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The laws of physics by Stanton Freidman

I am sick and tired of people complaining that one or another law of physics would have to be violated by flying saucers, and, therefore, since I am a nuclear physicist, how can I say some UFOs are alien spacecraft?

There is a long list of such supposed violations: It would take too long to get here from other star systems. It would take too much energy to get here from other star systems. Right angle turns are impossible. High accelerations would violate the laws of physics. People can't be taken through walls without damaging the walls or the people. Etc. ad nauseum.

What we seem to be dealing with are claims by people who don't understand the laws of physics, who have no comprehension that the feasibility of accomplishing a particular objective is almost completely dependent on the engineering

assumptions made, and that much of the blind acceptance we give to today's technology would have been totally rejected by other noisy negativists 100 or more years ago.

It is easier and perhaps more erudite to suggest that something is impossible because it supposedly violates the laws of physics rather than admitting, "I don't know how to do that." Can we reach the stars? Can we withstand high accelerations? Can we go into orbit? Can we make powerful computers that will fit on a desk?

Slide rules and vacuum tubes won't cut it for today's computers. Neither will transistors nor integrated circuits. . . But micro integrated circuits will do it. They were only attained with the expenditure of billions of dollars and thousands of man-years of effort by physicists and others.

The key thought is that progress comes from doing things differently in an unpredictable way.

Acceleration

How much acceleration can people stand? This, of course, is a biology question, but the simple answer to so many such questions is that it depends on the duration of the acceleration, the direction of the force acting on the person with regard to her body, the magnitude of that force, the restraints on the person, etc. As it happens, the shorter the duration, the more one can stand.

This question is often confused by the units we physicists use. One G (ask any physics class) is 9.8 meters per second squared-which means nothing to most people. In normal units that is about 21 miles per hour per second. NASA data shows that a trained pilot can perform a tracking task while being accelerated at 14 Gs for two minutes.

Think about that for a moment. 14 Gs is about 300 miles per hour per second. A Corvette going from 0 to 60 miles an hour in 6 seconds if uniformly accelerated is pulling $60/6$ or 10 mph per second, or only about 0.5 G's! It turns out one can withstand 30 Gs for 1 second without damage, if properly constrained, and the force is in the right direction with regard to the body.

Notice how the astronauts are launched on their backs because people can stand much more acceleration back to front than foot to head. Note, too, that contour couches are used to distribute the load and that strong seat belt restraints are employed.

There are really no laws of physics being violated here, though one book foolishly claimed that when one gets to 8 G's, one dies. True, if one slams a standing unrestrained person into a brick wall....Dr. Stapp actually lived through deceleration of 43 Gs (From over 600 mph to zero), for a fraction of a second. The rocket sled can be seen at the Clyde Tombaugh Space Museum in Alamogordo, NM. No, you wouldn't catch me on such a sled.

Right angle turns

Some have said that saucers making right angle turns violate the laws of physics. The laws of physics say nothing about the possibility of making rapid right angle turns. Our present jet and rocket technology, which work by carrying along something thrown out the back end, is not capable of providing right angle turns, because we cannot rapidly change the direction of the rearward thrust.

A magneto-aerodynamic system which could provide rapid changes of the direction of electric and magnetic forces probably could provide right angle turns. More likely there is a technique about which we know nothing.

Sonic booms

Sometimes it is claimed that one cannot go faster than the speed of sound in the atmosphere without producing a sonic boom. Therefore, any claims of supersonic flying saucers without booms being heard would mean the laws of physics would be violated. The truth is that the production of a sonic boom is dependent on the shape of the high speed object and its interaction with the surrounding boundary layer of air. If the air is electrically ionized (made to be a conducting plasma) then there may NOT be an accompanying sonic boom.

Energy and time

I have been told that getting here from another solar system in a time shorter than the average person's life span would take far too much energy and would violate the laws of physics, or it would take thousands or millions of years. The fact is that the feasibility of any space travel is based upon the assumptions made.

As I noted in my "Challenge to SETI Specialists" (see my Web site at www.vj-enterprises.com/sipage.html), a "scientific" calculation in 1941 oft he required initial launch weight of a chemical rocket able to get a man to the moon and back concluded it would be a million million tons.

Dr. Campbell was off by a factor of 300 Million! He made all the wrong assumptions, such as single stage rockets, a limit of 1G acceleration, using a retrorocket to slow down when approaching earth on the return, assuming much too low an exhaust velocity, and assuming that the rocket would have to provide all the energy.

We use cosmic freeloading such as the earth's rotation of 1000 mph when launching to the east near the equator, the gravity field of the moon to pull in the rocket, and the earth's atmosphere to slow us down on return. It was Dr. Campbell's ignorance that was the problem, not the laws of physics.

Another misunderstanding of the laws of physics comes from people pointing out that since one would have to approach the speed of light (670,000,000 mph) to go to nearby solar systems, the amount of energy required would be humongous because the mass of the rocket increases as one approaches the speed of light. However, it only takes one year at 1G acceleration to get close to the speed of light.

If one uses nuclear fusion of deuterium (heavy hydrogen) and helium-3 (light helium one produces charged particles which can be directed by electric and magnetic fields) then there is ten million times as much energy per particle as they can get in a chemical rocket. The particles are born that way and are not accelerated to that energy.

In addition, time slows down for things moving that fast to the point that at something like 99.99 % of light speed, it only takes a little over six months pilot time (not counting acceleration time) to go the 39 light year distance to Zeta 1 and Zeta 2 Reticuli.

Also, if one uses gravitational assist (the traveler doesn't provide the energy) as we do on all our deep space probes, the increase in mass wouldn't matter anyway. A black hole would be quite convenient.

Moving through walls

"But Stan, how do the laws of physics permit people to be pulled through walls and windows without breaking them or the person?" I haven't the faintest idea. I am sure that 150 years ago the idea of having information enter a closed room and be reproduced to make pictures and sounds on TV and radio sets using electricity, which also wasn't known at that time, would have been thought absurd.

Remember that radio waves have been reaching Earth for billions of years even

though we weren't aware of them. Maybe we will learn how, with strong electric or magnetic or unknown fields, to go through the mostly empty space of walls and windows with the mostly empty space of people.

New nanotechnology techniques are truly as extraordinary as the breakthroughs in quantum mechanics, relativity, radioactivity, and solid state physics over the past century or so. Does anybody really believe that the progress has stopped? I certainly don't.

That we cannot either explain or duplicate what to us seems like anomalous technology, doesn't mean a more advanced society didn't get there a long time ago. It is our lack of understanding that provides the limits, not the laws of physics.

Limited realms

Remember that the closest-to-each-other pair of sun like stars, Zeta 1 and 2 Reticuli, are a billion years older than the sun. An important aspect of the laws of physics is that they apply in limited realms. Einstein's relativity involving increase of mass and slowing down of time is only significant at velocities near that of light, or in situations where the conditions are very different from "normal"-for example, near very very dense black holes or neutron stars.

Quantum mechanics, on the other hand, normally deal with the world of the very small. In the biological sciences we find that a great variety of very new microscopes enable us to see the very small world. Nanotechnology and quantum dots are part of that very small world.

The myriad of applications for lasers, from the check-out counters, to CDs, to very sophisticated analyses of materials, to the surgeon's special tools frequently accomplishing what was thought to be impossible should help us

recognize that violations of the laws of physic are not really very common.

What new realms will be discovered in the next decade or in the next century?

New variations on old theme of the world of physics?