

# The Sunset Gazette

*Serving the Tri-Cities since 1975*

Volume 7, Issue 8

April, 2010



#### 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 Page 6 for this month's meeting site.

#### Membership Information

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

1 year - \$15

2 year - \$20

**Regular:** (18+ years)

1 year - \$20

2 year - \$30

**Family:** 1 year - \$25

2 year - \$40

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 Rd.

Bay City, MI 48706-1243

#### Subscription Information

Subscription prices available at club rate with the purchase of individual or family membership.

"Sky and Telescope" Magazine:

1 year - \$33.00 + Membership

"Astronomy" Magazine:

1 year - \$34.00 + Membership

2 year - \$60.00 + Membership

**Please watch out for e-mail notification about time and place of the Messier Marathon 2010 in the days before April SAS meeting!**

- If the weather is good on Friday April 9<sup>th</sup>, the usual SAS meeting **will not take place** but be replaced by the Messier Marathon! The Location is the public access East of M 25 at Fillion Rd. Approx. 6 miles north of Bay Port.
- If the weather if bad on April 9<sup>th</sup>, the SAS meeting will take place at the usual time and venue.
- If the weather is good on Saturday April 10<sup>th</sup> the Messier Marathon will take place.
- If the weather if bad on April 9<sup>th</sup> and 10<sup>th</sup>, the Messier Marathon will take place Friday April 16<sup>th</sup> or Saturday April 17<sup>th</sup> again weather dependant.

**Check your e-mail often! If you do not have e-mail call Steve VanTol (home 989-496-3541) or (work 989-662-4940) on Friday April 9<sup>th</sup> or 16<sup>th</sup> for the status of the event.**

**Elections for SAS Officers in May!!!**

*Anyone interested in an office can*

*contact*

*Steve VanTol @ [stevenv106@aol.com](mailto:stevenv106@aol.com)*

*or call his home tel 989-96-3541*

## 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 18th part of an (very) extended summary of a lecture about Astrobiology that Dana Bachmann, SETI Institute/SOFIA-Ames gave on Wednesday, March 26th at the CMU.

### Nuclear propulsion (Continued)

Nuclear Propulsion (continued)

For the last newsletters we were looking at the possibility of interstellar travel and discussing the various technologies which may be able to achieve this feat. Granted all of them a pretty much science fiction today but very early prototypes of solar sails have been tested in the last few years. Much further out in the future are various kinds of nuclear propulsion technologies despite the fact that at the dawn of nuclear energy usage quite a few scientists were convinced that they would see some kind of nuclear propulsion in their life time!

So far we mentioned the Orion concept: its nuclear pulse drive would have combined very high exhaust velocities of 20,000 – 30,000 m/s with enormous thrust. For example chemical drives like used in today's rockets also have a large thrust but much lower exhaust velocities (max 3,000 – 4,000 m/s) whereas electrical ion or plasma drives used on satellites and space probes have exhaust velocities in the area of Orion or even higher. These probes gain their power usually from solar cells and the amount of electrical energy defines the strength of the electrical or magnetic field in which the propellants are accelerated. Electrical ion or plasma drives can only work in the vacuum of space and their thrust is minute: milligrams to grams versus hundreds or thousands of tons like with nuclear or chemical propulsion. On the other hand they are very frugal with the amount of propellant they use and can therefore accelerate over a very long time.

The performance of Orion spaceship depends on the shape of the nuclear fireball. For example if the reaction mass is shaped like a cylinder, then the fireball will expand into a disk-shaped plasma ball which is not very effective to drive the ship forward. A bomb with a disk-shaped reaction mass expands into a far more efficient cigar-shaped wave of plasma debris. The cigar shape wave focuses much of the plasma to press against the pusher-plate needed to absorb the push of the explosion and convert it into a forward momentum. For a manned mission only small impulses are needed which would result in low accelerations of ca 1 g, so a lot of small explosions would be necessary.

As can be seen from above exhaust speeds of 20,000-30,000 m/sec the original Orion design would not be suited for interstellar travel. Therefore advanced derivatives of the design were developed with cruising speeds of 8%-10% of light speed. In 1968 Freeman Dyson published an analysis how an Orion mission would shape up to reach Alpha Centauri. Instead of using a large number of small fission bombs he instead proposed using 1 megaton fusion explosions instead. His conclusions were simple: the debris velocity of fusion explosions was probably in the 3000-30,000 km/s range and the reflecting geometry of Orion's hemispherical pusher plate would reduce that range to 750-15,000 km/s. He considered two designs: a more conservative *energy limited* pusher plate design which had to absorb all the thermal energy of each explosion - half of which would be absorbed by the pusher plate - without melting. By using a 1 mm copper surface the diameter and mass of the hemispherical pusher plate would have to be 20 kilometers and 5 million metric tons, respectively. It would take 100 seconds to cool the copper plate enough to allow for the next explosion. The ship would take about 1000 years to reach Alpha Centauri and would be a so called "Generation Ship" where many dozens of generations would be born, live and die before finally their ancestors would reach the final destination. The second design had an alternative *momentum limited* pusher plate where an ablation coating of the exposed surface is substituted to get rid of the excess heat. Materials available at the time of writing (1968) would have allowed a 1 g acceleration with a pulse rate of one explosion every three seconds. The cruise velocity of a thermonuclear Orion starship is about 8% to 10% of the speed of light. At this speed the ship would have made the journey to Alpha Centauri in about 44 years – well in one's lifetime! As the late astronomer Carl Sagan pointedly suggested this would be an excellent use for current stockpiles of nuclear weapons!

### Fusion rockets

Fusion rocket would use fusion reactors and should be able to reach speeds of approximately 10 percent of that of light. They would burn light elements like as deuterium, tritium, or  $^3\text{He}$ . One famous design for such a rocket is Project Daedalus which was a study conducted between 1973 and 1978 by the British Interplanetary Society to design an unmanned interstellar spacecraft and sent it to Barnard's star.

Unlike the original Orion the Daedalus would be constructed in Earth orbit and would have an initial mass of 54,000 metric tons. This includes 50,000 tons of a deuterium/tritium mixed fuel and 500 tons of scientific instruments. The concept of Daedalus was to be a two-stage spacecraft, in which the first stage would operate for two years, taking the spacecraft to 7.1% of light speed.



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



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

<http://sunsetastronomicalsociety.com>

## SAS Meeting

7 PM, April 9<sup>th</sup>, 2010

If weather permits the SAS meeting of April 9<sup>th</sup> will instead become the

### Messier Marathon!

Please watch out for e-mail notification about time and place in the days before the meeting.

See front page!

If the weather is bad:

1. Welcome, new members
2. Dale's Constellation of the Month:  
"Hydra"
3. Break
4. To be determined

## UPCOMING EVENTS

**April 15:** *Dusk to Evening:* Now it's a good time to look for Mercury:

You need an unobstructed western horizon and some binoculars or a telescope. Mercury and the thin crescent Moon are ca 7 deg lower right of Venus.

**April 16:** *Early Evening:* Thin crescent Moon ca 8 deg above Venus.

**April 21:** First quarter Moon. Later in the evening look for Mars ca 5 deg above the Moon.

**April 23 - 25:** *Early Evening:* Venus and the Pleiades inside a 5 deg field of view - binoculars recommended.

**April 24,25:** *Evening and Night:* Moon can be found to the lower right of Saturn (24th) to the lower left on the 25th.

**April 28:** Full Moon

**May 1:** *Dusk:* You need bino's to spot 4 mag Kappa Tauri 0.25 deg lower left of Venus.

**May 4:** *Dusk:* Ca 0.5 deg left of Venus 4th mag Kappa Tauri can be found in mounted bino's or telescopes.

**May 6:** Last quarter Moon

**May 9,10:** *Dawn:* 20 Piscum can be found near Jupiter about 0.25 deg to the lower right. Mounted binoculars or a telescope needed.

**May 15,16:** *Dusk:* On the 15th the thin crescent Moon is to the lower right of Venus and to the upper left on the 16th.

## UPCOMING MEETINGS