FASTER THAN LIGHT

What was that? You've got the zoomies? Yeah. Well, don't we all?

Ohhhhh! *Those* kinds of zoomies! Well, why didn't you say so? Sure. I know a bit about those kinds of zoomies. I mean, I'm not an engineer and all, but I'll give it my best.

Traveling faster than the speed of light in normal space-time is impossible. It can't be done. Nope. Not a chance. You can't travel faster than the speed of light in normal space-time. Buuuuuuuut… What you can do is travel faster than the speed of light *relative* to normal space-time.

But Miss Librarian, you say, that's impossible too! We can't just step outside normal space time without falling into the depths of the higher order dimension beyond! How can you navigate when a tiny bit of thrust results in infinite speeds? And even if you could, how could you get back into your own native universe's normal space-time? It would require just as much energy to get back in as it would to hit the speed of light in normal space-time, and you know what happens then!

Of course, I know. $E=mc^2$ happens. Kaboom!

You see, if you want to travel faster than the speed of light, relative to normal space-time, you have to finesse the system. Cheat a little. You know. Just like you do when you walk across the grass instead of sticking to the pavement on campus. And don't you dare tell me you haven't done that. Everyone does. E-ver-eeeeeee-one!

So, how do you cheat the system when it comes to FTL travel? Simple! All you have to do is skim the surface where normal space meets the first higher

order dimension! Of course, there are some serious caveats to that, which is why it always takes so long for civilizations to figure it out.

The first of the big caveats is that you can't just pop into higher order space. Popping into higher order space has just about the same effects as hitting the speed of light in normal space-time. Kaboom! No. You have to do it softly. Gently. You use various exotic field coil combinations, energized by various exotic methods, to float up to the point where you're hovering in the 'confluence' layer where the properties of normal space-time and the first higher order dimension mix.

The second big caveat is that you can't just get there and think you can happily move through the confluence layer like you would in normal space-time. There's a density gradient through the confluence layer, and you need to do something to keep yourself from floating up into the higher order dimension, with no possible way to return. To keep within the confluence layer, what you need to do is to generate 'negative lift'. It's kind of like how most submarines work when they're moving. They're always a bit buoyant. They always want to pop back up to the surface. To keep that from happening, they use their diving planes to generate just enough down force to keep them at the desired depth.

You may have spotted the third caveat already. Did you? Yeah. You can't stay still in the confluence zone. If you cut all power, you'll float up into the higher order space. Even the best gravity anchors can't hold you still in the confluence zone, though they can slow you down a bit. Their effect trails off as you get closer to the higher order dimension though, and given that it only takes a minute or so to float from one edge of the confluence zone to the other, they really don't offer any useful service. Adding to that, a ship's normal gravity drive fields will also trail off in effect, requiring any FTL capable starship to have a secondary pulse fusion drive to ensure safe travel.

The fourth major caveat is that sensors are reduced in effectiveness the further away from the inner edge of the confluence zone you get. Perhaps unsurprisingly, their relative effectiveness is exactly the same as that of the gravity anchor.

The fifth major caveat is… does this even count as a caveat, really? Hmm. I don't know. Anyhow, once you're moving in the confluence zone, you don't interact with matter that's fully within normal space-time. Matter equals mass, and mass makes normal space-time warp. No matter how hard you try, you will always wind up 'lensing' around mass in normal space time.

Yes. I said around. If you pass through the position of a star, you lens around it. In a ring. But that's just trans-dimensional geometry for you, right?

Anyhow, the only exceptions are objects that pass through the inner edge of the confluence zone. Not many objects are like this. Black holes are the best known. Some people think they go all the way through, but they don't. They just butt into the confluence zone a ways, the lower pressure there allowing for the concentration of so much mass in such a small space. If a black hole ever did penetrate into the higher order space, it would be like poking a hole in a balloon. Best case, the universe would slowly deflate. Worst case, well, the universe would go bang and, perhaps, spawn a few new ones in its place.

Now, what about other objects in the confluence zone? Well, that gets complicated. The field generators required to enter and travel safely through the confluence zone typically isolate a starship from other similarly isolated objects. They simply move around one another, sliding along each other's field lines as they pass. This is quite fortunate, because the same isolation that allows such travel also drastically blunts emissions. It's impossible to detect another moving object before a collision takes place.

So, that's the theory about it. What about the practical aspects?

A starship can't jump into 'superspace' from a standstill. Well, a standstill relative to the geometry of normal space-time, that is. Movement is required not merely to generate the required 'lift', but also to allow the progressive propagation of the required field effects. In purely practical terms, a ship turns toward its desired destination, helm orders a modest speed ahead, the ship's backup fusion thrust system is brought online, and once that's all done, engineering ramps up the FTL field coils.

Depending on the exact systems, the starship will enter the confluence zone after anywhere between one second and ten minutes. The former is the military standard. Typical modern civilian vessels will take about five or six seconds. Ships from a few centuries ago, maybe about ten. Multi-minute durations are typical for organic or semi-organic based FTL travel.

Once within the confluence zone, a starship will be navigated using its normal gravity drive coils. As you know, these 'lock' onto a specific point in the local spatial geometry and then act like tractor or tank treads, pulling the ship from point to point. These allow for virtually arbitrary movement, but as mentioned previously, their effects diminish the further you get into the confluence zone.

Near the inner edge of the confluence zone, just the gravity drive coils are generally sufficient for low FTL speeds in the 1-4c range. Higher speeds, up to 16c can be achieved using a combination of fusion and gravity drive thrust. About midway into the confluence zone, the gravity drive coils are only good for maneuvering. However, fusion thrust is far more effecting in this zone, allowing for speeds up to 9,550c for civilian starships. If the rumors are true, modern military ships can hit 16,000+c in this zone. Talk about the zoomies, right? You can get across the whole galaxy in just a measly four years! Like, wow! Really!

Almost all travel takes place in the middle of the confluence zone. Going much further can net much higher speeds, but the risk of exiting into higher order space goes up almost exponentially. Only a few specialized military and research vessels are known to move in the so-called ‘three quarters region’. Here, gravity coils are next to useless, and ships have to rely on old-fashioned fusion power and high energy thrusters to maneuver. That tends to require a lot of fuel, and even a momentary loss of thrust can result in the ship entering higher order space. At the same time, you can reach such phenomenal speeds that you can cross the galaxy in a week, rather than in four years.

Alright, you ask, what are the risks? What are the perils besides floating off into the higher dimensional abyss?

The biggest peril of FTL travel is snagging the wrong confluence zone when jumping. What does that mean? You’ve got to remember that every point in normal space-time has a matching point in the first higher order dimension. But… our universe isn’t the only bubble space-time. There are others, and they can overlap in higher order space. Thus, it’s entirely possible to snag on the confluence zone between our universe and another, rather than that with higher order space. This always results in the permanent disappearance of the vessel in question. It’s usually possible to detect a confluence zone error before a ship actually enters the confluence zone with another universe, however, and accidents of this sort are extremely rare.

Encounters with trans-dimensional entities in the confluence zone are another extremely rare peril. Generally, objects, and entities, are isolated from one another sufficiently to prevent a brief passing from becoming a full-on encounter. Every so often, an entity may make its way into a starship and linger. Whether this is a positive event or not entirely depends on the entity. Most such entities encountered are the same sort of predators which hunt one thing or another in our normal universe, and the results are often catastrophic for ship and crew.

Another extremely rare peril is the possibility that one might inadvertently experience ‘lateral motion’ while in the confluence zone. This type of movement is typically associated with movement in the higher order dimension, and involves movement in time, rather than space. Such motion can, at least theoretically, be deliberately induced using artificial wormhole generators, but that involves a wormhole that actually passes through the higher order dimension. The energy required is almost surely impossible for any starship to generate, and it’s theorized that lateral movement in the confluence zone is typically caused by sudden, severe, ‘weather events’ that move the ship and everything around it all at once.

Another risk is potential interaction between field effects and the ephemeral threads that connect mortal bodies with their immortal souls. It is possible for energetic transient field events can do strange things to individuals. Strange dreams. Seizures. Memory loss. Gaining memories of other, typically very alien entities.

In the worst case, death can occur due to disconnection of an individual’s thread. In the strangest case, body swapping, albeit losing one’s own memory and personality in exchange for the other’s. Exactly how they figure out that there’s been a body swap is beyond me, though. But I digress.

Less catastrophic are interactions between field effects and the countless ephemeral threads that connect mortal bodies with their immortal souls. These must pass through numerous higher order dimensions before they reach normal space-time, and the first such dimension is no exception. These encounters typically take the form of dreams that seem to come from another person’s life, or of a more direct memory infusion. They can affect starship passengers and those who happened to have a starship pass through their life essence connection like.

So, how perilous is FTL travel for civilians, exactly? Well, on average there are something like three hundred thousand starships traveling in FTL at any given time in the Fey’li Empire alone. Upwards of *one hundred and forty million* FTL jumps are made every year. Of all of those trips, only *five* result in a minor incident such as life essence thread interaction, *four* to FTL engineering failures, and only *one* ship is lost to exotic FTL hazards. All other travel incidents are conventional in nature, making the FTL component of a trip the safest in both engineering and practical terms.

Hmm? You want to know about ‘transporter’ accident rates now? Uh… what’s a ‘transporter’? I’ve never heard of… hey! Wait a minute! Are you

trying to use me to fake a paranoia so you can get out of your mandatory practical spaceflight semester?

You are, aren't you?

Yeah. No. I don't care how hot the girls are down at Ley'an Beach in the spring, you are *not* skipping out on your trip. And if you keep trying, I'm going to tell your Chief Instructor to send you on an ore scow to Galdik. You know, the asteroid mining colony where there's nothing to do but stare at liquefied ore being sucked out asteroids all day. Yeah. That one.

Hmm? What was that? Leaving so soon? Well, suit yourself. In biogel, preferably. Because if you want to worry about something doing unexpected things to your body and soul, that's the stuff that's going to keep you up all night.