

Chapter 1 : Is Warp Drive Real? | NASA

The field equations of Einstein's General Relativity theory say that faster-than-light (FTL) travel is possible, so a handful of researchers are working to see whether a Star Trek-style warp.

Thus, because the energy density is negative, one needs exotic matter to travel faster than the speed of light. In particular, Alcubierre has shown that a ship using an Alcubierre drive travels on a free-fall geodesic even while the warp bubble is accelerating: Enormous tidal forces, however, would be present near the edges of the flat-space volume because of the large space curvature there, but suitable specification of the metric would keep them very small within the volume occupied by the ship. This might explain the widespread misconception that this spacetime is a solution of the field equation of general relativity. Alcubierre interpreted his "warp bubble" in terms of a contraction of space ahead of the bubble and an expansion behind, but this interpretation could be misleading, [9] since the contraction and expansion actually refer to the relative motion of nearby members of the family of ADM observers. This practice means that the solution can violate various energy conditions and require exotic matter. The need for exotic matter raises questions about whether one can distribute the matter in an initial spacetime that lacks a warp bubble in such a way that the bubble is created at a later time, although some physicists have proposed models of dynamical warp-drive spacetimes in which a warp bubble is formed in a previously flat space. Some suggested methods avoid the problem of tachyonic motion, but would probably generate a naked singularity at the front of the bubble. It only means that the actions required to change the metric and create the bubble must be taken beforehand by some observer whose forward light cone contains the entire trajectory of the bubble. Counterarguments to these apparent problems have also been offered. Later, by slightly modifying the Van den Broeck metric, Serguei Krasnikov reduced the necessary total amount of negative mass to a few milligrams. However, Van den Broeck concludes that the energy densities required are still unachievable, as are the small size a few orders of magnitude above the Planck scale of the spacetime structures needed. But in this case, the Alcubierre drive vessel can only travel routes that, like a railroad, have first been equipped with the necessary infrastructure. The pilot inside the bubble is causally disconnected with its walls and cannot carry out any action outside the bubble: For example, travelling to Vega which is 25 light-years from Earth requires arranging everything so that the bubble moving toward Vega with a superluminal velocity would appear; such arrangements will always take more than 25 years. Coule further argues that an analogous objection will apply to any proposed method of constructing an Alcubierre drive. Some results in semiclassical gravity appear to support the conjecture, including a calculation dealing specifically with quantum effects in warp-drive spacetimes that suggested that warp bubbles would be semiclassically unstable, [10] [29] but ultimately the conjecture can only be decided by a full theory of quantum gravity. In the next slide he brings up the chronology protection conjecture and writes: The conjecture does not prohibit faster-than-light travel. It just states that if a method to travel faster than light exists, and one tries to use it to build a time machine, something will go wrong: Warp-field experiments and White's Juday warp-field interferometer In , a NASA laboratory announced that they had constructed an interferometer that they claim will detect the spatial distortions produced by the expanding and contracting spacetime of the Alcubierre metric.

Chapter 2 : Alcubierre drive - Wikipedia

Ever since the sound barrier was broken, people have turned their attention to how we can break the light speed barrier.

Humanity may not need a warp drive to go interstellar Humanity may not need a warp drive to go interstellar Here are a few ways that humanity may be able to leave the cradle of Earth. But this need not be a showstopper against human interstellar flight in the next century or two. Short of FTL travel, there are technologies in the works that could enable human expeditions to planets orbiting some of the nearest stars. Picking the Target Certainly, feasibility of such missions will depend on geopolitical-economic factors. But it also will depend on the distance to nearest Earth-like exoplanet. Three years later, astronomers were unable to find that same planet, but if it exists it would be too hot for life anyway. What we really want to know is whether planets exist further out from the two main stars, or whether their much smaller, dimmer companion star, Proxima Centauri, located just 4. They will also be able to read the chemical composition of planetary atmospheres. Northrup Gruman Imagine this: Each unit explodes and the shockwave delivers concussive force to an immense, steel pusher plate, which is connected to the most immense shock absorber system that you could imagine. An Orion propulsion schematic. NASA The researchers calculated the ship to could reach five percent the speed of light 0. A Cleaner System But what about a less explosive, cleaner propulsion system that could achieve the same end? Named for the inventor from Greek mythology who built wings to escape the island of Crete, the design was based on projected development of inertial confinement fusion ICF , one of two main strategies for generating nuclear fusion energy on Earth. Effectively, the ship is a space colony. In a two-part novel series written in , Robert A. Heinlein wrote of a vessel that took so long to reach its destination that the people aboard had forgotten they were on a ship. Instead, they believed the large craft to be their natural world. NASA Sending colonists on a voyage lasting centuries or millennia raises social questions, such as whether it is ethical to commit unborn generations to live out their lives in transit between planets. Still, it raises questions as to who would volunteer for such an expedition. But what about people with shorter attention spans and what if we have no will to build enormous, moving colonies? Upon reaching the destination star system, the embryos would be developed. Genetic Literacy Project Then, all you need are robot nannies to raise and educate the infant colonists. The egg ship concept is loaded with ethical questions, which can be hashed out in the comments section. Suspended Animation As technically ambitious as it may sound, medical science is making incremental progress toward a safe form of human hibernation. Not routine yet, but now under clinical trials, trauma surgeons are cooling patients down to just above freezing temperature in cases of severe blood loss. With incremental progress, the procedure may eventually be extended to time frames of many hours, and eventually days or weeks to treat other conditions.

Chapter 3 : How to make a warp-drive / hyperdrive effect in Processing â€“ KTBYTE Computer Science A

David Pares is building a warp drive. In his garage. Using parts from Radio Shack and Home Depot. Can he actually build a warp drive? Could an Alcubierre drive be physically possible? What the.

Leave one block of space on its cardinal faces the four sides, not the top or bottom and place Stabilization Lasers just outside of that so there is one block of space between the sides of the Reactor Core and the Stabilization Lasers. Place the Laser Mediums on top of each Stabilization Laser. Hook up wired modems to the bottom of each Stabilization Laser and the Reactor Core and connect them all with networking cable to a wired modem on an Advanced Computer. Remember to right click each modem after placing it to activate it. The Laser Mediums must be powered to make the Stabilization Lasers effective. While it is possible to start a reactor without them having power beforehand, it is recommended that they are powered beforehand to minimize the risk to the Core destabilizing to the point of explosion. Hook up some sort of power conduit or storage from the top of the reactor core to each Laser Medium so that the Reactor Core can power its own Laser Mediums. Go to the Advanced Computer. If you are on a World War Minecraft server the codes should be downloaded already if so jump to the bullet points , if not then to run the program, type: Name your reactor and you will be in its program. Press the key given for the reactor at the bottom 1. You will see options at the bottom for different commands. P - Stop reactor: L - Use lasers: O - Output mode Hold: All power is sent to the internal buffer of the reactor. A reactor can get started in many fashions, this is just a safe and easy way to start one up. This method assumes your Laser Mediums already are powered. Start by setting the Laser Amount to 25, or so. This is enough that will stabilize the reactor enough so there is enough time between laser shots, but will not drain power too much. Set the output mode to hold and configure the output to be something extremely low like 1. The internal buffer will start to fill and the stability will drop. Once the target stability is reached the Stabilization Lasers will fire to keep the Reactor Core stable. Once you are generating enough power over 1k output switch the output mode to "rated at" and start to increment the power output so that you are still generating more than you output. Do this until you are outputting enough power to keep all of your Stabilization Lasers running. Once you output that much you can wait for the internal buffer to fill or jump to the next step. Lower the target stability. The lower the stability the more power is generated. A reactor will not explode until stability reaches 0 so it is possible to have a safe reactor setup at extremely low stability percentages. This just means there is less room for error and if something goes wrong with the power going to the Laser Mediums the Reactor Core will blow before you can save it. Once the internal buffer is completely filled it is time to output power for outside use. You can either set the output to be rated at some value lower than the reactor creates, set it to surplus above the complete internal buffer size, or set it at unlimited and take as much power as possible. The former is recommended and the latter is not. You can adjust the Laser Amount as you see fit, but remember not to tax the Laser Medium buffer size or you will empty the Laser Medium buffer, possibly faster than you can fill it. After the saving press Ctrl again and go to Exit. You need a Monitor on the same frequenz to use the Camera.

Chapter 4 : How to Build a Warp Drive Using Metamaterials - MIT Technology Review

We contacted White at NASA and asked him to explain how this real life warp drive could actually work. The above image of a Vulcan command ship features a warp engine similar to an Alcubierre.

In the future, the Internet of Things will impact our daily lives. Learn how the Internet of Things will work in this video from Fw: Learn about the present and future of 3D printing in this video from Fw: Learn about the future of time in this video from Fw: Learn about the future of water in this video from Fw: In the future, renewable energy could come from wind harvesting drones. These devices are portable, and would require a lot less material to make. And where do we find this wind? Jonathan Strickland examines the future of big data. How the Internet of Things Will Change the World When we launched this channel, our very first episode was about the Internet of Things, and how this technology might affect our day-to-day lives at home. Now, over episodes later, we felt it was time to give this topic an update. So what does this mean for the future of the sport? In this episode of Fw: Thinking, Jonathan looks into some innovative ideas that just might solve this growing global affair. Learn about the future of online privacy. Recent Videos in Fw: Being Human In Years What will it be like to be human one hundred years from now? And simulations are playing an important role in our journey into the future. Science fiction writers have solved the problem with the "warp drive," which allows future humans to travel faster than light, crossing the vast emptiness of space. But how does that affect romance? Craig Venter Institute sequenced the genome of the bacterium *Mycoplasma mycoides* and coded it into a computer. But that notion is changing.

Chapter 5 : NASA unveils its futuristic warp drive starship - called Enterprise, of course - ExtremeTech

Building a Warp Drive | AsteronX In this video we discuss what it would take (knowledge) to build an Alcubierre Warp Drive/Screen including vital information about spacetime, time travel.

Transwarp[edit] Transwarp generally refers to speeds and technologies that are beyond conventional warp drives. The warp drive has a natural physical or economical limit beyond which higher speeds are no longer possible. The reference work Star Trek Fact Files indicates this limit at warp factor 9. This is the highest conventional warp speed mentioned for a spaceship Borg cube. Also in the episode Threshold Star Trek Voyager the warp factor 9. This is the last warp factor mentioned before the leap takes place in the transwarp state. In the book Star Trek: Finally, we had to create a back door for various powerful aliens like Q who got the knack of hurling the ship through the room for millions of light years during a commercial break. The Transwarp concept itself is not tied to any particular technology or speed limit. The Search for Spock. The principle of this drive is not explained. Later, in Star Trek VI: In Star Trek Fact Files it is stated that the experiment was a failure and the spaceship was converted to a normal warp drive. To get home faster, a shuttle is modified with novel dilithium crystals. The crew is trying to break the transwarp threshold. This threshold is between warp factor 9. The shuttle allegedly found itself at all points in the universe at the same time during the flight. However, the pilot suffers genetic mutations after the flight, so it is not repeated. The entire experiment is described in the reference work Star Trek Fact Files. Some episodes later, fictionalized a few months later, the crew of USS Voyager encounters a species called Voth. This species has spaceships with transwarp drive. However, this drive does not work on the base of transwarp conduits, as the transwarp drive of the Borg, but is a further development of the conventional warp drive. The mention of a second Transwarp technology took place in the episode Descent of the series Star Trek: A group of renegade Borg used transwarp conduits. These are wormhole-like tunnels through the subspace. It was said in the dialogue that the flight through these tunnels was 20 times faster than the flight with maximum warp speed of the Enterprise. The flight itself was described as follows: There were two ways to use these conduits outside these hubs. In TNG, the Enterprise was able to open such a channel with a precisely modulated tachyon impulse, traveling 65 light-years. However, when the USS Voyager tried the same thing in Day of Honor , the attempt failed and almost destroyed the ship. The second possibility is the use of the transwarp coil. In episode Dark Frontier the crew of Voyager steals such a coil from the Borg and is able to shorten their journey home by 15 years, before the coil burns out. This creates a subspace tunnel, which is projected ahead of the vessel. Once a ship has entered this tunnel, the forces inside propel it at incredible speed. To maintain the slipstream, a ship has to constantly modify the quantum field with its deflector dish. The speed of the drive is inversely proportional to the time and distance. When the crew enters the Dauntless in episode Hope and Fear for the first time and accidentally activates the propulsion system, the spaceship flies a flight of 15 light-years over a period of about 10 seconds. That's equivalent with approximately 50 Million times the speed of light. After realizing that they would have to leave Voyager forever to get home with the Dauntless, the crew tries to match the drive of the USS Voyager to the parameters of the Dauntless. The modified Voyager is able to cover a distance of light years with the slipstream modification before the system becomes unstable. The way back to Earth is stated in a fake message, created by Arturis, with 7 months aboard the Dauntless. For this period, the stocks are filled. At a residual distance of 60, light years at this time, this would correspond to a speed of about , times the speed of light or times slower than a short slipstream jump. However, in the episode " Timeless ", the technology proved to be dangerously unstable, resulting in the loss of all hands of the Voyager in an alternate timeline. Due to a phase variance, the Slipstream tunnel, produced by a replica slipstream drive of the Voyager, collapsed during the flight and the ship crashed on a planet near the border on the edge of the Delta Quadrant. Harry Kim and Chakotay survived, because they used the Deltaflyer, which flew ahead of the Voyager, reached the Earth safely. They used some years after this event a temporal communication device to change the timeline and rescue the ship and the crew. Folding space[edit] In addition to the possibility to let a spaceship glide through space in a warp field, there is also space folding in Star Trek. Spatial folding means

that two points of space-time are directly connected and an instantaneous change takes place. The space between is simply folded into a higher-dimensional hyperspace or subspace. In the episode *That Which Survives* of the original series, the *Enterprise* encountered the remains of people called Kalandans. These are able to instantaneously teleport spaceships as well as people over long distances. In the episode *Contagion* of the series *Star Trek*: These people were able to instantaneously teleport people over long distances with the help of Iconian Gateways. To ensure the gateway did not fall into the wrong hands, Captain Picard destroyed it. However, this caused progressive physical harm to people during transport; multiple use almost always ended in death. The *USS Voyager* came in touch with this technology several times on their way home. This wraps an object in a kind of subspace bubble, and teleports it to another location using spatial folding. The range was 40, light-years. However, the technology was not compatible with the warp core and almost destroyed *Voyager* when it was used. This also used spatial folding for locomotion. But the system was very unstable and if there is a fault in the drive it could cause a tear in the space-time continuum. A replica of the drive was only tested in a shuttle and never used for the *Voyager*. Last but not least, spatial folding appeared as a geodesic fold in the episode *Inside Man*. A geodesic fold occurs when a Verteron beam is fired at the atmosphere of a giant star at two different locations. This connects both points in space and creates a short lived passage. However, this was not usable because of deadly radiation that occurred during flight. However, the Ferengi only wanted to get the Borg technology aboard *Voyager* and would have let the crew die. At the last moment, travel through the passage was aborted. Fictional history[edit] The episode " *Metamorphosis* ", from *The Original Series*, establishes a backstory for the invention of warp drive on Earth, in which Zefram Cochrane discovered the "space warp". Cochrane is repeatedly referred to afterwards, but the exact details of the first warp trials were not shown until the second *Star Trek*: *The Next Generation* movie, *Star Trek: The Movie* depicts Cochrane as having first operated a warp drive on Earth in This successful first trial led directly to first contact with the Vulcans. It was also established that many other civilizations had warp drive before humans; *First Contact* co-writer Ronald D. The procedure involves traveling at a high warp velocity in the direction of a star, on a precisely calculated "slingshot" path; if successful, it causes a ship to enter a time warp, leading to the past or future. The same technique is used in the episode " *Assignment: Earth* " for historic research. The term "time warp" was first used in " *The Naked Time* " when a previously untried cold-start intermix of matter and antimatter threw the *Enterprise* back three days in time. The term was later used in *Star Trek IV* in describing the slingshot effect. The technique was mentioned as a viable method of time travel in the TNG episode " *Time Squared* " This "slingshot" effect has been explored in theoretical physics: Warp core[edit] A primary component of the warp drive method of propulsion in the *Star Trek* universe is the "gravimetric field displacement manifold", more commonly referred to as a warp core. Starship warp cores generally also serve as powerplants for other primary ship systems. When matter and antimatter come into contact, they annihilate – both matter and antimatter are converted directly and entirely into enormous quantities of energy, in the form of subnuclear particles and electromagnetic radiation specifically, mesons and gamma rays. In the *Star Trek* universe, fictional " dilithium crystals " are used to regulate this reaction. These crystals are described as being non-reactive to anti-matter when bombarded with high levels of radiation. Usually, the reactants are deuterium , which is an isotope of hydrogen , and antideuterium its antimatter counterpart. The reaction chamber is surrounded by powerful magnetic fields to contain the anti-matter. If the containment fields ever fail, the subsequent interaction of the antimatter fuel with the container walls would result in a catastrophic release of energy, with the resultant explosion capable of utterly destroying the ship. Such "warp core breaches" are used as plot devices in many *Star Trek* episodes. An intentional warp core breach can also be deliberately created, as one of the methods by which a starship can be made to self-destruct. Warp requirements for 10m OD sphere. Real-world theories and science[edit] In , physicist Miguel Alcubierre formulated a theoretical solution, called the Alcubierre drive , for faster-than-light travel which models the warp drive concept. Calculations found that such a model would require prohibitive amounts of negative energy or mass. NASA engineers have begun preliminary research into such technology.

DOWNLOAD PDF CAN WE BUILD A WORKING WARP DRIVE?

If we can find a way to generate the necessary negative energy densities, and if that actually works to warp space in the appropriate way (GR is pretty well tested, but we haven't tested that), and if we have the proper interpretation of the subjective effects of the Alcubierre metric, and bunch of other "ifs", then we could build a working warp drive spaceship.

Chapter 7 : Has NASA Really Created A Warp Drive? | IFLScience

The system is based on electromagnetic drive, or EMDrive, which converts electrical energy into thrust without the need for rocket fuel. The concept of an EmDrive engine is relatively simple.

Chapter 8 : WarpDrive Mod | Minecraft Mods Wiki | FANDOM powered by Wikia

We are probably looking at a decade or more before we can create a car-sized warp drive "€" and even then, that's only if we can find some of that elusive "exotic matter," which we probably.

Chapter 9 : NASA discusses its warp drive research, prepares to create a warp bubble in the lab - Extreme

My personal estimate of the likelihood we will ever be able to build a "warp drive" is much less than 1%. And the chances it will happen in the next hundred years I would put at less than %.