HOLOGRAPHIC WORMHOLE DRIVE: PHILOSOPHICAL BREAKTHROUGH IN FTL WARP-DRIVE TECHNOLOGY pdf

1: Alcubierre drive - Infogalactic: the planetary knowledge core

1 Holographic Wormhole Drive: Philosophical Breakthrough in FTL 'Warp-Drive' Technology Richard L. Amoroso Noetic Advanced Studies Institute Beryl, UT USA.

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 Whiteâ€”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.

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2: Wormholes, Time Machines & Warp Drives - Â© Ã‡etin BAL -

Holographic Wormhole Drive: Philosophical Breakthrough in FTL 'Warp-Drive' Technology Richard L. Amoroso Noetic Advanced Studies Institute Beryl, UT USA amoroso@www.enganchecubano.com Skeptics say Faster than light (FTL) space travel is the stuff of Science Fiction, could take 1, years and require a Jupiter size mass-energy source to operate superluminal warp drive spaceships.

Thus, as the energy density is negative, one needs exotic matter to travel faster than the speed of light. Low has argued that within the context of general relativity, it is impossible to construct a warp drive in the absence of exotic matter. Physics of the Alcubierre drive For those familiar with the effects of special relativity, such as Lorentz contraction and time dilation , the Alcubierre metric has some apparently peculiar aspects. In particular, Alcubierre has shown that even when the ship is accelerating, it travels on a free-fall geodesic. In other words, a ship using the warp to accelerate and decelerate is always in free fall, and the crew would experience no accelerational g-forces. Enormous tidal forces would be present near the edges of the flat-space volume because of the large space curvature there, but by suitable specification of the metric, these would be made very small within the volume occupied by the ship. This may explain the widespread misconception that this spacetime is a solution of the field equation of general relativity. Metrics in ADM form are adapted to a certain family of inertial observers, but these observers are not really physically distinguished from other such families. Alcubierre interpreted his "warp bubble" in terms of a contraction of "space" ahead of the bubble and an expansion behind. But this interpretation might be misleading, [4] since the contraction and expansion actually refers to the relative motion of nearby members of the family of ADM observers. In general relativity, one often first specifies a plausible distribution of matter and energy, and then finds the geometry of the spacetime associated with it; but it is also possible to run the Einstein field equations in the other direction, first specifying a metric and then finding the energy-momentum tensor associated with it, and this is what Alcubierre did in building his metric. This practice means that the solution can violate various energy conditions and require exotic matter. The need for exotic matter leads to questions about whether it is actually possible to find a way to distribute the matter in an initial spacetime which lacks a "warp bubble" in such a way that the bubble will be created at a later time. Yet another problem is that, according to Serguei Krasnikov , [5] it would be impossible to generate the bubble without being able to force the exotic matter to move at locally FTL speeds, which would require the existence of tachyons. Some methods have been suggested which would avoid the problem of tachyonic motion, but would probably generate a naked singularity at the front of the bubble. However, if certain quantum inequalities conjectured by Ford and Roman hold, [9] then the energy requirements for some warp drives may be absurdly gigantic, e. This is orders of magnitude greater than the estimated mass of the universe. Counter-arguments to these apparent problems have also been offered. Later, by slightly modifying the Van Den Broeck metric, Krasnikov reduced the necessary total amount of negative energy to a few milligrams. But in this case, the Alcubierre Drive vessel is not able to go dashing around the galaxy at will. It is only able to travel routes which, 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. Thus, because the pilot cannot place infrastructure ahead of the bubble while "in transit", the bubble cannot be used for the first trip to a distant star. In other words, to travel to Vega which is 25 light-years from the Earth one first has to arrange everything so that the bubble moving toward Vega with a superluminal velocity would appear and these arrangements will always take more than 25 years. Since none have been proven to exist already then the drive is impossible to construct, even if the metric is physically meaningful. Coule argues that an analogous objection will apply to any proposed method of constructing an Alcubierre Drive. These problems do not arise if the bubble velocity is kept subluminal, but it is still necessary to provide exotic matter for the drive to work. A bubble macroscopically large enough to enclose a ship meters across would require a total amount of exotic matter equal to 10 billion times the mass of the observable

universe. So-called cosmic strings, hypothesized in some cosmological theories, involve very large energy densities in long, narrow lines. But[clarification needed] all known physically reasonable cosmic-string models have positive positive space-time warping effects energy densities. These results seem to make it rather unlikely that one could construct Alcubierre warp drives using exotic matter generated by quantum effects. The Alcubierre drive and science fiction Faster-than-light travel is often used in science fiction to denote a wide variety of imaginary propulsion methods, most of which have nothing to do with the Alcubierre drive or any other physical theory. The Alcubierre drive theory is proposed as a possible reason for events occurring in the graphic novel " Orbiter " by Warren Ellis and Colleen Doran. The Ian Douglas " Star Carrier " series exclusively uses the Alcubierre drive as the main mode of interstellar travel.

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3: CiteSeerX â€" Citation Query The End of Time, The Next Revolution in Physics

Holographic Wormhole Drive: Philosophical Breakthrough in FTL 'Warp-Drive' Technology Authors: Richard L. Amoroso Skeptics say Faster than light (FTL) space travel is the stuff of Science Fiction, could take 1, years and require a Jupiter size mass-energy source to operate superluminal warp drive spaceships.

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4: Alcubierre drive | Revolvy

Abstract. Skeptics say Faster than light (FTL) space travel is the stuff of Science Fiction, could take 1, years and require a Jupiter size mass-energy source to operate superluminal warp drive spaceships.

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 may 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 may be misleading [9] because the contraction and expansion actually refers to the relative motion of nearby members of the family of ADM observers. In general relativity, one often first specifies a plausible distribution of matter and energy, and then finds the geometry of the spacetime associated with it; but it is also possible to run the Einstein field equations in the other direction, first specifying a metric and then finding the energyâ€”momentum tensor associated with it, and this is what Alcubierre did in building his metric. 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. Causality violation and semiclassical instability Calculations by physicist Allen Everett show that warp bubbles could be used to create closed timelike curves in general relativity, meaning that the theory predicts that they could be used for backwards time travel. 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] [30] but ultimately the conjecture can only be decided by a full theory of quantum gravity. 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 Whiteâ€”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. In , the Jet Propulsion Laboratory published results of a Neither the Alcubierre theory, nor anything similar, existed when the series was conceived, but Alcubierre stated in an email to William Shatner that his theory was directly inspired by the term used in the show, [35] and references it in his paper.

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5: Alcubierre drive : definition of Alcubierre drive and synonyms of Alcubierre drive (English)

Faster than light (FTL) space travel - the stuff of Science Fiction?. Recent models require a Jupiter size negative mass-energy to operate. Now R. Amoroso has solved this problem in a radical new approach called the "Holographic Wormhole Drive".

Rather than exceeding the speed of light within its local frame of reference, a spacecraft would traverse distances by contracting space in front of it and expanding space behind it, resulting in effective faster-than-light travel. It is impossible for objects to actually accelerate to the speed of light within normal spacetime; instead, the space around an object would shift so that the object would arrive at its destination faster than light would in normal space. However, this does not necessarily mean that it is physically meaningful or that such a drive could be constructed. The proposed mechanism implies a negative energy density , and thus requires exotic matter. Although there has never been any evidence that such matter exists, some theoretical models that depart from the Standard Model require it to exist. This is a Lorentzian manifold , which, if interpreted in the context of general relativity , allows a warp bubble to appear in previously-flat spacetime and move away at effectively- superluminal speed. Inhabitants of the bubble feel no inertial effects. This method of propulsion does not involve objects in motion at speeds faster than light with respect to the contents of the warp bubble; that is, a light beam within the warp bubble would still always move faster than the ship. As objects within the bubble are not moving locally faster than light, the mathematical formulation of the Alcubierre metric does not contradict the conventional claims of the laws of relativity namely, that a slower-than-light object cannot attain speeds greater than that of light , and conventional relativistic effects such as time dilation would not apply as they would with conventional motion at near-light speeds. The Alcubierre drive, however, remains a hypothetical concept with seemingly insuperable problems: Though the amount of energy required is no longer thought to be unobtainably large, [3] there is no known method to create a warp bubble in a region that does not already contain one, and no method has been found to exit the warp bubble after reaching a destination. The general form of the metric described within the context of this formalism is: The particular form that Alcubierre studied [2] is defined by: Thus, as the energy density is negative, one needs exotic matter to travel faster than the speed of light. Citation needed Low has argued that within the context of general relativity, it is impossible to construct a warp drive in the absence of exotic matter. In particular, Alcubierre has shown that even when the ship is accelerating, it travels on a free-fall geodesic. In other words, a ship using the warp to accelerate and decelerate is always in free fall, and the crew would experience no accelerational G-forces. Enormous tidal forces would be present near the edges of the flat-space volume because of the large space curvature there, but by suitable specification of the metric, these would be kept very small within the volume occupied by the ship. This may explain the widespread misconception that this spacetime is a solution of the field equation of general relativity. Metrics in ADM form are adapted to a certain family of inertial observers, but these observers are not really physically distinguished from other such families. Alcubierre interpreted his "warp bubble" in terms of a contraction of space ahead of the bubble and an expansion behind. But this interpretation may be misleading, [5] because the contraction and expansion actually refers to the relative motion of nearby members of the family of ADM observers. In general relativity, one often first specifies a plausible distribution of matter and energy, and then finds the geometry of the spacetime associated with it; but it is also possible to run the Einstein field equations in the other direction, first specifying a metric and then finding the energy-momentum tensor associated with it, and this is what Alcubierre did in building his metric. This practice means that the solution can violate various energy conditions and require exotic matter. The need for exotic matter leads to questions about whether it is actually possible to find a way to distribute the matter in an initial spacetime that lacks a warp bubble in such a way that the bubble will be created at a later time. Yet another problem is that, according to Serguei Krasnikov , [6] it would be impossible to generate the bubble without being able to force the exotic

matter to move at local faster-than-light speeds, which would require the existence of tachyons. Some methods have been suggested that would avoid the problem of tachyonic motion, but would probably generate a naked singularity at the front of the bubble. This is orders of magnitude greater than the estimated mass of the universe. Counter-arguments to these apparent problems have also been offered. Later, by slightly modifying the Van den Broeck metric, Krasnikov reduced the necessary total amount of negative energy to a few milligrams. One of the legs of the interferometer would appear to be a slightly different length when the test devices were energised. But in this case, the Alcubierre drive vessel is not able to go dashing around the galaxy at will. It is only able to 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. Thus, because the pilot cannot place infrastructure ahead of the bubble while "in transit", the bubble cannot be used for the first trip to a distant star. In other words, to travel to Vega which is 25 light-years from the Earth one first has to arrange everything so that the bubble moving toward Vega with a superluminal velocity would appear and these arrangements will always take more than 25 years. Thus, according to Coule, an Alcubierre drive is required in order to build an Alcubierre drive. Because none have been proven to exist already then the drive is impossible to construct, even if the metric is physically meaningful. Coule argues that an analogous objection will apply to any proposed method of constructing an Alcubierre drive. These problems do not arise if the bubble velocity is kept subluminal, but exotic matter is still necessary for the drive to work. This is close to the limiting Planck length ,1. A bubble macroscopically large enough to enclose a ship meters across would require a total amount of exotic matter equal to 10 billion times the mass of the observable universe. So-called cosmic strings, hypothesized in some cosmological theories, involve very large energy densities in long, narrow lines, but Template: Clarify all known physically reasonable cosmic-string models have positive positive space-time warping effects energy densities. These results seem to make it rather unlikely that one could construct Alcubierre warp drives using exotic matter generated by quantum effects. Whiteâ€”Juday warp-field interferometer In a NASA laboratory announced that they have constructed an interferometer that they claim will detect the spacial distortions produced by the expanding and contracting spacetime of the Alcubierre metric. A wide variety of imaginary propulsion methods are postulated, though not necessarily based on the Alcubierre drive or any other physical theory. The Star Trek television series used the term " warp drive " to describe their method of faster than light travel. The Alcubierre theory, or anything similar, did not exist when the series was conceived, but Alcubierre stated in an email to William Shatner that his theory was directly inspired by the term used in the show, [24] and references it in his paper.

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6: Alcubierre drive - Wikipedia

1 Holographic Wormhole Drive: Philosophical Breakthrough in FTL 'Warp-Drive ' Technology by Richard L. Amoroso, Richard L Amoroso Skeptics say Faster than light (FTL) space travel is the stuff of Science Fiction, could take 1, years and require a Jupiter size mass-energy source to operate superluminal warp drive spaceships.

The following list of drives and their descriptions are based on a quick survey of PerryPedia and is probably not very exhaustive. First FTL drive tech adopted by humanity. Nearly instantaneous, but individual jumps need careful calculations and are limited to a few thousand light years a time. Separate advanced transition drive variants, using short, soft hyperspace transition jumps in very rapid succession to reach FTL speeds. Since objects moving through linear space are not bound by the speed of light limit, the ship can now use its conventional sublight drives to reach high FTL speeds before emerging back into normal space. Advanced drive based on linear drive tech. Metagrav aka Hyperkon Drive, Grigoroff Drive. In sublight mode, it uses hyperdimensional fields to project a virtual gravitational singularity in front of the vessel, tugging it along kind of like a carrot on a stick. The FTL mode shifts the ship into a state of partial dematerilaization, allowing it to coast at speeds of up to several tens of million times the speed of light. Refined variants of the Metagrav are designed to allow more dynamic control over the geometries of the fields. They permit travel through Hyperspace at speeds of up to several hundreds of million times the speed of light. Similar in principle to the Metagrav, but based on different technologies. Intergalactic jump drive based on osculating the dematerialised vessel between normal space and hyper space. Ships will need to rematerialize in the gravimetric centre of the target galaxy, limiting its usefulness. Dimesexta and Transferdim Drives. Advanced technologies that allow a ship to continuesly move through a partial space between the 5th and 6th dimension. Allows intergalactic travel at up to several billion times the speed of light. Septim Parallel Track Drive. Exotic drive that allows a ship to move through a partial space between the 6th and 7th dimension. Allows intergalactic travel at up to several trillion times the speed of light. Oktabim Parallel Track Hyper Drive. Experimental drive possibly based on 8-dimensional tech. Exotic organic drive allowing travel at speeds of up to several thousand times the speed of light through normal space, possibly by warping spacetime. An interstellar and intergalactic transit network build from wormholes aka "Einstein-Rosen-Bridges" inside black holes, spanning some million LYs. Transport is fast but non-instantaneous. To the user it appears as a physical bridge constructed from wooden planks floating above a galactic vista and has to be crossed by foot, reducing a journey of many light years to a short stroll. Yet another ancient transport network spanning intergalactic distances, built some 20 millions years ago. Exotic means of transport. Some rare human mutants and a few alien species with naturally occurring gifts in the Perry Rhodan-verse have the psychic ability to teleport themselves across varying distances. Mental capabilities of the Motana. Through the focussing of a group of Matana with the aid of chants, Motana can move spaceships with sub-light and FTL velocities. Typically, such capabilities of biological lifeforms are related to the psionic network. Biodim propulsor of the Kybb. Not much info on that one, only that it has been used in the Kybb-Titans and seem to contain biological components extracted form the Motana which presumably are related to their capabilities of propulsing a spaceship beyond light-speed. A unique psychic faster-than-light "travel" method mastered by the Cappins, a humanoid species. Instead of travelling physically, they can project their consciousness across light years, taking over the body of a host person while leaving their own natural body behind. A technology developed by the Cappins, enabling their unique psychic ability to physically transport them across intergalactic distances by creating a network of 6-dimensional "beacons" the Cappins can tune into. Instead of just projecting their minds, they can now transfer their whole essence, including their bodies. Which brings us to A general term for several different FTL technologies within the Perry Rhodan-verse that allow instantaneous or near-instantaneous transport between a sending and a receiving device usually sized for personal transport, not unlike transporter pads in Star Trek. Some rare "di-polar" transmitter types only require a sending, some only a receiving mechanism.

Earliest transmitter tech discovered by humans. Two booths can connect with each other across interplanetary distances, effectively sending the contents of one to the other. Advanced but less robust transmitter tech that creates a continous transport field, not unlike a door one can step trough to cross interstellar distances although you still need two of those, one acting as a sender and one as a receiver. Some less powerfull devices limited to planetary distances can fold down to portable size. Exotic transmitter tech that seeks a random "victim", encases it in a mist-like energy field and transports it to a receiver station. The big, bad versions of the basic transmitter. Big, as in "constructed out of suns". Mega engineering is used to bring stars close together, forming special geometric patterns and allowing a nearby planetary "tuning station" to induce gigantic transport fields between them, fit to send entire fleets of starships across galactic distances. Exotic and poorly understood transmitter devices that can within their range transport a person to an arbitrary location, not requiring a receiving station. Only two of those devices have been given to humanity. For centuries, various variants of the transform cannon have formed the primary heavy-duty ship-to-ship armaments of Terran starships. Instantaneous and unhindered by physical barriers, transform cannons can engage targets across some 10 million miles, even if they are on the far side of a planetary body. There is at least one case of a person making a successful emergency transport by "riding" an inert transform bomb which they only survived by being lucky and having a immortality-like healing factor.

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Warp Drive Research is a portal see Chap. 15, pp. , Holographic wormhole drive: Philosophical breakthrough in faster than light "Warp Drive" technology.

It was thought to use too much negative energy until Harold Sonny White [5] [6] said that the amount of energy required could be reduced if the warp bubble were changed into a warp ring. Alcubierre metric The Alcubierre metric defines the warp-drive spacetime. It is a Lorentzian manifold that, if interpreted in the context of general relativity , allows a warp bubble to appear in previously flat spacetime and move away effectively faster than lightspeed. The interior of the bubble is an inertial reference frame and inhabitants suffer no proper acceleration. This method of transport does not involve objects in motion at speeds faster than light with respect to the contents of the warp bubble; that is, a light beam within the warp bubble would still always move faster than the ship. Because objects within the bubble are not moving locally faster than light, the mathematical formulation of the Alcubierre metric is consistent with the conventional claims of the laws of relativity namely, that an object with mass cannot attain or exceed the speed of light and conventional relativistic effects such as time dilation would not apply as they would with conventional motion at near-light speeds. The Alcubierre drive, however, remains a hypothetical concept with seemingly difficult problems, though the amount of energy required is no longer thought to be unobtainably large. The particular form that Alcubierre studied [2] is defined by: 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 may 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 may be misleading [9] because the contraction and expansion actually refers to the relative motion of nearby members of the family of ADM observers. In general relativity, one often first specifies a plausible distribution of matter and energy, and then finds the geometry of the spacetime associated with it; but it is also possible to run the Einstein field equations in the other direction, first specifying a metric and then finding the energyâ€”momentum tensor associated with it, and this is what Alcubierre did in building his metric. 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 Whiteâ€”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. Cramer, where Cramer notes that "Alcubierre, following the lead of wormhole theorists, argues that quantum field theory permits the existence of regions of negative energy density under special circumstances, and cites the Casimir effect as an example. Retrieved 1 October Harold "Sonny" White 30 September Retrieved 28 January Retrieved 10 January Conformal gravity and the Alcubierre warp drive metric. Here one has a constant negative energy density Dvorsky, George 26 November

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The Law of Hierarchies and Noetic Epistemology p. References p. Holographic Wormhole Drive: Philosophical Breakthrough in FTL 'Warp-Drive'.

Alcubierre drive Two-dimensional visualization of an Alcubierre drive, showing the opposing regions of expanding and contracting spacetime that displace the central region. Rather than exceeding the speed of light within a local reference frame , a spacecraft would traverse distances by contracting space in front of it and expanding space behind it, resulting in effective faster-than-light travel. Objects cannot accelerate to the speed of light within normal spacetime; instead, the Alcubierre drive shifts space around an object so that the object would arrive at its destination faster than light would in normal space without breaking any physical laws. Even if it is physically meaningful, its possibility would not necessarily mean that a drive can be constructed. The proposed mechanism of the Alcubierre drive implies a negative energy density and therefore requires exotic matter. So if exotic matter with the correct properties does not exist then the drive could not be constructed. However, at the close of his original paper [2] Alcubierre argued following an argument developed by physicists analyzing traversable wormholes [3] [4] that the Casimir vacuum between parallel plates could fulfill the negative-energy requirement for the Alcubierre drive. Some physicists have presented arguments to suggest that a theory of quantum gravity which would incorporate both theories would eliminate those solutions in general relativity that allow for backwards time travel see the chronology protection conjecture and thus make the Alcubierre drive invalid. History In , Alcubierre proposed 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 the space behind it to expand. It was thought to use too much negative energy until Harold Sonny White [5] [6] said that the amount of energy required could be reduced if the warp bubble were changed into a warp ring. Alcubierre metric The Alcubierre metric defines the warp-drive spacetime. It is a Lorentzian manifold that, if interpreted in the context of general relativity , allows a warp bubble to appear in previously flat spacetime and move away effectively faster than lightspeed. The interior of the bubble is an inertial reference frame and inhabitants suffer no proper acceleration. This method of transport does not involve objects in motion at speeds faster than light with respect to the contents of the warp bubble; that is, a light beam within the warp bubble would still always move faster than the ship. Because objects within the bubble are not moving locally faster than light, the mathematical formulation of the Alcubierre metric is consistent with the conventional claims of the laws of relativity namely, that an object with mass cannot attain or exceed the speed of light and conventional relativistic effects such as time dilation would not apply as they would with conventional motion at near-light speeds. The Alcubierre drive, however, remains a hypothetical concept with seemingly difficult problems, though the amount of energy required is no longer thought to be unobtainably large. The particular form that Alcubierre studied [2] is defined by: Thus, because the energy density is negative, one needs exotic matter to travel faster than the speed of light. Low has argued that within the context of general relativity, it is impossible to construct a warp drive in the absence of exotic matter. 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 may explain the widespread misconception that this spacetime is a solution of the field equation of general relativity. Metrics in ADM form are adapted to a certain family of inertial observers, but these observers are not really physically distinguished from other such families. Alcubierre interpreted his "warp bubble" in terms of a contraction of space ahead of the bubble and an expansion behind, but this interpretation may be misleading [9] because the contraction and expansion actually refers to the relative motion of nearby members of the family of ADM observers. In general relativity, one often first specifies a plausible distribution of matter and energy, and then

finds the geometry of the spacetime associated with it; but it is also possible to run the Einstein field equations in the other direction, first specifying a metric and then finding the energyâ€”momentum tensor associated with it, and this is what Alcubierre did in building his metric. 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. Causality violation and semiclassical instability Calculations by physicist Allen Everett show that warp bubbles could be used to create closed timelike curves in general relativity, meaning that the theory predicts that they could be used for backwards time travel. 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] [30] but ultimately the conjecture can only be decided by a full theory of quantum gravity. 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 Whiteâ€”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. Results have been reported as "inconclusive". Neither the Alcubierre theory, nor anything similar, existed when the series was conceived, but Alcubierre stated in an email to William Shatner that his theory was directly inspired by the term used in the show, [35] and references it in his paper.

HOLOGRAPHIC WORMHOLE DRIVE: PHILOSOPHICAL BREAKTHROUGH IN FTL WARP-DRIVE TECHNOLOGY pdf

9: Warp Drive Research

The Alcubierre drive or Alcubierre warp drive (or Alcubierre metric, referring to metric tensor) is a speculative idea based on a solution of Einstein's field equations in general relativity as proposed by Mexican theoretical physicist Miguel Alcubierre, by which a spacecraft could achieve apparent faster-than-light travel if a configurable.

Richard Amoroso Holographic Wormhole Drive: But this model requires a negative mass-energy the size of Jupiter to operate. In this chapter we offer radical solutions to these conundrums albeit for the purposes of this sophomoric introductory overview primarily in conceptual form; however still bringing a glimpse of the feasibility for FTL warp-drive travel putatively to near term. Skeptics say it may take 1, years and require an energy source the size of Jupiter to operate superluminal faster than light FTL warp-drive technol- ogies. In this work we present ideas on how to change that scenario. Firstly the HWD name is coined after the Holographic Multiverse cosmology paradigm that in our view allows it to operate [1]. The second part wormhole drive is misleading because it is suggestive of those models that seek natural or propose creation of large wormholes to pass a spaceship through []. We define the term wormhole, which shares some general utility with both models, before we proceed further. The term wormhole was first coined by Wheeler in [5], but Weyl had already proposed the theory in Wormholes are also called Einstein- Rosen bridges or Lorentzian Schwarzschild wormholes after the solution to his field equations discovered by Einstein and Rosen in [6]. In Wheeler and Fuller showed that this type of wormhole is unstable, would pinch off instantly after forming so that even light could not pass through. However the existence of this Schwarzschild solution inspired Kip Thorne to consider holding the throat of a wormhole open by exotic matter with negative mass energy. The possibility of traversable wormholes in general relativity was first demonstrated by Thorne and Morris in [7,8]. This is the origin of the model of traversable wormholes held open by a spherical shell of exotic matter. The Holographic Wormhole Drive 3 Figure 1. Illustration of a spacetime traversable wormhole [9]. It is a 2D conceptualization of what takes 4D or greater dimensionality to describe. Imagine folding a 2D surface into a third dimension that does not exist in the 2D surface space. This is somewhat reminiscent of a Klein bottle where the handle cannot be drawn free in 2D or as a 3D object. Special relativity only applies locally. Wormholes allow superluminal travel by ensuring that the speed of light is not exceeded locally in time because while traveling through a wormhole, subluminal velocities are used. There are several constructs that make our model unique and to allow FTL warp drive theory to leap to the brink of practicality. The greater the amplitude and duration of the wave the larger the FTL distance traveled between harmonic beats; this is the warp factor as developed below. One major theoretical FTL method has been the utility of macroscopic wormholes created with a Jupiter size exotic matter negative energy gravitational mass or utilizing a natural traversable wormhole in the proximity of a black hole. This is where the HWD wormhole concept enters in. The warp bubble boundary is covered by a layer of mini-wormholes created by resonant vacuum programming. This layer of mini-wormholes provides the grease so to speak for operation of the figure-ground effect. This figure-ground effect is somewhat reminiscent of the friction table demonstration used in elementary physics education. A puck pushed across the table has the highest coefficient of friction. Hundreds of tiny holes conceptually our mini-wormholes are drilled in the table. When air is forced through the holes the pucks then glides across the table with virtually no friction. The HWD may seem farfetched at this point, but we will develop these new principles as we go along in our dissertation. As in our description for universal bulk quantum computing by surmounting the uncertainty principle [1] most consider quantum computing as merely a fast form of computing utilizing entangled quantum states. This is by no means the case. Our model for universal quantum computing requires a 12D string theoretic background that allows the manipulation of reality itself. The other primary advance is that the HWD needs no Jupiter size negative energy mass. This feature is the other boon that comes from a greater understanding of the 12D Dirac vacuum [1,11]. Virtually infinite negative and positive energy in equilibrium is inherent in the background of infinite The Holographic

Wormhole Drive 5 potentia. This apparently is what holds the Multiverse and our individual Hubble sphere, HR together and allows each HR in the holographic anthropic multiverse to be fine-tuned. The Alcubierre solution is currently considered the most advanced model; and although the solution does not require a wormhole to traverse, it does require exotic matter to generate the spacetime distortion To quote Alcubierre original paper: In this formalism, spacetime is described by a foliation of spacelike hypersurfaces of constant coordinate time, t. The geometry of spacetime is then given in terms of the following quantities: Using those quantities, Alcubierre generates the warped spacetime metric written above in Eq. The original Alcubierre Warp Drive Metric. Showing how space stretches in a wave. Space ahead of a ship contracts and space behind expands. Time emerges from a more fundamental domain organizing the structure of and guiding the evolution of events in local reality [17,18]. In our extended interpretations the regime of infinite potentia can be coherently controlled and programmed in a manner essential to practical FTL warp-drive technology. This usage is beyond the usual meaning applied to Heisenberg potentia which only refers to the body of probabilistic states of the wave function before a local measurement is taken. The Holographic Wormhole Drive 7 Figure 4. This multilevel process has properties similar to wave-particle duality except that it applies to the dimensionality and topological boundary conditions of reality not just quanta. A combination of the Heisenberg uncertainty principle and the arrow of time a subtractive interferometry mediates this process keeping reality as a virtual subspace of a HD absolute space of infinite potentia. This is a major aspect of the continuous-state process inherent in the new Holographic Anthropic Multiverse HAM cosmological paradigm [1]. This is meta- phorically as the film in an analog movie projector, a 2D or 3D hologram strip and the bulb in the projector an anthropic laser producing the perceived 3D images on the screen perceived by the observer seated in the theatre. This is not a popular view because not only does it give prime import to the role of the observer, but it also represents a dualist-interactionist model of awareness [19] unpopular among cognitive theorists who consider mind tantamount to brain because it includes an anthropic teleological action principle giving an inherent importance to the nature and role of the observer We believe this correct and have presented empirical models to support it [20,21]. We wish to stick with something that suggests a domain that is truly like a hologram in an HD sense because it seems theoretically the most efficient manner to operate an anthropic multiverse. Especially see our model of the vacuum exiplex which potentially solves numerous open questions in cosmology [1,13]. The scalar equation in spherical coordinates of wave motion in spacetime which has spherical symmetry [24,25]. A Ring may vibrate with n standing wavelengths depending on the relationship of the circumference to the multiple number of whole wavelengths. Simplified here, it is suggested that the topology of spacetime and matter vibrate on and as hyperspherical surfaces. Traditionally electron standing-waves oscillate about the atomic nucleus. Here we attempt to expand the wave nature of matter itself as static waves centered on the locus of least spacetime units as it is annihilated and recreated in the arrow of time relative to the observer. The external field is the unitary action driving the evolution of the spacetime lattice structure as a putative self-organized complex system. Surface of constant phase, in this case to represent orthogonal standing reality waves that can be utilized in figure-ground resonance effects. Amorphous Ising model lattice-gas cellular automata can be used for programming spacetime if designed to mirror the spacetime structure utilized. Each independent computational element in the amorphous or stochastic accepting all medium is identically programmed on a topological surface which in this case conforms to the least-unit tori of spacetime. There are too many units to program individually so programming is achieved by neighbor connect- edness. Toffoli formed a metaphor to describe this neighbor model [32,33]. Usually a marching band has a leader, this will not work for cellular automata where local self-assembly is internalized for each individual unit which acts as its own agent. This is a fundamental requirement for a massive ballistic response. The nanostructure of the defense shield materials must contain a computing substrate that is composed of fine-grained computing nodes distributed throughout space which communicate using only this nearest neighbor type of interactions []. According to Drexler [36] the closely The Holographic Wormhole Drive 13 packed computational units may be constructed to simulate a fractal system that for us

would mean has the required incursive properties. A mini-wormhole domain wall is created by coherently controlled conformal scale invariant constructive interference of least-cosmological unit phase relations [1]. The hierarchical nanoscale spacetime cellular automata programmable substrate of modulated cascades is built up into the warp bubble domain wall by static transduction of de Broglie matter-wave resonance configurations into a specified radius of macroscopic Minkowski space. The group velocity of de Broglie waves is associated with the velocity of a particle. MacKinnon [26,27,38] described the de Broglie wave packet for stationery states and nondispersive wave packets of a free particle. Equation 13 is a spherically symmetric solution to Eq. Although we are interested in relativistic waves, The Holographic Wormhole Drive 15 our interest is not for the usual demonstration proving that particles or atoms in general are comprised of de Broglie matter-waves for particles in coordinate motion. R to the other programming parameters for the ballistic programming of cellular automata phase modes. MacKinnon concludes that these stationery states are static and for which Bohm postulated a quantum potential to account for it. MacKinnon carries this point further [26] to suggest that: The motion of a particle in spacetime does not depend on the motion relative to it of any observer or any frame of reference [and] if the particle has an internal vibration of the type hypothesized by de Broglie, the phase of that vibration at any point in spacetime must appear to be the same for all observers Each observer or reference frame will have its own de Broglie wave for the particle. By superimposing all these possible de Broglie waves, a [nondispersive] wave packet is formed centered in space on the particle. Conceptualized schema of the underlying spacetime structure utilized as a template for modulating the matter-wave resonance hierarchy mimicked in the programmable matter of the shield construction materials. The Holographic Wormhole Drive 17 Figure Reductionist hierarchic levels of HAM reality from the local standing- wave future-past eternal present to the atemporal geon of unitarity. The ontological foray into level 5 achieved by programming the geometric information of spacetime is before time at the level of the unified field. A Cramer transaction is based on the Wheeler- Feynman absorber theory of radiation [42] and entails future-past, standing- wave symmetry conditions which when extended to the HD SUSY regime of 18 Richard L Amoroso Calabi-Yau mirror symmetry readily lend themselves to an HD extension of the Dirac polarized vacuum. As illustrated in Fig. But in HAM cosmology this Planck scale action is considered as the microscopic lower bound of a duality whose upper bound creates macroscopic reality and the observed arrow of time. In the standard Copenhagen Interpretation of QT an event emerges only as a result of measurement and objective reality is considered to be a probabilistic illusion. We may call the final event a resultant of the conditions of Heisenberg Potentia. Here we still wish to consider reality illusory to the Minkowski observer. The Holographic Wormhole Drive 19 Figure Adapted from Cramer [12]. Issues of the nature of the fundamental cosmological background continue to be debated with disparate views jockeying for philosophical supremacy; a scenario remaining tenable because experimental avenues for testing physics beyond the standard model have remained elusive. In a companion volume [1] we presented a putative empirical protocol for manipulating the so-called covariant Dirac polarized vacuum DPV providing a methodology for both surmounting uncertainty and low energy protocols for testing string theory. The DPV has a sixty year history in the physics literature [] which has for the most part been ignored by the main stream physics community for a number of philosophical conflicts.

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