Can we ever travel faster than light?

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Abstract

I claim that we can travel faster than light (FTL). In this answer, I suggest a conceptual way how to do it.

FTL travel is of paramount importance when considering traveling to other stars in our Milky Way galaxy or to other galaxies. The closest star in our galaxy, alpha centaury, is located 4.5 light-years from the Sun. Special relativity postulates that **in space** it is not possible to travel faster than the speed of light. So, even traveling at the speed of light it will take 4.5 years to reach alpha centaury. The closest galaxy to the Milky Way is Andromeda that is located 2.5 million light-years. It will take 2.5 million years to reach it.

Apart from many Sci-Fi movies and books, traveling at FTL has been considered by scientists. The concept is manipulating space-time in such a way it does not break relativity. There is the wormhole structure suggested by Einstein and Rosen. A wormhole can be visualized as a tunnel with two ends at separate points in spacetime. Another idea was proposed in 1994 by Miguel Alcubierre that is a method for changing the geometry of space by creating a wave that would cause the fabric of space ahead of a spacecraft to contract and space behind it to expand. The ship would then ride this wave inside a region of flat space, known as a warp bubble, and would not move within this bubble but instead be carried along as the region itself moves due to the actions of the drive.

The following is my suggestion for an FTL spacecraft.

To explain the spacecraft structure, I will relate to three topics:

1) The first relates to the question of what is space? Nowadays, it is recognized that space is a medium that is composed of something, albeit, unlike anything that is currently known. Sometimes space is described as superfluid. In any case, free space is far from being an absolute void. According to quantum field theory (QFT), space is endowed with fluctuating fields of energy. There are many fields for example electric, magnetic, quark, gluon, electron, Higgs boson, etc. Space at every point contains a minimum level of energy that is known as vacuum energy. From this fluctuating energy field, pairs of virtual matter and antimatter particles (e.g., quark and anti-quark, electron and positron, etc.) perpetually appear and then immediately mutually annihilate each other.

Space has measurable properties. Two important physical parameters of the space are its magnetic permeability ($\mu 0 = 1.2566\times10{-}6$ N/A2) and electrical permittivity ($\varepsilon 0 = 8.854\times10{-}6$ F/m). Maxwell postulated that light is electromagnetic radiation that is a self-propagating wave in space with electric and magnetic components. Maxwell showed that changing electric fields are sources of magnetic fields and changing magnetic fields produce electric fields.

An outcome of these two parameters is that speed of light C in space can be found according to:

$$C = \frac{1}{\sqrt{\varepsilon_0 \cdot \mu_0}} = 299792 km/s$$

From the above equation, it is clear that if the electrical permittivity ($\varepsilon 0$) of space can be reduced then the maximum speed of light will become higher. If for example $\varepsilon 0$ is decreased by a factor of 4 then the speed of the electromagnetic wave will be twice the speed of light. The question is how to do this?

2) As space is some type of fluid, I would like to bring now the analogy of the motion of a torpedo in the water.

A torpedo is an underwater weapon, once launched from a craft it is self-propelled towards a target. It can be launched from a submarine or a warship. Some data: The speed of a torpedo in water is hampered by the drag of the water. The speed is limited to under 190 km/h. A submarine can travel at a speed of ~50km/h. A warship has a velocity of ~110km/h.

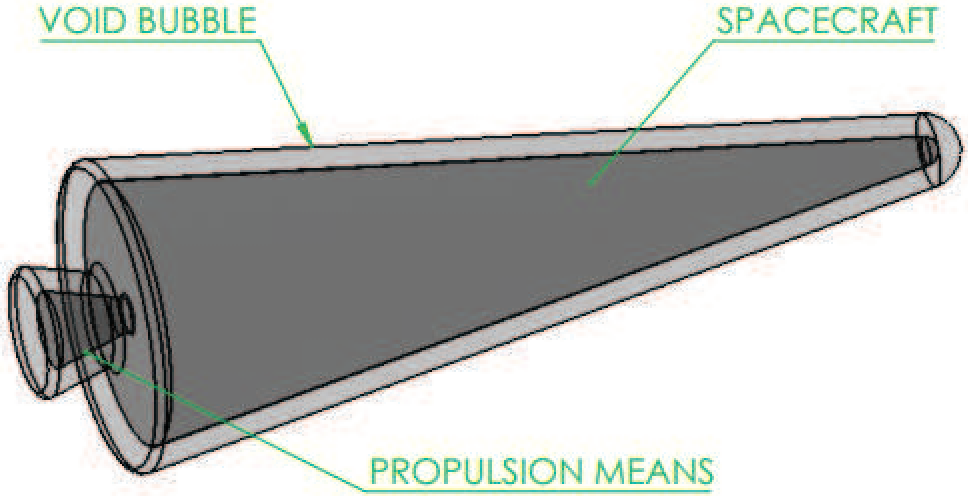
Having this data, I raise the following question: If the torpedo is launched from a submarine or a warship while in motion, from the same location, in what case will the torpedo reach the target sooner? The trivial answer is from the warship because the speed of the torpedo + warship is 300km/h (=110+190) vs. 240km/h (=50+190) from the submarine. But this is a wrong answer. The instant that the torpedo is launched in the water it moves, self-propelled, at its maximal velocity no matter at what speed of the craft it was launched.

I bring this analogy because it resembles the special relativity postulate regarding the speed of light. No matter what was the initial velocity of the light source, the self-propelled light will move at its maximum speed.

Suppose that it is needed to design a torpedo with a faster velocity than 190km/h. From the engineering point, it is not feasible to build a bigger torpedo with more power because the water dragging becomes higher.

An ingenious idea was suggested by the Russians. The high speed of the torpedo is made possible by supercavitation, whereby a gas bubble surrounding the torpedo is created. This minimizes water contact with the torpedo, significantly reducing drag. This idea has been used in their Shkval torpedo that reaches a speed of 370km/h nearing lower aircraft speeds.

3) I suggest using the same concept of reducing drag acting on the spacecraft. The question now is how to build a spacecraft that can reduce the dragging of space.
The concept is shown in the following figure.



The spacecraft is made of a hollow metal cone-shaped body. When this shell is uploaded with a charge it generates an electrical field around it. This description is the known structure of the Van de Graff generator (VDG). Usually, VDG has a spherical shape, but the shell can be of any shape. Outside the sphere, there is an electric field that can reach a million volts. Inside the hollow body there is no electric field, so humans can live there. I claim that the electric field on the surface of the spacecraft can repel all fields in the bubble surrounding the spacecraft (T.B.D.). Virtual particles cannot pop out at this bubble void because there are no corresponding fields. The bubble surrounding the spacecraft is an **absolute void**, so no drag force is exerted on the spacecraft and it can reach FTL speeds. At its rear, the spacecraft has propulsion means. The direction of motion is determined by the angle of the propulsion means and the spacecraft axis.