Sunset Astronomical Society

The Sunset *Gazette*

Serving the Tri-Cities since 1975

Volume 6, Issue 8 April, 2009

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

New Members receive a New Member Observing Kit at their first meeting, courtesy of SAS. Membership includes voting privileges, the newsletter and free admission into Delta College Planetarium shows.

Subscription Information

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

"Sky and Telescope" Magazine:
1 year - $32.95 + Membership

2 year - $65.90

"Astronomy" Magazine:

1 year - $34.00 + Membership

2 year - $60.00 + Membership

Reminder: Next SAS Meeting April 3rd!

President's Message

The state of the economy... Oh, wrong President.

Tonight it is finally clear AND warm enough outside (44F) to do some serious back yard observing. I'm taking a break to warm a little while changing scopes from my 80mm refractor to the 5" goto that I want to use for astrophotos. My last practice session proved once again that computers will do what they are programmed, not necessarily what you expect. I hope to tame the beast tonight so I can go onto the next step - putting the Meade "Deep Sky Imager" camera in the eyepiece holder. // I just took some accessories for the 5" scope outside and it is now cloudy... So I practiced with the goto computer inside. Not nearly as satisfying, but OK.

Venus is gone from the evening sky but Saturn rises pleasingly early to enjoy and share with anyone you can get to your telescope. I could just barely see Titan in the 80mm tonight. Hopefully you've had as many inquires in the last month as I have about the "bright star" just after sunset, of course referring to Venus. I usually shared that in a telescope it looks like a crescent moon, the same as Galileo saw it 400 years ago this year, the International Year of Astronomy. Be sure to celebrate this anniversary by participating in the Delta Planetarium public observing sessions on the first Friday of each month. The Sky Show presented by Garry is alone worth the visit especially when it's cloudy. But we've had clear skies for the last two open houses and those visiting us are thirsty for your knowledge! Take the opportunity to share it with them.

I'm looking forward to talking with you at our next meeting on April 3rd (one week earlier due to "Good Friday"). Come join us for an interesting exploration of the possibility of intelligent life elsewhere in our galaxy. And of course, we will enjoy one of Dale Sisson's spectacular 'Constellation of the Month'...

Clear Skies - Bill

ARE WE ALONE? or

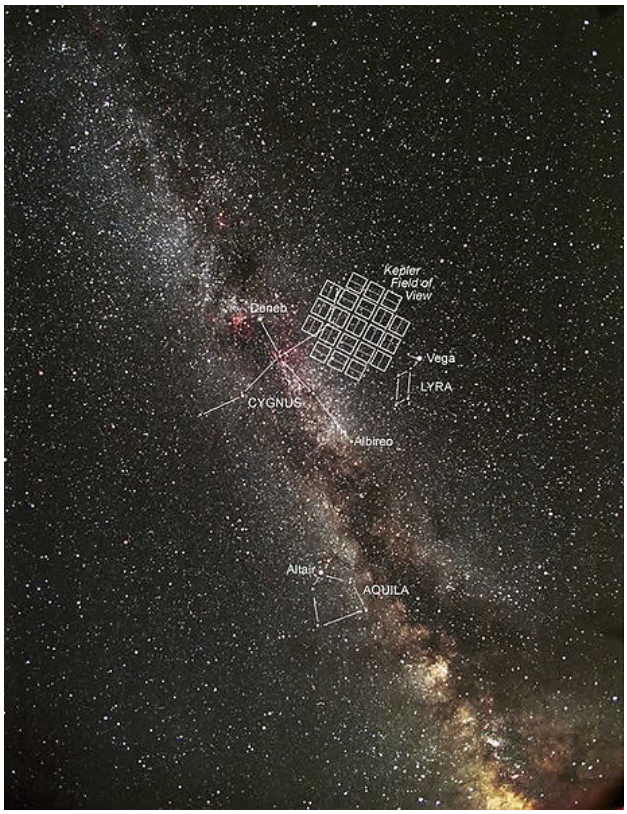
"The discovery of one-cell organisms on a distant planet in our solar system or beyond would have an impact as big as the Copernicus revolution"

By Martin Grasmann. This is the 12th part of an extended summary of a lecture about Astrobiology that Dana Bachmann, SETI Institute/SOFIA-Ames gave on Wednesday, March 26th 2008 at the CMU.

In the last issue we began to search for life far beyond our own solar system and were looking at **extra-solar planets**. We were discussing the various methods scientist are currently using to detect these distant worlds. Just recently NASA launched the **Kepler** Mission which consists of a space telescope designed to discover Earth-like planets orbiting other stars. Kepler will observe over 100,000 over a time period of 3.5 years looking for the tiny variations in their brightness when a planet passes in front of the star. As mentioned in the previous issue most of the extra-solar planets detected are giant planets, mostly the size of Jupiter and bigger, but the photometer Kepler is using is so sensitive that even Earth-like planets should be detectable.

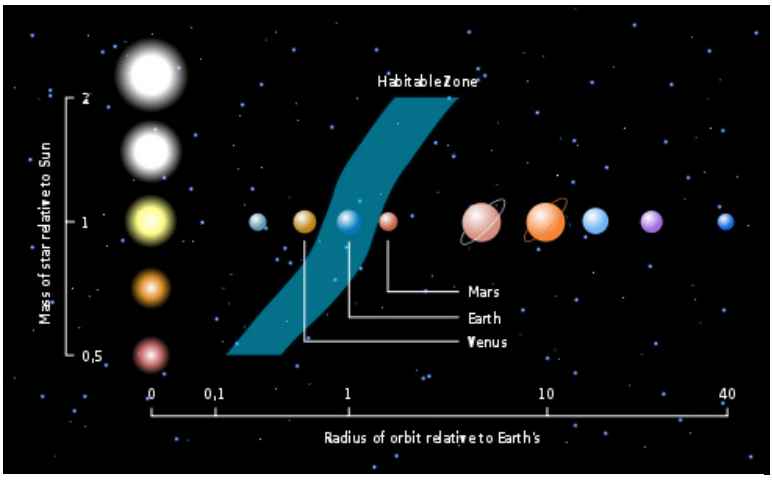
ARE WE ALONE? continued

Over the next few years Kepler will try to answer some very important questions like how many terrestrial and larger planets are in or near the habitable zone of a wide variety of different star types. The habitable zone is defined as a region of a planetary system where stellar conditions are favorable for life as it is found on Earth. The planets and moons in this zone are good candidates to be habitable and thus capable of harboring extraterrestrial life. The habitable zone is spherical shell of space surrounding stars where the surface temperatures of any planets or moons might maintain liquid water. The presence of liquid water is believed to be vital for life because of its role as the solvent needed for biochemical reactions needed to sustain life. The habitable zone is different from star to star and can be calculated from star size and luminosity. For example, a star with 25% the luminosity of the Sun will have a habitable zone centered at about 0.50 AU and a star with twice the Sun's luminosity will have a habitable zone centered at about 1.4 AU. The concept of the habitable zone is not without criticism and the limitation to a small sphere around a star may be too conservative. For example the presumed ocean underneath the ice sheet of the Jupiter moon of Europa would lie outside the habitable zone of the Solar system despite the possibility that it may harbor life. The concept also does not take notion of special circumstances like planets changing orbits (= moving in- or outwards in a solar system). A planet having developed life but then moving outwards and leaving the habitable zone may still be able to sustain life for a long time.



The spec of sky Kepler will be looking for the next few years.

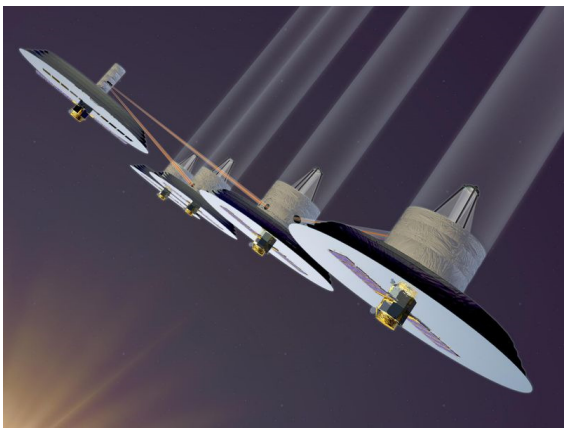
A second question the Kepler mission may answer is the range of sizes and shapes of the orbits of these planets and to give an estimation of how many planets there are in multiple-star systems. Then Kepler will be able to determine the properties of those stars that harbor planetary systems. The advantage of Kepler over the much larger Hubble telescope is that it is designed to observe 100,000 stars simultaneously and measuring tiny variations in their brightness every 30 minutes. Doing this over several years provides a very good chance for seeing a transit. So what would be the probability of detecting an Earth-like planet at 1 AU transiting a sun-like star? About 1 in 215! So if 100% of the stars observed had the exact same diameter as the Sun, and each had one terrestrial planet in an orbit identical to that of the Earth, Kepler would find about 465 of them.



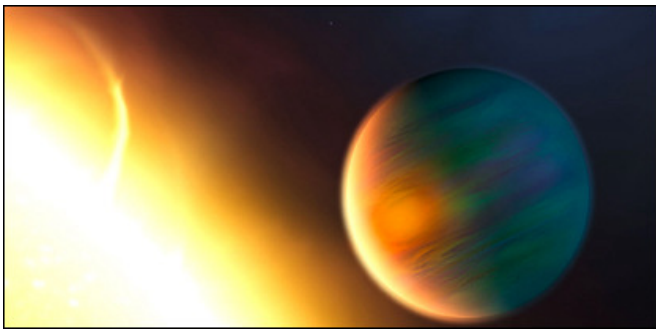
A range of theoretical habitable zones with stars of different mass (our solar system at center).

So, what future space mission will look for terrestrial planets?

Currently two mission are discussed: NASA's **Terrestrial Planet Finder** and ESA's **Darwin** project. The **Terrestrial Planet Finder** (see upper picture on page 3) was based on two different concepts. Concept A is a infrared astronomical interferometer where small telescopes on a fixed structure or on a separated spacecraft floating in precision formation would simulate a much larger, very powerful telescope. Concept B was a visible light coronagraph which consists of a large optical telescope with a mirror ca 3 - 4 times as large and ten times more precise than the Hubble Space telescope. A disk in the light path would occult the light of the observed star reducing it by a factor of one billion making faint planets be observable. The current status of the project is unclear because spending limits passed in 2007 by the U.S. House of Representatives and by the Senate have postponed the program indefinitely.



The **Darwin** mission is very similar to the **Terrestrial Planet Finder.** It is an European Space Agency program designed to directly detect Earth-like planets orbiting nearby stars, and search for evidence of life on these planets with a launch date not be before 2015. The current design incorporates three free-flying space telescopes, each at least 3 meters in diameter, which fly in formation as an astronomical interferometer. The space telescopes will observe in the infrared part of the electromagnetic spectrum because there an Earth-like planet is only outshone by its star by a factor of a million as opposed to visible spectrum where an Earth-like planet is outshone by its star by a factor of a billion. Once a planet is detected, a detailed infrared spectrum would allow to determine the chemistry of its atmosphere. The presence of oxygen and water vapor in the atmosphere could be evidence for life: Oxygen is very reactive gas, and would rapidly consumed by reactions with other chemicals forming oxides (e.g. rust) — so if large amounts of oxygen exist in the atmosphere, it must be continually reproduced, probably, by biological processes, i.e., photosynthesis. Unfortunately the presence of oxygen alone cannot be seen as conclusive evidence for life. It has been shown by simulations that under the proper conditions it is possible to build up an oxygen atmosphere via photolysis of carbon dioxide. The reaction sequence starts with the photolysis of water vapor at high altitude and, not going into too much chemical reaction details, this process together with lightning produced oxygen for the early atmosphere before photosynthesis became dominant. During the high altitude photolysis of water compounds like H and OH radical are generated and which attack very efficiently ozone and prevent its accumulation. Ozone is generated by reaction between an oxygen molecule and an oxygen radical and the only known way to have a significant amount of ozone in the atmosphere is that oxygen be produced at low altitude, e.g. by biological photosynthesis. Consequently, for terrestrial planets, the simultaneous presence of ozone , water and carbon dioxide in the atmosphere appears to be a reliable bio-signature.



The planet is a "hot Jupiter" blasted by starlight

Recently astronomers have been able to detect the spectral signature of water on 'hot Jupiter's', giant planets orbiting very closely their star. The planet, known as HD 209458b and , is located ca 150 light-years from Earth in the constellation Pegasus. Astronomers expect water vapor to be present in atmospheres of most known extra-solar planets, even those that orbit more closely to their parent star than Mercury is to our Sun. For the majority of exo-planets, their close proximity to their parent star would made detecting water and other compounds difficult and for several years the scientist were puzzled because their telescopes did not detect any. "We concluded there was no water a couple of years ago, the theoreticians were upset, they'd predicted it would be there. We didn't understand it. We looked much harder we watched it for over 120 hours, and sure enough there was the signature matching brilliantly with the models," said Dr Grillmair from Spitzer Science Center at the California Institute of Technology, who led the research. "With planets this close to their star…. you're going to get enormous heat loads that create storms, perhaps clouds one year and none the next - this thing is changing right before our eyes". It is suggested that high clouds created by the storms may have hidden the water vapor in the earlier observations and they are confident that the latest findings are correct. The identification of water takes advantage of the fact that HD209458b, as seen from Earth, passes directly in front of its star every 3.5 days. Every time the planet passes in front of its star its atmosphere blocks a different amount of starlight at different wavelengths. In particular, absorption by water in the atmosphere of a giant planet makes the planet appear larger across a specific part of the infrared spectrum compared with wavelengths in the visible spectrum.

On another ‚hot Jupiter' methane, the most basic carbon-hydrogen molecule alongside water has been detected in the Jupiter-sized planet known as HD 189733b orbiting a star some 63 light years away in Vulpecula. It orbits extremely close to its parent star - more than 30 times closer to its star than the Earth is to the Sun. As such, temperatures range from a scorching 1,200 Kelvin (930C) on the dayside of the planet, to a relatively balmy 700 Kelvin (427C) on the nightside. As the scientists state "The methane here, although we can call it an organic constituent, is not produced by life - it is way too hot there for life."

The next part we will look at the history of the search for intelligent life starting with Ozma a pioneering SETI experiment started in 1960 by Cornell University astronomer Frank Drake and leading to modern day efforts and theories about the possibility of other intelligent life besides ourselves. Interested? Then watch this space! The next parts of this gripping story of 'Are We Alone?' will follow in the next issues of the Sunset *Gazette*!

Martin Grasmann
Secretary - SAS
6108 Summerset Drive
Midland, MI 48640

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

http://sunsetastronomicalsociety.com

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

SAS Meeting

April 3, 2009

Delta College Planetarium Theater

7:00 Welcome, new members

7:10 Bill Albe

"Astronomical Tutorial":

"The Drake Equation -

Calculating the Possibility of Intelligent Life Elsewhere in Our Galaxy"

Bill Albe will explain the origin and basis for the 'Drake Equation' - the simple method of calculating the possibility of life elsewhere in our galaxy and what we have found out since it was originally published in 1960. Bill will also share his memorable meeting with Dr. Frank Drake and request insights from the audience of the possibility of life elsewhere in our galaxy including UFOs visiting us on Earth.

Break: Refreshments served

8:00 Planetarium:

GREAT LAKES NIGHT SKY

9:00 Don't forget it's the first Friday of the month, so weather permitting it's Public Observing at the Planetarium

UPCOMING EVENTS

April 2: First quarter Moon.

April 6: The moon is 5 to 7° to the right from Saturn around dusk.

April 9: Full Moon.

April 11 - 26: Last good opportunity to see the zodiacal light in the western evening sky 80 - 120 min after sunset. (Seek dark location!)

April 16 - 24: Dusk: Mercury at 0 mag or brighter and 10° above western horizon half hour after sunset.

April 17: Last quarter Moon

April 19: Crescent Moon ca 1 to 3° upper right of Jupiter.

April 22: Lyrid meteor shower peaks with best views ca 1 - 4 am.

April 24: New Moon.

April 26: Telescope needed: The 5th mag star 44 Capricorni can be seen directly between Jupiter and Ganymede.

April 28: Mercury less than 2° from the center of the Pleiades. Binoculars needed!

UPCOMING MEETINGS

Supporting the International Year of Astronomy 2009:

First Friday of each month: Public Observing at the Planetarium

April 3: Astronomical Tutorial: **The Drake Equation**

GREAT LAKES NIGHT SKY

April 18: ***Star Party at Tawas***

April 24: ***Messier Marathon with the AU***

May 8: "The Lunar Landings" Dick Van Effen

SAS Elections

May 1 - 31: Possible Star Party at the 30" Observatory of Garry Beckstrom. Weather permitting on short notice.

If you are interested in presenting to our club, please contact

Bill Albe: (989) 835-4142