

## **Appendix 3**

### **Interstellar and Time Travel**

All matter is interconnected by waves spread through space and time; the past, present, and future are equally real; and the zeropoint field permeates the entire universe. The implication is that there must be a way to manipulate the quantum processes within to achieve interstellar and time travel unprecedented in the history of humanity.

—Atticus Masimovian, 168 AR

*The following is a selected portion of the transcript from the conclave called for Supreme Scientist Heywood Querice in 333 AR. Its central topics included a discussion of the latest methodologies and theories in interstellar and time travel. The discussion at the conclave is stored in Marstone's Database and is considered classified government property.*

**Masimovian:** Your z-disk contains comprehensive explanations, data, and equations, but I'd like to keep this discussion at a high level so that we can best determine whether or not your theories reach the level of significant conversion.

**Querice:** Where would you like me to start?

**Masimovian:** The basics, what is superluminal travel? What are Lagrange points? What is exotic matter? Why is it relevant to this discussion?

**Querice:** Lagrange points represent positions of gravitational stability. For instance, in the Sun-Earth-Moon system, an object placed at one of five Lagrange points would orbit the sun and maintain the same relative position with respect to the Earth-Moon system. Superluminal travel requires  $v > c$ , where  $v$  denotes speed and  $c$  denotes the speed of light. Exotic matter is negative energy.

**Masimovian:** Negative energy exists?

**Querice:** Yes! The laws of physics, specifically quantum field theory, allow it, if that's what you mean. We were able to generate it within a unique particle accelerator at our laboratories in Area 55. This accelerator pulls the exotic matter out of the lowest vacuum pressures achieved by transhumankind. The exotic matter literally "pops" into existence, removing energy from the vacuum, and is then accelerated into specially designed magnetic storage capsules.

**Masimovian:** How do all of these terms relate to interstellar travel as you've devised it?

**Querice:** My team has designed a small space shuttle capable of traveling to the Lagrange points in the Sun-Earth gravitational system; for our purposes let's assume the mission protocols require a rendezvous at Lagrange point one. The shuttle will approach the point and move into a stable orbit. A small rocket (10 centimeters (cm) long and 15 cm diameter) carrying exotic matter is launched at the most stable gravitational position possible at the Lagrange point. The

shuttle needs to be at least 1,000 kilometers (km) away to avoid damage from the explosion that will form the portal. A small amount of exotic matter (only a few grams are needed) is inside a tiny shaped charge, similar to how a nuclear weapon functions. The force of the explosion must be applied to the exotic matter so that it is forced into a dense pellet. At a high enough density the exotic matter changes state, like liquid water changing to ice. In this new state, the exotic particles have new quantum numbers that, when having the correct values, can connect to another particle in the nearby universe and form a bond to that particle. This is the critical moment when the pilot uses her control of the ZPF to change the quantum numbers of the dense exotic matter. The pilot must have the destination in the universe fixed firmly in her mind; through her manipulation of the ZPF she adjusts the quantum numbers of the dense exotic matter so that each particle is connected to a particle at her destination by the ZPF. In a split second the dense exotic matter opens the portal in space. If the pilot has correctly manipulated the ZPF, the portal will take her to her destination.

**Masimovian:** What happens if the pilot is wrong?

**Querice:** The shuttle could go to any random place in the galaxy.

**Masimovian:** What does the portal look like?

**Querice:** The portal is the complete absence of light, as though one were staring directly into a black hole. It truly forms a 3-dimensional hole in space.

**Masimovian:** So the portal will be invisible to the transhuman eye?

**Querice:** No! The edge of the portal is clearly seen. Where the dense exotic matter of the portal ends and the mixture of space and normal matter begins, there's a dark purple circle marking the boundary. The circular boundary is not a thin line but a shimmering band radiating away from the center of the portal, changing from purple to dark blue at its outermost edge.

**Masimovian:** How far can the pilot take the shuttle with each jump through space?

**Querice:** Even the best pilot has only limited ability to travel a distance with accuracy. The farther a pilot wishes to travel, the less accurate she can be.

**Masimovian:** Why is that?

**Querice:** It's due to the quantum uncertainty principle. The best pilot might be able to travel to another star system 100 light years away but not be able to accurately determine where they'll emerge in that system. If the same pilot attempted to jump only 10 years away, maybe she could put her crew in orbit around the star at a known radius or even around a planet in the system. In other words, when jumping long distances, the jumps must be split into smaller segments, and then the craft must travel within a system to another Lagrange point before making a new portal and initiating the next segment of the trip.

**Masimovian:** There's a trade-off between resources and time.

**Querice:** Yes! Based on our ability to procure exotic matter and store it within the shuttle, we believe we can travel as far as 20,000 light years round trip.

**Masimovian:** How does this relate to time travel?

**Querice:** The implementation of the time travel system is similar to that of the interstellar travel system. The portal must also be formed at a point of sufficient gravitational stability, the nearest to Earth being Lagrange points one or two. The system will be the exact same until the point where the shaped exotic matter explosion happens. When the exotic matter explodes, there must be a beam of tachyons passing through the middle of the dense exotic matter pellet. As the exotic matter state change happens, the tachyons connect and produce a different effect on the new particles. Continuing the liquid and ice example, think of an icicle; the tachyons change the quantum number properties of the exotic particles so they connect to particles in other times instead of other points in space. Similar to interstellar travel, during the explosion is the critical moment when the pilot must fix the time they wish to travel in mind; they must use the ZPF to manipulate the quantum numbers of the dense exotic matter so that the portal will open in the correct time. When returning through this two-way portal, it is crucial that the portal be stable, as changes to the quantum numbers of the exotic matter could take the traveler to a different time.

**Masimovian:** What happens if the quantum numbers change?

**Querice:** For most manipulators of the ZPF, it would not be possible to change them again and find the path back to their original time. However, a sufficiently skilled transhuman could focus

intently and make the changes. It is not physically impossible, just challenging. A transhuman particularly skilled in manipulating the ZPF should also be able to change the time and space destination of an exotic/tachyon portal. The portal destination is controlled by two separate quantum numbers: spin of the exotic particle controls time, and angular momentum controls space. However, it takes unusual concentration to be able to manipulate both numbers in the time required.