swedish physicist Oskar Klein in 1929. Graphene was the first material in which Klein tunnelling was observed experimentally, as massive Dirac electrons required energy barriers too large to be observed. [6, 7]

5. The experiment

Now this setup is made in the space and made to fall on a large thin film of graphene whose edges are arrested to the surface of a space ship. There should be complete vacuum, inside the space between the film and their velocity to the particles of the thin film. This is due to the law of conservation of momentum that the momentum before and after collision remain equal. Hence now what happens is that the particles go and strike the space ship. And truly speaking the space ship will travel at the velocity of light. Thus we have proved the impossible (no vehicle can travel at the velocity of light) to be possible. Thus here is an innovation in the field of automation by discovering the possibility of travelling at the speed of light. Law of conservation of momentum:

p = mv.
m1u1 +m2u2 = m1v1 +m2v2.

Where,
P – Momentum
m – Mass
u – Initial velocity
v – Final velocity.

Velocity needed to be achieved = 3×10^8 ms^{-1}

Momentum = mass × velocity

According to the law of conservation of momentum,
(as stated earlier)

There is only gravitational force and no frictional force in space. So,

Gravitational pull between space ship and the earth =

$G \times (m1 \times m2)/r^2$

$= 6.67 \times 10^{-11} \times 5.97 \times 10^{24} \times 2030000/(100000)^2$ N

= 80834397000 N = 8242814494.646571 kg

Therefore momentum needed =

$= 8242814494.646571 \times 3 \times 10^8$ kg m /s

$= 2.4728 \times 10^{18}$ kg m/s

Momentum of electron moving at velocity of light =

$= 9.10938291 \times 10^{-31} \times 3 \times 10^8$ kg m/s

$= 2.73281487 \times 10^{-22}$ kg m/s

Number of electrons needed to be projected =

$= 2.4728 \times 10^{18} / 2.73281487 \times 10^{-22}$

$= 9.048545602 \times 10^{39}$

Therefore energy of these electrons =

And energy, $e = mc^2$

$E = mc^2$
$= 8.24266667 \times 10^{-12} \times (3 \times 10^8)^2 \times 9.048545602 \times 10^{39}$ kg m^2/s^2

$= 6.712573072 \times 10^{45}$ J

For a time period of 1second,

$= 6.712573072 \times 10^{45}$ W

$= 4.189656754162 \times 10^{13}$ MeV

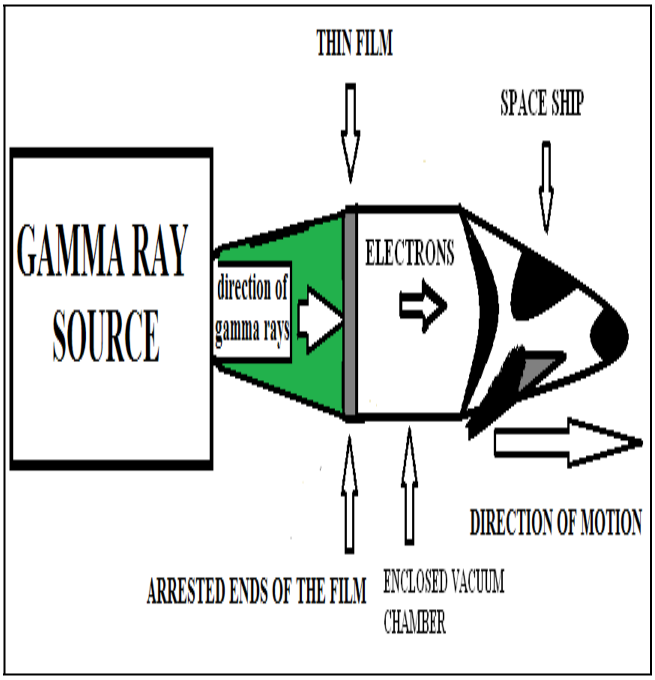
Therefore the power required for a beam to move the space-craft is pulse of $4.189656754162 \times 10^{13}$ MeV energy.

Tables

TABLE – II

Sl.	Units	Units - (expansion)	Terms
1.	kg	Kilogram	Mass
2.	N	Newton	Force
3.	kg m /s	kilogram meter/second	Momentum
4.	kg m^2/s^2	kilogram $meter^2/second^2$	Energy
5.	J	Joule	Energy
6.	MeV	Mega electron-Volt	Energy
7.	W	Watts	Power
8.	W/m^2	$Watts/m^2$	Intensity
9.	µm	Micro-meter	λ(wavelength)
10.	fs	Femto-second	Fraction of time
11.	TW	Terawatts	Power
12.	m	Meter	Length
13.	GeV	Giga electron -volt	Energy

6. Diagram



The setup

7. Definitions

Asteroids

Asteroids are minor planets, especially those of the inner Solar System. The larger ones have also been called planetoids. These terms have historically been applied to any astronomical object orbiting the Sun that did not show the disk of a planet. [8]

8. Classical physics

Classical physics refers to theories of physics that predate modern, more complete, or more widely applicable theories. If a currently accepted theory is considered to be "modern," and its introduction represented a major paradigm shift, then previous theories (or new theories based on the older paradigm) will often be referred to as "classical".[9]

9. Coherent

Being coherent is an ideal property of waves that enables stationary (i.e. temporally and spatially constant) interference. It contains several distinct concepts, which are limit cases that never occur in reality but allow an understanding of the physics of waves, and has become a very important concept in quantum physics. More generally, coherence describes all properties of the correlation between physical quantities of a single wave, or between several waves or wave packets.[10]

10. Comets

A comet is an icy small Solar System body that, when passing close to the Sun, heats up and begins to outgas, displaying a visible atmosphere or coma, and sometimes also a tail. These phenomena are due to the effects of solar radiation and the solar wind upon the nucleus of the comet. Comet nuclei range from a few hundred metres to tens of kilometres across and are composed of loose collections of ice, dust, and small rocky particles. The coma and tail are much larger, [11]

11. Damping factor

Damping is an influence within or upon an oscillatory system that has the effect of reducing, restricting or preventing its oscillations. In physical systems, damping is produced by processes that dissipate the energy stored in the oscillation. Examples include Viscous drag in mechanical systems, resistance in electronic oscillators, and absorption and scattering of light in optical oscillators. Damping not based on energy loss can be important in other oscillating systems such as those that occur in biological systems. [12]

12. Dynamic

It a branch of physics (specifically classical mechanics) concerned with the study of forces and torques and their effect on motion, as opposed to *kinematics*, which studies the motion of objects without reference to its causes. Isaac Newton defined the fundamental physical laws which govern dynamics in physics, especially his second law of motion.[13]

13. Einstein's theory of relativity

The theory of relativity, or simply relativity in physics, usually encompasses two theories by Albert Einstein: special relativity and general relativity. Concepts introduced by the theories of relativity include. :particular, space and time can dilate. Space-time: space and time should be considered together and in relation to each other. The speed of light is nonetheless invariant, the same for all observers. [14]

14. Flex

"To flex" as a verb means "to bend". [15]

15. Frame of reference

In physics, a frame of reference (or reference frame) may refer to a coordinate system used to represent and measure properties of objects, such as their position and orientation, at different moments of time. It may also refer to a set of axes used for such representation. In a weaker sense, a reference frame does not specify coordinates, but only defines the same 3-dimensionalspace for all moments of time such that the frame can distinguish objects at rest from those that are moving. [16]

16. Frequency

Frequency is the number of occurrences of a repeating event per unit time. It is also referred to as temporal frequency, which emphasizes the contrast to frequency and angular frequency. [17]

17. Friction

Friction is the force resisting the relative motion of solid surfaces, fluid layers, and material elements sliding against each other. There are several types of friction: like fluid friction, dry friction, and sliding friction. [18]

18. Advantages

- The advantages of the methodology are:
- Travel at the speed of light.
- Space probes to other galaxies is possible.
- Less amount of fuel usage.
- It is time saving process.

19. Conclusion

Thus it is possible to travel at the velocity of light by the use of gamma rays capable of producing a minimum energy of $4.189656754162 \times 10^{13}$ MeV .In order to accelerate the electrons in the graphene film kept in between the gamma rays source and the targeted spaceship in vacuum (it is considered as outer-space beyond an altitude of 100 km from the sea level). The scope of this paper is that gamma rays can be used to achieve things that have not been possible over centuries. Moreover a spaceship travelling at the speed of light will lay a milestone in the field of Astrophysics which is an evergreen branch of science and technology. This experiment will also lead to probes into space to distances not gone so far even to other stars and galaxies.

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14. http://en.wikipedia.org/wiki/Flex
15. http://en.wikipedia.org/wiki/Frame_of_reference
16. http://en.wikipedia.org/wiki/Frequency
17. http://en.wikipedia.org/wiki/Friction