

The Sunset Gazette

Serving the Tri-Cities since 1975

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Meeting information

Meetings are generally in the theater in the Delta College Planetarium in Bay City. The meetings will usually be on the 2nd Friday of each month at 7:00 PM. Watch the newsletter for changes in dates and times. Membership is not required to participate in meetings and activities. See last Page for this month's meeting site.

Membership Information

Our club has switched to e-mailing our newsletters. For those wishing to receive a hard copy mailed an additional dues of \$10.00 per year is required.

Student / Senior: (17 years & younger, 65+ years)

1 year - \$15 (mailed Newsletter add \$10)

2 year - \$20 (mailed Newsletter add \$10)

Regular: (18+ years)

1 year - \$20 (mailed Newsletter add \$10)

2 year - \$30 (mailed Newsletter add \$10)

Family:

1 year - \$25 (mailed Newsletter add \$10)

2 year - \$40 (mailed Newsletter inclusive)

Membership includes voting privileges, the newsletter and free admission into Delta College Planetarium shows.

Treasurer's address for renewals and subscriptions:

Tom Smith, 3423 Hidden Road,

Bay City, MI 48706-1243

Subscription Information

Subscription prices for "Sky and Telescope" Magazine or "Astronomy" Magazine are available at club rate with the purchase of individual or family membership. For prices please refer to the treasurer or the club's website:

<http://www.sunsetastronomicalsociety.com/SASMembership.htm>

Update:

SAS Meeting canceled on Oct 8th to give all members the chance to visit the Great Lake Star Gaze 8 from October 7 to 10 at River Valley RV Park:

For Information and Registration see <http://www.greatlakesstargaze.com/>

Next regular SAS meeting will be on Nov 12th!!!

ARE WE ALONE? or

"The discovery of one-cell organisms on a distant planet in our solar system or beyond would have an impact as big as the Copernicus revolution"

By Martin Grasmann. This is the 21th of an (very) extended summary of a lecture about Astrobiology that Dana Bachmann, SETI Institute/SOFIA-Ames gave on Wednesday, March 26th 2008 at the CMU. Previously we were discussing more serious and technological doable drive systems for getting humans to the stars – that is if you give technology another 100 years or more to develop those drives. Today's newspaper issue will deal with purely speculative methods for interstellar travel. Speculative because the science they are based on is currently not (well) established - and the technology based on this science even less! Nonetheless I had great fun searching for these quite outrageous and highly speculative theories and proposals, if only because serious scientists and organizations (NASA) have found it necessary and worthwhile to invest time and money to research future revolutionary interstellar drive systems. And you never know: the development of such a breakthrough technology could have an impact on future human civilization equally important like the invention of fire or tools. That said let's dive into the first of these inter stellar drive systems:

Black Hole Starship

In 1974 Stephen Hawking provided the theoretical argument for the existence of a thermal radiation which is emitted by black holes due to quantum effects. The Hawking radiation reduces the mass of the black hole and is therefore also known as black hole evaporation: the smaller black holes are predicted to emit more radiation than larger black holes; thus, they tend to shrink and dissipate faster. A black hole starship would use a parabolic reflector to reflect the radiation coming from an artificial black hole. In 2009, Louis Crane and Shawn Westmoreland investigated the feasibility of this idea. As outrageous as it sounds the idea offers some advantages: The Crane and Westmoreland paper states: *"On the other hand, the process of generating a black hole from collapse is naturally efficient, so it would require millions of times less energy than a comparable amount of antimatter or at least tens of thousands of times given some optimistic future antimatter generator. As to confinement, a black hole confines itself. We would need to avoid colliding with it or losing it, but it won't explode. Matter striking a black hole would fall into it and add to its mass. So making a black hole is extremely difficult, but it would not be as dangerous or hard to handle as a massive quantity of antimatter."*

Although the process of generating a black hole is extremely massive, it does not require any new Physics. Also, if a black hole, once created, absorbs new matter, it will radiate it, thus acting as a new energy source; while antimatter can only act as a storage mechanism for energy which has been collected elsewhere and converted at extremely low efficiency." Generating black holes may be on the verge of possibility. It has been discussed that the Large Hadron Collider which is currently taking up work in Cern, Switzerland may be able to produce micro black holes which due to the Hawking radiation would only last an incredible short time.

Interstellar travel by transmission at light speed



This concept involves the transportation of matter in form of information which is then used at the destination to reconstruct it. In short: A teleportation system like in Star Trek only over interstellar distances. The carrier of information would be a light beam and the travel time would be near light-speed travel for an outside observer but for the traveler the journey would be instantaneous. Of course the encoding, sending and then reconstructing of a human body atom by atom and would be a daunting prospect and the Heisenberg uncertainty principle is often mentioned why it may be impossible at all. A more simplistic concept would be to transport only the genetic information to create a human on a distant world which would then report back. That would of course imply that either an alien civilization would have to be present on that world having a) the technology and b) the will and courage to undertake this experiment. I do not know how humanity would react if they would get such a proposal from another civilization... The other way would be to send an interstellar probe to that distant world by conventional means which has an apparatus on board to reconstruct a human.

Slow manned missions - Generation ships

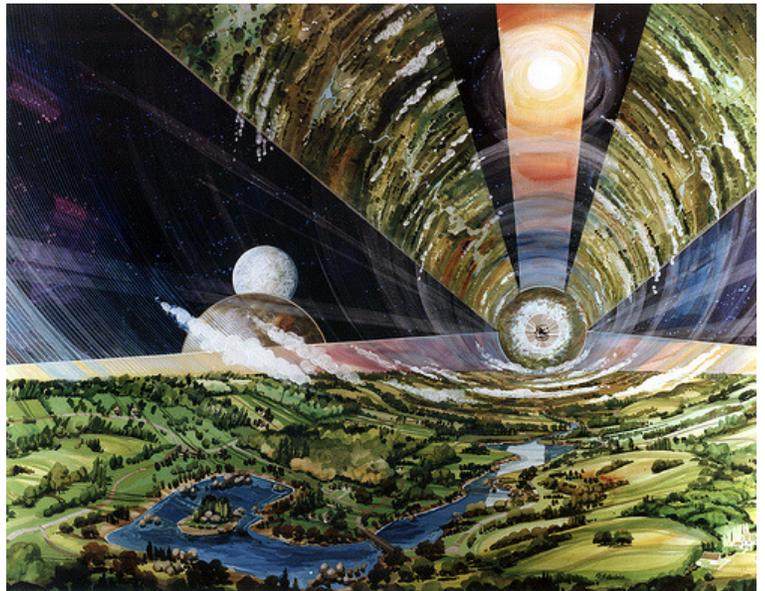
One fascinating concept of interstellar travel are the so called generation ships. These are like interstellar arks traveling for hundreds or even thousands of years at speeds much smaller than light speed. Only the far descendants of the original crew will reach the destination. These ships would have to be constructed on an enormous scale and carrying hundreds if not thousands of inhabitants inclusive a whole biosphere. In addition these ships would have to have seeds and genetic material (plants, humans etc) on board to guarantee a better chance of survival on the new world.

Above: A hollowed out asteroid could provide the outer hull of an orbital habitat or generation star ship.

The ships would have to be completely self-sustaining, providing everything from food, energy, water and air to its inhabitants. Because the ship have to function over hundreds or thousands of years the ships system have to be extremely reliable either by multiple redundancy or better by a kind self-repair system which works independent from the crew. In the past big habitats in Earth or Moon orbit have been envisaged which would work like generation ships only that they are based close enough to Earth for help. This would be an excellent testing ground if thousands of humans can live effectively isolated from the rest of humanity for a very long time period. During this time it would become clear if the major biological, social and moral problems can be solved. A moral quandary might exist for those who are born after the ship has left Earth but who will never see the final destination. They had no say in the decision of their descendants to go onto this journey but they will also never earn the fruits of this endeavor so who knows how they might feel about their forced existence on such a ship.

There have also been estimates of the minimum viable population which is necessary to sustain itself and avoid inbreeding. In 2002 anthropologist John Moore estimated that a population of 150-180 would allow normal reproduction for 60 to 80 generations, equivalent to 2000 years. If the crew would undergo a careful genetic screening and if sperm banks from Earth would be used the starting base could be even smaller. The generation ships are based on the normal human lifespan. Only an extreme extension would make it possible to live through the entire trip. One way to extend the human lifespan would be suspended animation which would include hibernation and cryonic preservation. Neither of these are currently practical but they would offer the possibility of a sleeper ship which automatically reaches its destination while its passengers are sleeping for years and are only awoken shortly before arrival.

Currently quite often discussed is the extension of the human lifespan. Of course a few dozen years would not do it - what is needed is a lifespan extension over many hundreds of years which of course would rise all kinds of social and psychological questions.



A cylindrical orbital habitat as an artist envisaged it. The whole cylinder rotates slowly along its main axis to create artificial gravity on the inside wall of the structures.

The ship would need a very effective shielding against ionizing radiation especially cosmic rays. The radiation environment of deep space is very different from that on the Earth's surface or in low earth orbit, due to the much larger flux of high-energy cosmic rays along with radiation from solar proton events (these occur when protons emitted by the Sun or any other star are accelerated to very high energies during a solar flare or in interplanetary space by the shocks associated with coronal mass ejections). These radiations have serious effect on the DNA, increasing the risk of cancer, cataracts, and neurological disorders. The Apollo astronauts actually saw cosmic rays as tiny flashes of light inside their eyes when they closed their eyes. This was caused by Cherenkov radiation, the interaction of the cosmic rays with the vitreous humour which is the clear gel that fills the space between the lens and the retina of the eyeball.

In a way we all live on a generation ship traveling through our milky way: Earth!

NASA Breakthrough Propulsion Program

In 2003 the NASA Breakthrough Propulsion Program to identify some breakthroughs which are needed for interstellar travel to be possible was terminated after 6 years with the comment: "No breakthroughs appear imminent".

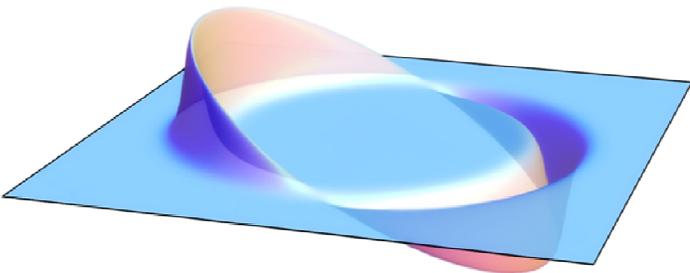
Several drive systems have been envisaged for (very) advanced propulsion and I want present the most important ones. Be with me that these propulsion systems are very heavy on theoretical physics and because I am not a theoretical physicist I will try to keep it as simple as possible (In most cases I did not even bother to try and put this into my own words so the following excerpts are right out of Wikipedia or from NASA web-sites).

"The **diametric drive** involves hypothetical particles with negative mass, originally proposed by Robert Forward and Jamie Woodward. If one were to construct a block of negative mass, and then attach it to a normal "positive" mass, the negative mass would fall towards the positive as does any mass toward any other. On the other hand, the negative mass would generate "negative gravity", and thus the positive mass (the spaceship itself generally) would fall *away* from the negative mass. If arranged properly, the distance between the two would not change, while they continued to accelerate forever. It has been argued that stability issues might arise." (Wikipedia)

The "**Disjunction Drive**": "This concept entertains the possibility that the source of a field and that which reacts to a field can be separated. By displacing them in space, the reactant is shifted to a point where the field has a slope, thus producing reaction forces between the source and the reactant. Although existing evidence strongly suggests that the source, reactant, and inertial mass properties are inseparable, any future evidence to the contrary would have revolutionary implication to this propulsion application." (NASA)

The "**bias drive**" is a concept where the value of the gravitational constant G in front of and behind the craft is locally altered. So far it has been found that while the gravitational constant is indeed a fundamental physical *constant* in our current theory of gravitation, Einstein's General Gravity. But the Brans-Dicke theory of gravitation, its best known competitor, does in a sense allow for a locally varying gravitational constant, so the notion of a locally varying gravitational constant has been seriously discussed in mainstream physics.

The "**differential sail**" (for further reading a description of a differential sail appears in Christina, Mariette D., "Space at Warp Speed," Popular Science, May 2001, p. 49.) appeals to the zero-point energy field. According to the Heisenberg uncertainty principle because there cannot be an exact amount of energy in an exact location, vacuum fluctuations are known to lead to discernible effects such as the Casimir effect (see Wikipedia for further reading). It was speculated that the differential sail might allow to induce differences in the pressure of these vacuum fluctuations on either side of a sail-like structure. Propulsion is achieved by the difference of pressure on both sides of the sail.



Finally there is the **Alcubierre drive**, which is often also called the "warp drive" in reminiscence of the science fiction series Star Trek. In theory this would cause the fabric of space to contract in front of the spacecraft to expand the space behind it. The space ship would ride this wave inside a region known as a *warp bubble* of flat space. In relation to the bubble the ship would stand still - instead the region

of space itself would move. Therefore conventional relativistic effects such as time dilation do not apply. It would also not travel faster than light in a local sense, because inside the bubble light would still travel much faster than the ship: "Due to the contraction of space in front of the ship it could reach its destination faster than a light beam restricted to travelling outside the warp bubble. However, there are no known methods to create such a warp bubble in a region that does not already contain one, or to leave the bubble once inside it, so the Alcubierre drive remains a hypothetical concept at this time."

This is the end of our journey which began with the question "Are We Alone". Next time we will start a new series - thematic still open: one potential candidate is "how to measure cosmic distances from the moon to the brink of our universe". But if the reader has better or more interesting ideas he or she may come forward and contact me!

SUNSET ASTRONOMICAL SOCIETY
THE SUNSET GAZETTE
SERVING THE TRI- CITIES SINCE
1975



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New (Old) Elected Officers for the SAS:

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This issue can be accessed in color on the website of the SAS!!!

<http://sunsetastronomicalsociety.com>

SAS Meeting

7 PM, November 12th, 2010

Delta Planetarium

Please see front of Newsletter for last update!

1. Welcome, new members
2. Program to be determined
3. Break
4. Club Stuff

What's up in the Sky

Oct 3: Algol at minimum brightness: 3.4 mag instead 2.2 mag.

Oct 4: *Predawn:* Regulus ca 6 deg lower of waning crescent Moon.

Oct 6-20: *Pre-Dawn:* Zodiacal light visible 80-120 min before sunrise. Dark Skies needed.

Oct 6: *Dawn:* Very thin crescent Moon about 8 deg above eastern horizon. Mercury may also be visible left to Moon. Binoculars!

Oct 7: *New Moon*

Oct 9: *Dusk:* Binoculars needed for crescent Moon, Venus and Mercury above southwestern horizon.

Oct 10, 11: *Dusk:* Moon to the lower right of Antares on the 10th and to the upper left of Antares on the 11th.

Oct 14: *1st quarter Moon*

Oct 19: *Evening:* Jupiter 6 deg below Moon.

Oct 22: *Full Moon*

Oct 23: *Evening and Night:* Shadows of Ganymede and Europa fall on Jupiter from 9:40 to 11:04 pm EDT.

Oct 25: *Early Dawn:* Pleiades ca 1-2 dg upper right of the Moon.

Oct 30: *Last quarter Moon*

Nov 1-18: Long lasting Taurid meteor shower peaks in first half of Nov. Maximum from 9-10 pm to dawn.

Nov 6: *New Moon*

Nov 7: Daylight Saving time ends for US and Canada.

UPCOMING EVENTS

October 7 - 10: Great Lake Star Gaze 8 at River Valley RV Park: **Registration is now available online at:**

<http://www.greatlakesstargaze.com/>