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WARPING SPACE

Ken Tapping, 17th January, 2017

The light from the nearest star after the Sun takes about four years to get to us. The fastest spacecraft we have yet produced is moving at about 70,000 kilometres an hour. However, that is only some 0.006% of the speed of light. At such a speed we would reach the star in about 60,000 years, and that is only the nearest one. For us impatient, relatively short-lived individuals, this sort of space exploration is not attracting much interest.

We can try to go faster, but Einstein and others have shown we cannot go through space faster than light, and our experiments with high-energy particle accelerators here on Earth prove this to be correct. Even at 90% of the speed of light, space exploration beyond the Solar System will be extremely time-consuming. In addition, at such speeds, ploughing through even the rarefied clouds of gas and dust in space will cause radiation hazards for any human or robot explorers and could also damage the spacecraft. Moreover, as we get closer to the speed of light our clocks start running slower than those of the people we left at home. A short trip for us could be centuries for those who stayed home. This again is not a practical way to explore space. However, the early history of our universe suggests what might eventually lead to an alternative.

The universe began just under 14 billion years ago. In the beginning it was tiny, around the size of a proton, and incredibly dense and hot. It then started to expand, becoming cooler and more rarefied, eventually forming the universe we see around us today. There is evidence that for a brief period it expanded at a speed far faster than the speed of light. This might seem to be impossible. However, this conclusion is due to a widespread misunderstanding of what the beginning of the universe was like. It was not an explosion shooting stuff in all directions out into space. It was an expansion of space itself, which carried everything with it, like dots moving farther apart on the surface of an expanding balloon. Our understanding is that solid objects cannot move through space faster than light, but space itself can move at extremely high speeds, carrying things along with it. This idea is something that space agencies are researching as a method to open up the universe to us, to the point where getting to the nearest star could take as little as a week or two.

The idea is to make a “warp bubble”, a small pucker in space, stretching it a little behind the spacecraft and compressing it in front. This would make the spacecraft move forward, travelling with space rather than actually moving through it. The spacecraft inside the bubble is in a little bit of space that is not moving at all, so the speed of light limit does not apply here. The crew would feel no acceleration. The same idea could be used for slower-than-light travel, which would be just right for getting around in the Solar System.

Thinking this might be possible is a long way from making it happen. Leonardo da Vinci came up with the idea of the helicopter and powered flight, but actually making a working helicopter took around four centuries. Isaac Newton suggested that time and space are separate, constant and immutable. Since the beginning of the 20th Century we have learned that they are bendable, joined together and interchangeable. We see this not only in our calculations, but out there in space. Even our GPS navigation systems have to take into account the distortion of space and time caused by our planet. Those warp bubbles are a physical possibility. The big job is finding out how to make them an engineering possibility. Then all those planets we are finding in orbit around other stars might actually become destinations.

Venus shines brilliantly, low in the Southwest after sunset. Mars, redder and much fainter, lies to Venus’ left. Jupiter rises in the early hours. The Moon will reach Last Quarter on the 19th.

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