

### Offered Title: Fly Me to the Stars

So, Bart Howard is rolling over in his grave. Sorry Mr. Howard, taking liberty with your song title. Fly Me to the Moon has been recorded by hundreds of artists, it's a great song.

Making it to the Moon was a monumental achievement. We now have robots on Mars and have sent spacecraft to check out all the planets and many of their satellites in our solar system. Getting to stars, that's a horse of a different color. Planet Earth is a pale blue dot when seen from Saturn. Our solar system isn't visible from a planet going around the nearest star. It's that far away!

Proxima Centauri is the closest star other than our Sun. Using the distance from Earth to the Sun as one unit, called an astronomical unit (AU), it's easy to show the challenge of distance. Some example distances in AU: Sun = 1, Neptune = 29.8, Voyager 1 = 141.5, Proxima Centauri = 268,332. That's a huge distance! Even at the speed of light (186,000 miles/second) it will take over 4 years just to arrive at Proxima Centauri.

We really must get up to speed, as close to the speed of light as possible, if we expect to achieve practical interstellar travel. Sure, it can be done at much slower speeds...if we are willing to make it a relay, passing on the mission from generation to generation as the spacecraft makes its way. There are things to consider. Equipment must survive and be useable on arrival. Humans on board? Need to consider physical and psychological challenges. It's dangerous out there. Maybe send families where a great grandson or granddaughter gets to report a successful trip.

We will send unmanned craft first, duh, but how will they achieve the speed needed to zip (let's say, 20 years) to Proxima Centauri? To arrive in 20 years the craft needs to travel at around 20% the speed of light. One promising technology is the nanoparticle field extraction thruster (nanoFET), in development at the University of Michigan. This tiny craft proposes to process on board or existing particles in space into ions accelerating from its thruster. Some other proposed methods of propulsion including fusion and fission pulse, ion streams, laser powered light sail, antimatter rocket, hydrogen ramjet. Technical challenges abound for them, although the light sail concept has been tested and shows promise. An offshoot of light sail is Breakthrough Starshot and it's StarChip, a tiny cube driven by laser light, hopefully to speeds approaching 20% the speed of light.

Human travel to the stars? Scotty, get the warp drive online and get us out of here!

### What's in the Sky?

June 19; evening; northwest: Brilliant Venus is less than ½ degree north of M44, the Beehive Cluster. Use binoculars

June 21; 5:07 am CDT: – Summer Solstice, the northern hemisphere's longest day

June 23; nightfall; south: Jupiter and a waxing gibbous Moon are close