Star Gazer News

Newsletter of the Delmarva Stargazers

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NASA FINDS EARTH-SIZE PLANET CANDIDATES IN HABITABLE ZONE, SIX PLANET SYSTEM

From Michael Mewhinney/Rachel Hoover Feb. 2, 2011, Ames Res. Center, Moffett Field, Ca.
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MOFFETT FIELD, Calif. -- NASA's Kepler mission has discovered its first Earth-size planet candidates and its first candidates in the habitable zone, a region where liquid water could exist on a planet's surface. Five of the potential planets are near Earth-size and orbit in the habitable zone of smaller, cooler stars than our sun.

Candidates require follow-up observations to verify they are actual planets. Kepler also found six confirmed planets orbiting a sun-like star, Kepler-11. This is the largest group of transiting planets orbiting a single star yet discovered outside our solar system.

"In one generation we have gone from extraterrestrial planets being a mainstay of science fiction, to the present, where Kepler has helped turn science fiction into today's reality," said NASA Administrator Charles Bolden. "These discoveries underscore the importance of NASA's science missions, which consistently increase understanding of our place in the cosmos."

The discoveries are part of several hundred new planet candidates identified in new Kepler mission science data, released on Tuesday, Feb. 1. The findings increase the number of planet candidates identified by Kepler to-date to 1,235. Of these, 68 are approximately Earth-size; 288 are super-Earth-size; 662 are Neptune-size; 165 are the size of Jupiter and 19 are larger than Jupiter. Of the 54 new planet candidates found in the habitable zone, five are near Earth-sized. The remaining 49 habitable zone candidates range from super-Earth size -- up to twice the size of Earth -- to larger than Jupiter.

The findings are based on the results of observations conducted May 12 to Sept. 17, 2009, of more than 156,000 stars in Kepler's field of view, which covers approximately 1/400 of the sky.

"The fact that we've found so many planet candidates in such a tiny fraction of the sky suggests there are countless planets orbiting sun-like stars in our galaxy," said William Borucki of NASA's Ames Research Center in Moffett Field, Calif., the mission's science principal investigator. "We went from zero to 68 Earth-sized planet candidates and zero to 54 candidates in the habitable zone, some of which could have moons with liquid water."

Among the stars with planetary candidates, 170 show evidence of multiple planetary candidates. Kepler-11, located approximately 2,000 light years from Earth, is the most tightly packed planetary system yet discovered. All six of its confirmed planets have orbits smaller than Venus, and five of the six have orbits smaller than Mercury's. The only other star with more than one confirmed transiting planet is Kepler-9, which has three. The Kepler-11 findings will be published in the Feb. 3 issue of the journal Nature.

"Kepler-11 is a remarkable system whose architecture and dynamics provide clues about its formation," said Jack Lissauer, a planetary scientist and Kepler science team member at Ames. "These six planets are mixtures of rock and gases, possibly including water. The rocky material accounts for most of the planets' mass, while the gas takes up most of their volume. By measuring the sizes and masses of the five inner planets, we de-

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Upcoming Events:

Meeting !	**Mar 1st**	**7 PM**	**Mallard Lodge**
Observing !	**Mar 4th**	**Dusk**	**Blackbird & Eq. Cntr**
Mirror Making	**Mar 11th to 13th**		**Mallard Lodge**

It's Messier Marathon Time !

March presents a opportunity for you brave gazers to spend just one night, and see all of the Messier Objects. This is a dusk to dawn event, an undertaking best perform by a group.

For those who may not manage an all-nighter, just try to see how many you can observe before you crash for the night.

Below is what our Canadian Delagate wrote about his attempt in 2001, I hope it encourages you to brave the March darkness.

2001 Messier Marathon from Maryland

Paul Gray, RASC Halifax Centre

Again this year we had new moon during the last week of March, which means Messier Marathon time! I first tried a marathon close to 10 years ago in Digby with 4 members of the Halifax centre. Since then I made three more attempts with Dave Lane only to be clouded out on all tries. With my move to Maryland three years ago now I finally had a chance to attempt the marathon from a location farther south and a little warmer both of which will make it easier.

The best weekend this year was the 23rd to 25th of March and the weather did not look good. Friday came and it was clear with the forecast for Saturday being cloudy with showers. Luckily Friday afternoon we had some warm weather and fair weather clouds brought afternoon showers and then began to disappear. By 6pm it was mostly clear and getting better with only a few clouds left in the west and south. The night was not the best I had seen with the MVM at 5.8 but it was warm. There was frost by morning but only on the scope and none on the car thanks to the –2C temp and light breeze now and then.

I arrived at our observing site at 6:30pm to find the only cloud left blocking my view of M74 and M77. With an hour to go before I had to observe these objects was there a chance the cloud would move for me? Tuckahoe State Park, where we observe, is located on the Eastern Shore of Maryland. At 39 degrees north and 76 degrees west it is an hour and half from Washington DC but gets very dark due to the Chesapeake Bay acting like a buffer of area that cannot be polluted by light.

Nautical twilight would end at 7:21pm so observing began at 7:15. I was out 5 days earlier to practice the evening objects and it paid off. I saw M77 at 7:17 and then located the field for M74 and saw it at 7:40 when it was still over 8 degrees high. The race had begun and I was of to a good start. The evening objects were seen as in the chart.

Object	Time	Altitude
M77	7:17	16° 5'
M74	7:40	8° 51'
M31,32,110	7:44	14° 49'
M33	7:47	16° 49'

The rest of the evening objects easily were observed. All were seen with my 12.5" F5 dobsonion except for M45,36,37,38 which were done with Binos. The Virgo cluster was easy and I only got lost on the way to M49, the last one of the cluster. I was finished the Virgo cluster and spring galaxies by 10:16. The only object not found was M83, which had not risen yet. That would have to wait till later.

I then used this time to go on and find more of the finest NGC's as well as some of the Herschel 400 objects. By 11:30 it was time to get M83, then take a break. During this time I did visit with Don Surles who is the Delmarva Stargazers club president and his 25" F5 Obsession. We spent a good time looking at the Eskimo Nebulae (NGC 2392) with a 9mm Nagler and OIII filter. WOW! At 352x on a 25-inch telescope the view was amazing! More detail in both the outer shell and inner shell than I have ever seen!

My observing partner who confirmed my observations, Doug Norton and I then left our gear set up with the dozen other club members and we drove 15 miles to the nearest truck stop. We had some food, got warm and rested our eyes. An hour later we were back at the site ready to keep going. The rest does amazing things!

Before going on with the marathon it was time to swing the scope low in the south and look at NGC 5128 and Omega Centauri. Wow that is huge! It was my first time observing it and even though only a few degrees high it was still amazing! After a good look it was back to the hunt. Many say that you can break till 2 or so but I felt that if you go out and get ahead and stay ahead and that would give you more time for those hard objects in

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the morning. Well it paid off.

I began at 1:29 with M5 and hunted everything low on the horizon as it rose so that by 3:07am all that was left was the 10 hard morning objects!

Again a short break with drink and food that I brought refreshed me for the morning dash to the line. At 3:30 I began hunting M69,70,54 in the bottom of the teapot. Many will know how tough these can be and with the use of a club member's 25" F5 obsession I was able to see these easily. These were the only other objects that I did not use my 12.5" telescope to find. M15 was then easy at 3:50.

At 4:00am I started the search for M72 and 73. Both were seen at 4:09 and 4:12. M55 was then searched for and finally was seen at 4:21am and then a quick hop to M75 at 4:26. This was out of order but due to trees it was best to be done this way. Quickly starting to run out of time now as astronomical twilight began at 4:30 so quickly I jumped over and hopped in to find M2 and with that I had 109!

So at 4:30am I started the star hop to find M30. I felt before beginning that this was hopeless. As the morning dark gave to light I watched the star patterns of my star hop rise out of the trees and by 4:45 I was still a couple degrees from M30. It would not be on the horizon till 4:58am and nautical twilight started at 5:02! At 5:10 am when I could not see stars under 6th magnitude and was still 1 degree from M30 I gave up.

So, after 9 hours and 45 minutes of searching, napping and eating to stay awake I had bagged 109 of the 110 Messier's. I was asked if I would do this again? If I am at a location farther south where M30 is possible and all 110 can be seen I may try it again. But from here or farther north not likely now that I have done 109. It is a long night and you don't get much time to enjoy looking at objects. I prefer the relaxed pace of a slow observing session where you can take in all the views and study the objects.

(Editor's note: If you would like pdf files of the Messier objects with Telrad marks, follow this link:) http://astro-tom.com/messier/messier_finder_charts/messiercharts.zip

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termined they are among the lowest mass confirmed planets beyond our solar system."

All of the planets orbiting Kepler-11 are larger than Earth, with the largest ones being comparable in size to Uranus and Neptune. The innermost planet, Kepler-11b, is ten times closer to its star than Earth is to the sun. Moving outward, the other planets are Kepler-11c, Kepler-11d, Kepler-11e, Kepler-11f, and the outermost planet, Kepler-11g, which is half as far from its star as Earth is from the sun.

The planets Kepler-11d, Kepler-11e and Kepler-11f have a significant amount of light gas, which indicates that they formed within a few million years of the system's formation.

"The historic milestones Kepler makes with each new discovery will determine the course of every exoplanet mission to follow," said Douglas Hudgins, Kepler program scientist at NASA Headquarters in Washington.

Kepler, a space telescope, looks for planet signatures by measuring tiny decreases in the brightness of stars caused by planets crossing in front of them. This is known as a transit.

Since transits of planets in the habitable zone of sun-like stars occur about once a year and require three transits for verification, it is expected to take three years to locate and verify Earth-size planets orbiting sun-like stars.

The Kepler science team uses ground-based telescopes and the Spitzer Space Telescope to review observations on planetary candidates and other objects of interest the spacecraft finds. The star field that Kepler observes in the constellations Cygnus and Lyra can only be seen from ground-based observatories in spring through early fall. The data from these other observations help determine which candidates can be validated as planets.

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Thank Goodness the Sun is Single

By Trudy E. Bell

It's a good thing the Sun is single. According to new research, Sun-like stars in close double-star systems "can be okay for a few billion years—but then they go bad," says Jeremy Drake of the Harvard-Smithsonian Astrophysical Observatory in Cambridge, Mass.

How bad? According to data from NASA's Spitzer Space Telescope, close binary stars can destroy their planets along with any life. Drake and four colleagues reported the results in the September 10, 2010, issue of *The Astrophysical Journal Letters.*

Our Sun, about 864,000 miles across, rotates on its axis once in 24.5 days. "Three billion years ago, roughly when bacteria evolved on Earth, the Sun rotated in only 5 days," explains Drake. Its rotation rate has been gradually slowing because the solar wind gets tangled up in the solar magnetic field, and acts as a brake.

But some sun-like stars occur in close pairs only a few million miles apart. That's only about five times the diameter of each star—so close the stars are gravitationally distorted. They are actually elongated toward each other. They also interact tidally, keeping just one face toward the other, as the Moon does toward Earth.

Such a close binary is "a built-in time bomb," Drake declares. The continuous loss of mass from the two stars via solar wind carries away some of the double-star system's angular momentum, causing the two stars to spiral inward toward each other, orbiting faster and faster as the distance shrinks. When each star's rotation period on its axis is the same as its orbital period around the other, the pair effectively rotates as a single body in just 3 or 4 days.

Then, watch out! Such fast spinning intensifies the magnetic dynamo inside each star. The stars "generate bigger, stronger 'star spots' 5 to 10 percent the size of the star—so big they can be detected from Earth," Drake says. "The stars also interact magnetically very violently, shooting out monster flares."

Worst of all, the decreasing distance between the two stars "changes the gravitational resonances of the planetary system," Drake continued, destabilizing the orbits of any planets circling the pair. Planets may so strongly perturbed they are sent into collision paths. As they repeatedly slam into each other, they shatter into red-hot asteroid-sized bodies, killing any life. In as short as a century, the repeated collisions pulverize the planets into a ring of warm dust.

The infrared glow from this pulverized debris is what Spitzer has seen in some self-destructing star systems. Drake and his colleagues now want to examine a much bigger sample of binaries to see just how bad double star systems really are.

They're already sure of one thing: "We're glad the Sun is single!"

Read more about these findings at the NASA Spitzer site at www.spitzer.caltech.edu/news/1182-ssc2010-07-Pulverized-Planet-Dust-May-Lie-Around-Double-Stars . For kids, the Spitzer Concentration game shows a big collection of memorable (if you're good at the game) images from the Spitzer Space Telescope. Visit spaceplace.nasa.gov/en/kids/spitzer/concentration/.

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

Planetary collisions such as shown in this artist's rendering could be quite common in binary star systems where the stars are very close.

The Banners of the Sun
An Excerpt from
Curiosities of the Sky
by Garrett Serviss 1909

As all the world knows, the sun, a blinding globe pouring forth an inconceivable quantity of light and heat, whose daily passage through the sky is caused by the earth's rotation on its axis, constitutes the most important phenomenon of terrestial existence. Viewed with a dark glass to take off the glare, or with a telescope, its rim is seen to be a sharp and smooth circle, and nothing but dark sky is visible around it. Except for the interference of the moon, we should probably never have known that there is any more of the sun than our eyes ordinarily see.

But when an eclipse of the sun occurs, caused by the interposition of the opaque globe of the moon, we see its immediate surroundings, which in some respects are more wonderful than the glowing central orb. These surroundings, although not in the sense in which we apply the term to the gaseous envelope of the earth, may be called the sun's atmosphere. They consist of two very different parts -- first, the red ``prominences,'' which resemble tongues of flame ascending thousands of miles above the sun's surface; and, second, the ``corona,'' which extends to distances of millions of miles from the sun, and shines with a soft, glowing light. The two combined, when well seen, make a spectacle without parallel among the marvels of the sky.

Although many attempts have been made to render the corona visible when there is no eclipse, all have failed, and it is to the moon alone that we owe its revelation. To cover the sun's disk with a circular screen will not answer the purpose because of the illumination of the air all about the observer. When the moon hides the sun, on the other hand, the sunlight is withdrawn from a great cylinder of air extending to the top of the atmosphere and spreading many miles around the observer. There is then no glare to interfere with the spectacle, and the corona appears in all its surprising beauty. The prominences, however, although they were discovered during an eclipse, can now, with the aid of the spectroscope, be seen at any time. But the prominences are rarely large enough to be noticed by the naked eye, while the streamers of the corona, stretching far away in space, like ghostly banners blown out from the black circle of the obscuring moon, attract every eye, and to this weird apparition much of the fear inspired by eclipses has been due. But if the corona has been a cause of terror in the past it has become a source of growing knowledge in our time.

The story of the first scientific observation of the corona and the prominences is thrillingly interesting, and in fact dramatic. The observation was made during the eclipse of 1842, which fortunately was visible all over Central and Southern Europe so that scores of astronomers saw it. The interest centers in what happened at Pavia in Northern Italy, where

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the English astronomer **Francis Baily** had set up his telescope. The eclipse had begun and Bailey was busy at his telescope when, to quote his own words in the account which he wrote for the *Memoirs of the Royal Astronomical Society:*

"I was astounded by a tremendous burst of applause from the streets below, and at the same moment was electrified by the sight of one of the most brilliant and splendid phenomena that can well be imagined; for at that instant the dark body of the moon was suddenly surrounded with a corona, or kind of bright glory, similar in shape and magnitude to that which painters draw round the heads of saints...

Pavia contains many thousand inhabitants, the major part of whom were at this early hour walking about the streets and squares or looking out of windows in order to witness this long-talked-of phenomenon; and when the total obscuration took place, which was *instantaneous,* there was a universal shout from every observer which ``made the welkin ring,'' and for the moment withdrew my attention from the object with which I was immediately occupied. I had, indeed, expected the appearance of a luminous circle round the moon during the time of total obscurity; but I did not expect, from any of the accounts of preceding eclipses that I had read, to witness so magnificent an exhibition as that which took place...

Splendid and astonishing, however, as this remarkable phenomenon really was, and although it could not fail to call forth the admiration and applause of every beholder, yet I must confess that there was at the same time something in its singular and wonderful appearance that was appalling...

But the most remarkable circumstance attending the phenomenon was the appearance of *three large protuberances* apparently emanating from the circumference of the moon, but evidently forming a portion of the corona. They had the appearance of mountains of a prodigious elevation; their color was red tinged with lilac or purple; perhaps the color of the peach-blossom would more nearly represent it. They somewhat resembled the tops of the snowy Alpine mountains when colored by the rising or the setting sun. They resembled the Alpine mountains in another respect, inasmuch as their light was perfectly steady, and had none of that flickering or sparkling motion so visible in other parts of the corona...

The whole of these protuberances were visible even to the last moment of total obscuration, and when the first ray of light was admitted from the sun they vanished, with the corona, altogether, and daylight was instantly restored."

Baily's Beads

2011 EVENTS

Courtesy Barlow Bob and Friends

http://www.arunah.org/barlowbob_calendar_2011.pdf

Mar 30 – Apr 2	Atlanta, GA	http://www.atlantaastronomy.org/Zombie/
Apr 1 - 3	Stokes State Forest, NJ	http://www.teeterstelescopes.com/stokes/
Apr 14 - 15	Northeast Astronomical Imaging Conference, Suffern, NY	http://www.rocklandastronomy.com/NEAIC/
Apr 16 - 17	NEAF Solar Star Party, Suffern, NY	http://www.rocklandastronomy.com/neaf.htm
Apr 28 – May 1	Tuckahoe State Park, MD	http://www.delmarvastargazers.org
Apr 28 – May 1	Belleplain State Forest, NJ	http://www.sjac.us/starparty.html
May 26 - 29	Cherry Springs Park, PA	http://www.astrohbg.org/CSSP/Information.html
June-11	Wesleyan University, CT	http://www.asgh.org/starconn/index.htm
Jul 27 - 31	Shreveport Airport / Footlight Ranch York County, Pa	http://www.masondixonstarparty.org/
Jul 28 - 31	Springfield, VT	http://www.stellafane.com
Jun 29 – Jul 2	Bryce Canyon National Park, UT	http://www.astroleague.org/index.php
Jul 29 - 31	Roxbury, NY	http://www.aosny.org/Conventions_StarParties.htm
Jun 29 - Jul 2	Green Bank, WV	http://www.greenbankstarquest.org/
Jul 29 - Aug 7	Savoy, MA	http://www.rocklandastronomy.com/SSP/index.html
Aug 26 - 27	Northfield, MA	http://www.philharrington.net/astroconjunction/
Aug 26 - 28	Cherry Springs State Park, PA	http://www.bfsp.org/starparty/index.cfm
Aug 26 - 30	Spruce Knob, WV	http://www.ahsp.org
Sep 2 - 5	Cummington, MA	http://www.arunah.org/calendar.htm
Sep 23 - 25	Ashford, CT	http://www.asnh.org/
Sep 25 – Oct 2	Deerlick Astronomy Villiage, Sharon, GA	http://www.atlantaastronomy.org/PSSG/
Sep 29 – Oct 2	Tuckahoe State Park, MD	http://www.delmarvastargazers.org
Sep 29 - Oct 2	Mansfield, OH	http://www.wro.org/hiddenhollowinfo.html
Oct 24 - 30	Robbins, NC	http://www.masp.us/
Oct 24 - 30	Chiefland Astro Village, FL	http://chieflandstarpartygroup.com/fall.html

Astrophotos

by Members and Friends

Here's a picture of the Flaming Star Nebula that I just finished processing. It's a LRGB image with some Ha data blended into the Luminance layer that helps show up the red channel. Red in a nebula is caused by the excitation of the surrounding hydrogen gas by the energy from a nearby star and is called an emission nebula. Fluorescent light bulbs work the same way. The blue is caused by the reflection of light against dust from a nearby star and is thus called a reflection nebula.

Joe Morris

Delmarva Stargazers Hosts
Eleventh Annual Mid-Atlantic Mirror Making Seminar

Delmarva Star Gazers will host the 11th Mid-Atlantic Mirror Making Seminar Friday March 11 through Sunday March 13, 2011, at Mallard Lodge, Smyrna, DE. Mirror makers and other attendees should check into the Lodge before 11:00 AM Friday. Activities begin at Noon, March 11, 2011.

The purpose of the Seminar is to introduce proven successful mirror making techniques and practices to those wishing to make their own mirrors. Special emphasis will be placed on successfully figuring the mirror.

Members who would like to help with this event are welcome.

How to Join the Delmarva Stargazers: Anyone with an interest in any aspect of astronomy is welcome
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