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There are ways to run simulation games to address that part... but we still don't know what will actually turn up.

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Dear Andrew,

Don't worry about that. There's no known way to establish an interstellar hegemony. What's Imperial Earth (or Lockheed) going to do, threaten to bomb the hell out of you, as soon as they can get another ship there ... in two hundred years?! Oh yeah, that'll be a credible threat. Broad agreement that any interstellar mission is pretty much going to do whatever they feel like doing, with very little sense of obligation to do what Earth tells them.

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Posted by: ajaja | Friday, 27 October 2011 at 01:15 PM

Chein,

your post got me thinking, which is surely among your intentions, and I thank you for that. I'm by no means a physicist, but Wolfram Alpha helps me with a few of the more mundane calculations that you can probably do in your head.

Anyway, I came across this on You Tube:
http://www.youtube.com/watch?v=D6MiTxRGLUc It's a tad over 12 minutes long, but appears to address exactly the theme you and your colleagues did at the conference, even choosing the Alpha Centauri example that you offer. I have no idea who the narrator is, or his motives, or even if his calculations are entirely accurate. However, despite an initially laconic delivery, he does appear to make some good points (I nearly switched off after the first two minutes, but then he got on to real science and dropped the "Avatar" analogy). He had me interested from the point where he scaled our sun and Alpha Centauri to the size of peas, and placed them 100 miles apart with the earth being a grain of salt 4 inches from the pea-sized sun. That's a very long way.

His conclusions are that the physics of propulsion and less than 100% efficiency of propulsion systems would result in so much heat in the engine that the starship could not survive. I take it that you would quickly observe that "chemical" propulsion systems are not the answer, but your laser-based 0.9c system is not going even half as fast as his example.

If you have 12 minutes to spare, I'd be very interested in your interpretation of his conclusions.

Posted by: James B | Friday, 27 October 2011 at 04:19 PM

I have several reactions:

1. Maybe the smart people ought to hold off on the starship and work on some of the problems that we really urgently do need to solve. Just for example, we need to double world food production again in the next few decades, and this time it will be really hard. Our agricultural system isn't sustainable. And poor countries won't achieve demographic transition unless they experience shared prosperity, development, and access to education. But all this development will increase our global energy demands, and our current systems, also unsustainable, are causing global warming, so we need to figure out how to power a technological civilization more sustainably on a large scale. Etc. There's a long list of problems of this type: if they don't get solved, someone might want a starship someday as a last-ditch escape pod, but that's it.

2. Anyway, it's hard to read about all this serious talk of building starships without laughing out loud. Assuming you think Americans will play an important role in this, you're talking about a country whose institutions are so dysfunctional that it can't even manage to build a high-speed rail network, or a tunnel under the Hudson river, or maintain steel bridges properly, or put people back to work doing all the useful things that need to be done at a time when millions are idle and the government can borrow money at negative interest (!). In this country the only things that can get done are the things that provide immediate profits for the 1%. Europe? They can't figure out how to make money work. China? Don't get me started. The point is, our current global civilization can't even solve the easy problems, let alone the hard ones.

3. On the other hand, those same institutions are pretty good at attacking imaginary problems like nonexistent inflation, the awful burdens imposed on society by deranged schoolteachers who expect (gasp) non-poverty wages and (horrors) pensions, and so on. Since imminent invasion by aliens is also an imaginary problem, perhaps our institutions would actually be really good at wasting resources on that fleet of starships we absolutely need.

4. But maybe I'm thinking about this all wrong. Building starships wouldn't be a waste of resources. As a way of getting the economy going again, building starships would be infinitely preferable to our current approach, i.e., doing nothing except giving free money to the 1%. As a massive government procurement program, it would be much preferable to alternatives such as invading more countries or starting World War Three. And the beauty of it is that the starships wouldn't even have to work! The only thing that would matter is that we're building them. Think of the possibilities - a 30-year or 50-year or "endless" battle, not against "terror" or "Oceania" but against the stars. Full employment! A renewed sense of purpose! Morning in America!

5. OK, after all that, I admit: starships would be cool. I hope that human beings figure out how to build them someday. I hope our species doesn't die out here on this planet, and if we must, I hope it isn't soon. Surely, part of what makes us human is that we're dreamers. We think big. We have big dreams. I'm glad you guys are dreaming such beautiful dreams. Don't stop, after all.

Posted by: Joseph | Friday, 27 October 2011 at 12:24 PM

I am quite sangoine about the prospects of eventually going to the stars. At this point, it's mostly an engineering problem. (We know how to make anti-matter, we just don't know how to make much of it, or to control it when we've got it. If we could do those two things, we could do continual 1G boost.) So, engineering.

Nor do I think the social or organizational problems are insuperable barriers...or won't be. We now keep people in prisons for decades, and they survive. A large interstellar ship would be much more pleasant than that, and much more varied, and probably much larger.

The way I see earth evolving is that we'll hit a peak population sometime in the next century, and after that, population will begin to decline and eventually reach an equilibrium at a lower level than we have now. And we'll have general peace, and most people will have material sufficiency. So then, what do we do? We go to the stars.

I really don't see much purpose in humans traveling around the solar system. Robots could do everything we need. And why go down another gravity well when we have so much trouble getting out of the one we have? But the stars...that's different.

JC

Posted by: John Comp | Saturday, 08 October 2011 at 10:21 AM

I have the notion that such a venture doesn't so much need an organization to run it (in the corporate sense) so much as a society (in the community/nation sense) to develop the necessary autonomy of purpose and long-term view. There are very few corporations, let alone projects that have been able to survive for the sorts of durations necessary.
Certainly, I share your view that the people stuff is the difficult & most interesting bit here.

Posted by: Martin Freeman | Saturday, 08 October 2011 at 08:47 AM

Thanks Chein for your replies, If I get any brown or black-outs I'll know who to blame ;-)

cheers phil

Posted by: phil | Saturday, 08 October 2011 at 07:14 PM

Dear folks,

Several people have brought up the matter of quantum entanglement communication, so I better address this. The short answer is that doesn't give you faster than light communication. Although the "spooky action at a distance" propagates at at least 10,000 times faster than the speed of light (most recent experiments), any information that is conveyed that way is the information that was imposed on the system when you created the entanglement. We still don't have any way to physically separate the sender and receiver faster than the speed of light.

If you try to impose new information on the sender after you separate it from the receiver, you break the entanglement, so that trick doesn't work. You also can't use it as a kind of Morse code system by monitoring the timing of the collapse, because when either the sender or the receiver station looks at the entanglement it collapses. You can't peek at it to see what time the sender collapsed without collapsing it yourself.

I would note, theoretically, that if there were a way around this in physics, it would mean that there was no fundamental physics preventing a faster than light drive. If you can imagine one, you might as well imagine the other.

On the other hand, quantum entanglement does present a theoretical alternative to sending warm bodies. Entangle the crew with a quantum template on earth. Ship the templates off to wherever you want them to go. Then collapse the state. You end up with exactly the same crew that was on earth, at the moment you entangled them. You don't get there any faster, but the whole life support/culture support problem goes away. It's a kind of cold storage.

Understand that physically doing this is phenomenally difficult. It may very well not to turn out to be any cheaper or easier than sending people the conventional way. It might turn out to be much, much harder and more expensive.

But it is physically possible.

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[Please excuse any word-salad. MacSpeech in training!]

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Posted by: ajaja | Saturday, 08 October 2011 at 07:16 PM

Dear James B,

Indeed, nobody at the conference was envisioning building anything that would go remotely that fast. I could disagree with his engineering analysis on a number of important points, but I don't think that's necessary. If you look at my figure 4, the 2 gold diagonal lines on the far right are for an antimatter-matter drive going at 1G acceleration. The top line is based on the current cost of antimatter; the bottom one assumes you can drop that cost by a factor of 10. Note that the price tags are on the order of 10-100 quadrillion dollars. Not trillions, quadrillions. That's a number that's on par with the gross economic product of the entire planet for the next millennium.

And that's only for a 1 ton robotic payload.

Figure out how to pay for a full-blown matter-antimatter starship before the year 3000, and then I'll start worrying about engineering details [practical grin].

~~~~~

Dear JC,

A 1st-generation starship wouldn't be a 1G boost vehicle; the engineering and economic problems are simply too horrendous. Most (not all) of the designs are one way trips, as they don't permit a return voyage within a human lifetime. Charlie Stross doesn't even like calling them "starships" or "missions;" he thinks it badly distorts the thinking about how these would actually work and behave. They are entire self-contained worlds that just happen not to be bound to a particular star system and are moving at unusually high velocities.

Consequently, it would absolutely, positively be a very large and varied and pleasant environment.

At least it better be, if you want the mission (sorry, Charlie) to survive!

One interesting tidbit: selection criteria for the population likely will not be as physically rigorous as one would imagine from current space missions. It turns out that the minimum population you need to assure sufficient genetic diversity is somewhere between 2 and 4 orders of magnitude (depending on who's doing the calculations) smaller then the population you need to avoid technological/cultural decay. While the population would no doubt be cherry-picked in the extreme, physical fitness would not be more important than many other criteria; you can afford a lot of slop along that axis.

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Posted by: ajaja | Saturday, 08 October 2011 at 08:13 PM

Having read Heinlein's "Orphans of the Sky" and all the variations about multigenerational starships arriving at already human populated planets, (and given that I'm now 60 years old) I think I'll wait for a superluminal starship before I buy a ticket.

Posted by: Tom Duffy | Monday, 10 October 2011 at 07:14 AM

Want to facebook this but no button. Have to cut and press.

@yunfat

2) Your mindset is uniquely "western"... the Chinese would have no problem with this.

Not sure about that. The only person who do this is in a western movie called Superman I. As one of the Chinese, I have real problem with this (but see note below).

I do not recall any Chinese would send their children like this without regret. Remember the majority of the Chinese are still under socialist / communist rule (which emphasis the group) whilst the majority of the western culture, at least on the surface, emphasis individual capitalism. Like the Tiger Mother, you need to stand next to your children.

Having said that I think the q. entanglement is good. If we have complete and instant communication, we might use Droid like today or as in that 3d movie. They would see us but the real spirit is not there but in a 3rd rock 20 light year away.

BTW, the issue is not just work across human barrier but across culture one. That is why we have different language by the intervention of God, Remember Babel. Reach the sky ... sorry guys!

Posted by: Dennis Ng | Wednesday, 12 October 2011 at 08:01 PM

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