EPHEMERIS

January 2011

SJAA Activities Calendar

Jim Van Nuland

January

1 Dark-Sky weekend. Sunset 5:01 p.m, 5% moon rises 5:59 a.m.

8 Dark-Sky weekend. Sunset 5:07 p.m, 21% moon sets 9:38 p.m. Henry Coe Park's "Astronomy" lot has been reserved.

14 Houge Park star party. Sunset 5:13 p.m, 75% moon sets 3:28 a.m. Star party hours: 7:00 until 10:00 p.m.

15 General Meeting. Our speaker is TBD. Board meeting at 6:30; General Meeting at 8:00

28 Astronomy Class at Houge Park. 7:00 p.m. The topic: TBA.

28 Houge Park star party. Sunset 5:22 p.m, 23% moon rises 3:53 a.m. Star party hours: 7:00 until 10:00 p.m.

29 Dark-Sky weekend. Sunset 5:29 p.m, 15% moon rises 4:46 a.m.

February

5 Dark-Sky weekend. Sunset 5:37 p.m, 8% moon sets 8:25 p.m. Henry Coe Park's "Astronomy" lot has been reserved.

11 Houge Park star party. Sunset 5:43 p.m, 59% moon sets 2:12 a.m. Star party hours: 7:00 until 10:00 p.m.

19 General Meeting. Our speaker is TBD. Board meeting at 6:30; General Meeting at 8:00.

25 Astronomy Class at Houge Park. 7:00 p.m. The topic: TBA.

25 Houge Park star party. Sunset 5:58 p.m, 38% moon rises 2:42 a.m. Star party hours: 7:00 until 10:00 p.m.

26 Dark-Sky weekend. Sunset 5:59 p.m, 28% moon rises 3:30 a.m.

The Board of Directors meets before each general meeting at 6:30 p.m. All are welcome to attend.

24 hour news and information hotline:
(408) 559-1221
http://www.sjaa.net

The Way Science Progresses

Paul Kohlmiller

There has been a flurry of astronomical activity of late. It is interesting to look at how science reacts to some of the news. It illustrates how science works.

During the summer, there was an announcement of near-Earth sized objects within the habitable zone of Gliese 581. A few weeks later another group looking at the data said they couldn't back up the first announcement. So, is the planet there or isn't it? Most likely, it won't be clear until more information is captured and that may take several years.

But this is how science works. Some scientist or groups declares a finding. Then someone else tries the same thing. Sometimes the second group cannot reproduce the results. This is what happened with cold fusion. In that case the first announcement was badly bungled. In the case of Gliese 581, more data will be collected and it might require new or improved techniques.

Consider an earlier example. Edward Hubble noticed higher red shift for galaxies that were far away. He produced a plot that showed a nearly perfect correlation. Decades later it was shown that the data couldn't have been that perfect. Either deliberately or by error, Hubble fudged the data to help make

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The Way Science Progresses
Continued from page 1

his case. Still, Hubble was right. In this case, the additional data supported the original contention.

Going back even further in history, think about stellar parallax. The ancients knew enough about geometry to understand that it should be possible to tell which stars were closer and which ones were far away. If two measurements are made from distant locations, the nearer stars should appear to be in a different location relative to more distance stars. This is the same effect that you notice if you put your hand a few inches ahead of your nose and close one eye and then the other. This works because the baseline, the space between your eyes, is relatively large compared to the distance to your hand. If you try the same eye-winking exercise for an object 100 feet away, you won't see much of a difference. So when the ancients and even Renaissance scientists did not detect any stellar parallax, it was logical to assume that all stars must be the same distance away. But that didn't seem right either so people kept trying. Eventually Bessel was able to measure the parallax of the star 61 Cygni. Other people were able to reproduce those results and astronomy distance measurements became all the rage. Parallax measurements were used to calibrate other distance techniques such as Cepheid variables.

It was the distance measurements that solved another astronomical controversy. Scientists did not know what to make of the "spiral nebulae" such as Andromeda. One well-respected astronomer, Shapley, said that these nebulae must be within the Milky Way Galaxy. Otherwise, the distance to Andromeda would have to be absurd and the novae seen in these nebulae would have to be absurdly bright. Curtis, working at Lick Observatory, had less trouble believing that these distances were real. Once again, more data came in and eventually supported Curtis.

Another example of how science works occurred late in 2010. NASA announced that some bacteria not only tolerate arsenic but actually make it part of their metabolism. The science is roughly like this: 6 elements from the periodic table appear to be essential for any life form: hydrogen, carbon, nitrogen, oxygen, sulfur and phosphorous. Seth Shostak of SETI Institute is often asked about the use of silicon instead of carbon. The reasoning for why this might work is that silicon is located just under carbon in the periodic table. But the closest thing to evidence that this might work is an episode from the original Star Trek series when they encountered a species called the Horta. As Shostak says, if ever there was a place where life had ample opportunity to replace carbon with silicon, it is on Earth. That's why it was a shock when NASA said the bacteria in Mono Lake is replacing phosphorous with the element located directly below it in the periodic table, arsenic. This is all the more amazing when you consider how poisonous arsenic is. But, almost as quickly as NASA made this announcement, others claimed that NASA is wrong. Could NASA be wrong? In science, no one gets to claim infallibility. NASA has made some mistakes before such as the Challenger and Columbia tragedies. NASA also has been known to make use of dowsers and other non-science methods. In the matter of bacteria using arsenic, some non-NASA scientists will have to reproduce their results and others will debate if the results justify the conclusions.

"As Shostak says, if ever there was a place where life had ample opportunity to replace carbon with silicon, it is on Earth."

The Shallow Sky

Return of the Band

Akkana Peck

Welcome to 2011! Jupiter is still high in the sky at sunset as the new year begins, and it's visible until around midnight. As always, there's plenty to see — bands, spots, festoons, moons and their shadows.

And, of course, belts! It looks like Jupiter's South Equatorial Band, which went missing earlier this year while Jupiter was behind the sun, is starting to come back. Reports have it appearing as a faint pink band — nothing like its usual darkness, but much darker than it was a few months ago. It should be interesting to watch the band continue to darken, as it presumably will, over the next few months as Jupiter closes with the sun.

Uranus and Neptune are also up in the evening sky, though not as high as one might like: Uranus sets around 10pm, while Neptune, a tougher catch anyway, is gone before 8pm.

That's most of the planetary action for January evenings. Saturn rises a little before midnight, and the rest of the planets are only visible in the morning sky.

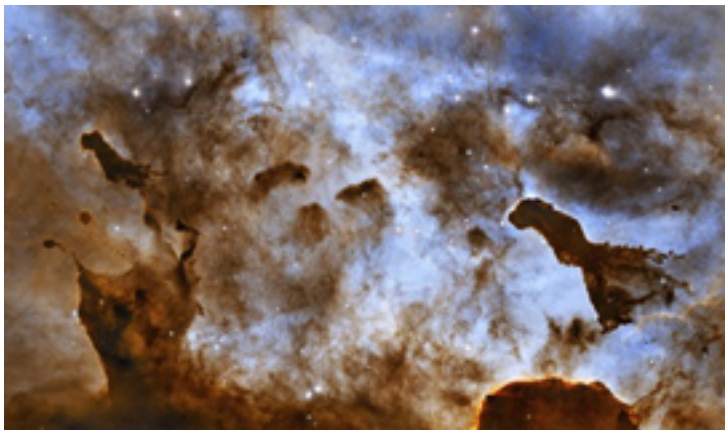
In Mars Rover news, NASA continues the effort to re-contact Spirit, who has been out of communication since last March. No word from the rover yet, but the rover drivers haven't completely given up hope — it's spring there and still warming up, so stay tuned.

Meanwhile, the other rover, Opportunity, is up to 16 miles (26 kilometers) of total travel and still going strong, heading toward a 262-foot crater called Santa Maria. So the roving hasn't stopped just because Spirit is stuck; her sister continues the Mars exploration.

Hubble 2010

Caroline Hirsch, posting for the New Yorker's website (http://www.newyorker.com/online/blogs/photobooth/2010/12/nasa.html), showed some of the best images released by NASA and Space Telescope Science Institute (STScI). Here is a subset of her favorites. Follow the link above to get more detailed captions.

Counterclockwise from left - The Carina Nebula sports a tower of gas and dust that is 3 light years long. Large, newly formed stars are blowing the dust away but even newer stars are being formed inside the plumes. *Credit: NASA, ESA, and M. Livio and the Hubble 20th Anniversary Team (STScI).* The Antennae galaxies are shown in a composite using the Chandra X-Ray observatory, Hubble and the Spitzer infrared telescope.*Credit: NASA, ESA, SAO, CXC, JPL-Caltech, and STScI. Acknowledgment: J. DePasquale (Harvard-Smithsonian CfA), and B. Whitmore (STScI).* This is another view of the Carina Nebula located about 7500 light years away. This time the picture was made from images taken in hydrogen light in 2005 and in oxygen light taken in 2010. *Credit: NASA, ESA, and the Hubble Heritage Project (STScI/AURA). Acknowledgment: M. Livio (STScI) and N. Smith (University of California, Berkeley).* The galaxy NGC 3982 is about one-third the size of the Milky Way galaxy. *Credit: NASA, ESA, and the Hubble Heritage Team (STScI/AURA). Acknowledgment: A. Riess (STScI).*



Blue Rings around Red Galaxies

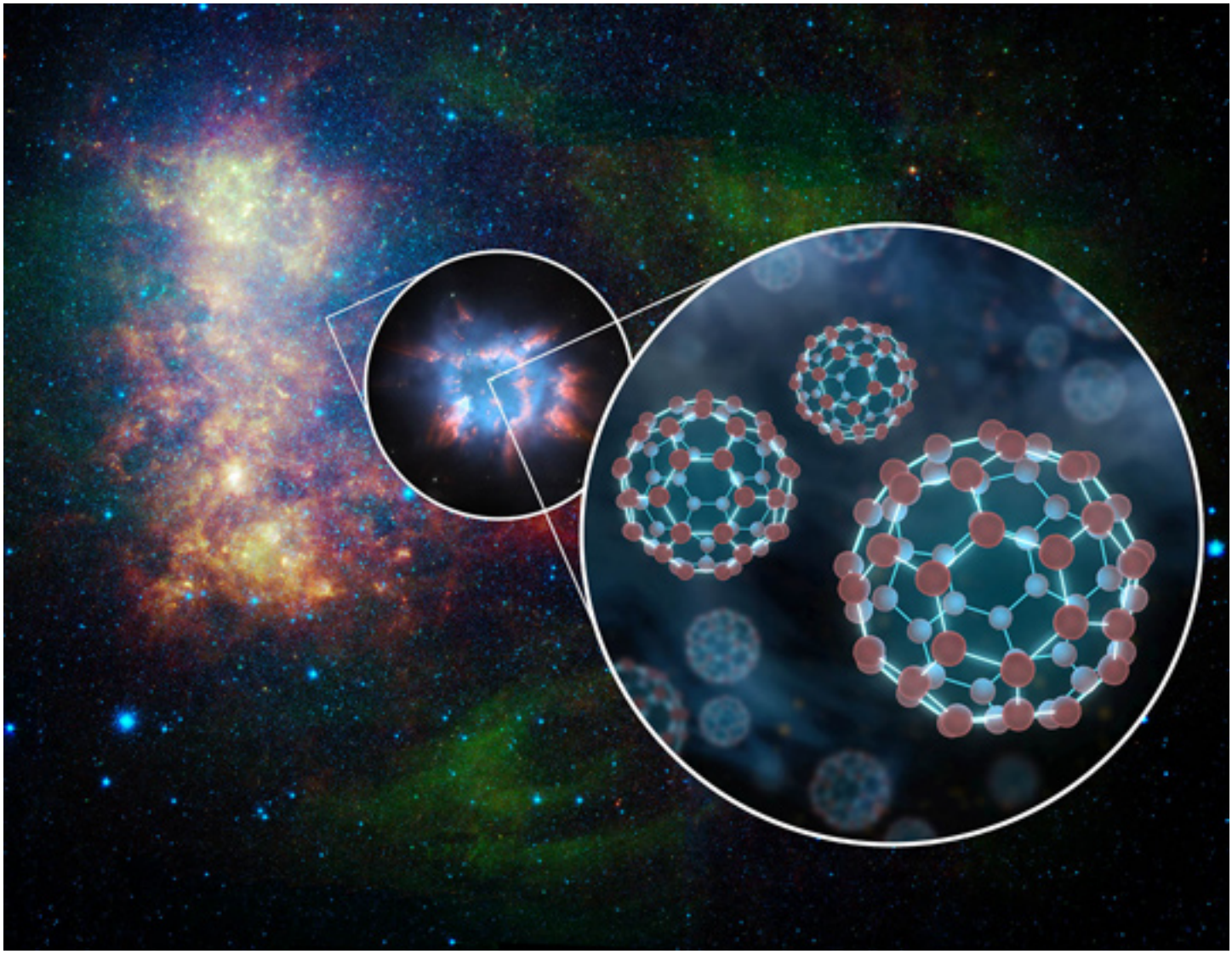
Trudy E. Bell and Dr. Tony Phillips

Deep in interstellar space, in the swirling gaseous envelope of a planetary nebula, hosts of carbon atoms have joined together to form large three-dimensional molecules of a special type previously seen only on Earth.

Astronomers discovered them almost accidentally using NASA's Spitzer Space Telescope.

"They are the largest molecules known in space," declared Jan Cami of the University of Western Ontario, lead author of a paper with three colleagues published in Science online on July 22, 2010, and in print on September 3.

Not only are the molecules big: they are



Superimposed on a Spitzer infrared photo of the Small Magellanic Cloud is an artist's illustration depicting a magnified view of a planetary nebula and an even further magnified view of buckyballs, which consist of 60 carbon atoms arranged like soccer balls.

of a special class of carbon molecules known as "fullerenes" because their structure resembles the geodesic domes popularized by architect Buckminster Fuller. Spitzer found evidence of two types of fullerenes. The smaller type, nicknamed the "buckyball," is chemical formula C60, made of 60 carbon atoms joined in a series of hexagons and pentagons to form a spherical closed cage exactly like a black-and-white soccer ball. Spitzer also found a larger fullerene, chemical formula C70, consisting of 70 carbon atoms in an elongated closed cage more resembling an oval rugby ball.

Neither type of fullerene is rigid; instead, their carbon atoms vibrate in and out, rather like the surface of a large soap bubble changes shape as it floats through the air. "Those vibrations correspond to wavelengths of infrared light emitted or absorbed—and that infrared emission is what Spitzer recorded," Cami explained.

Although fullerenes have been sought in space for the last 25 years, ever since they were first identified in the laboratory, the astronomers practically stumbled into the discovery. Co-author Jeronimo Bernard-Salas of Cornell University, an expert in gas and dust in planetary nebulae, was doing routine research with Spitzer's infrared observations of planetary nebulae with its spectroscopy instrument. When he studied the spectrum (infrared signature) of a dim planetary nebula called Tc 1 in the southern-hemisphere constellation of Ara, he noticed several clear peaks he had not seen before in the spectra of other planetary nebulae.

"When he came to me," recounted Cami, an astrophysicist who specializes in molecular chemistry, "I immediately and intuitively knew it I was looking at buckyballs in space. I've never been that excited!" The authors confirmed his hunch by carefully comparing the Tc 1 spectrum to laboratory experiments described in the literature.

"This discovery shows that it is possible—even easy—for complex carbonaceous molecules to form spontaneously in space," Cami said. "Now that we know fullerenes are out there, we can figure out their roles in the physics and chemistry of deep space. Who knows what other complex chemical compounds exist—maybe even some relevant to the formation of life in the universe!"

Stay tuned!

Learn more about this discovery at http://www.spitzer.caltech.edu. For kids, there are lots of beautiful Spitzer images to match up in the Spitzer Concentration game at http://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.

New Logo

The new banner that you see on the front of the Ephemeris was produced by Peter Natscher. It was approved by the board at the November meeting.

Thanks to Peter for working on this version.

A Course on "Planets for Poets" at Foothill College: Astronomy 10A

Andrew Fraknoi

* Are you excited to know that we have found over 500 extrasolar planets?
* Do you hope that we will find alien civilizations whose economies are in better shape than ours?
* Do you enjoy seeing the amazing close-up images of alien worlds on a giant screen?

Then you may want to take Astronomy 10A at Foothill College in the coming Winter Quarter: "An Introduction to the Planets & Life Out There".

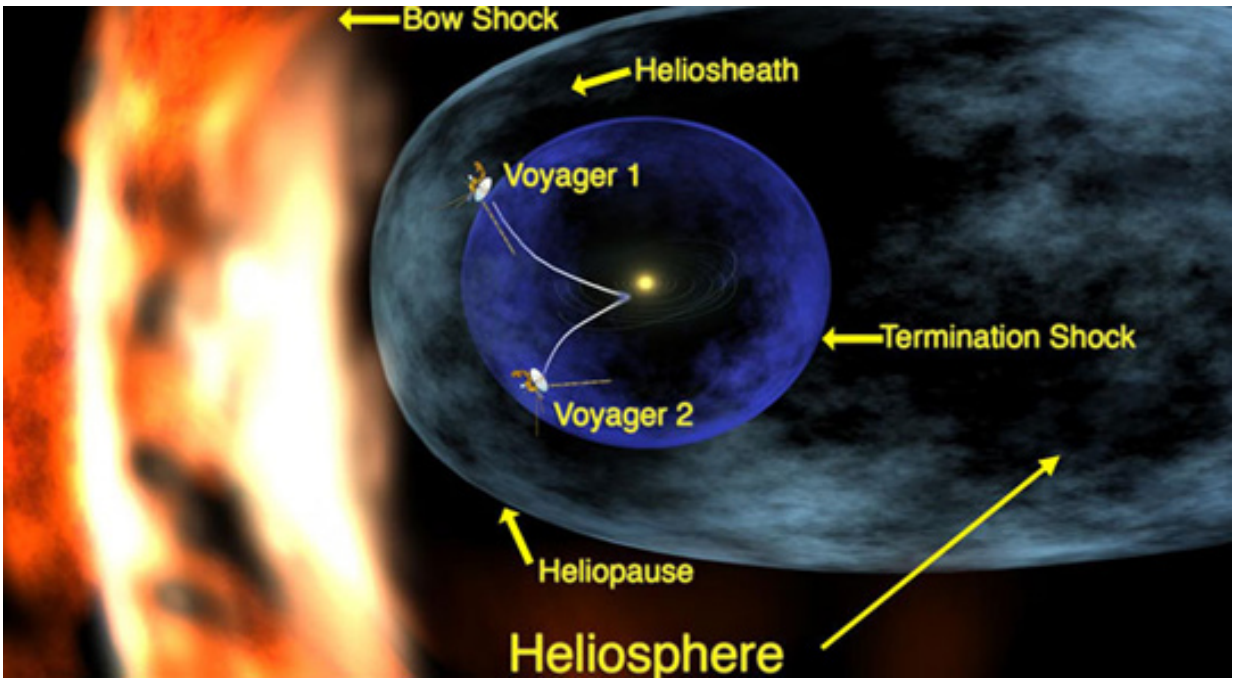
Share the woes of the Mars Rover that got stuck in the mud and is still sending back great information. Learn about Makemake and the other dwarf planets at the edge of the Solar System that helped get Pluto kicked out of the planet club. Find out more about the weird planets astronomers are finding around other stars. Get up to speed on the water geysers on one of Saturn's moons. This is an exciting time for planet fans, and we invite you to spend 11 "far-out" weeks being part of the excitement.

Astronomy 10A is an introductory course for non-science majors, requiring no background in science or math. The instructor, Andrew Fraknoi, specializes in explaining scientific ideas in everyday language. The course is offered at Foothill College both during the day (Mon, Tues, and Thursday, from 12 noon to 1:25 p.m.) and in the evening (Tues and Thurs, from 6:00 to 8:20 p.m.) in room 5015.

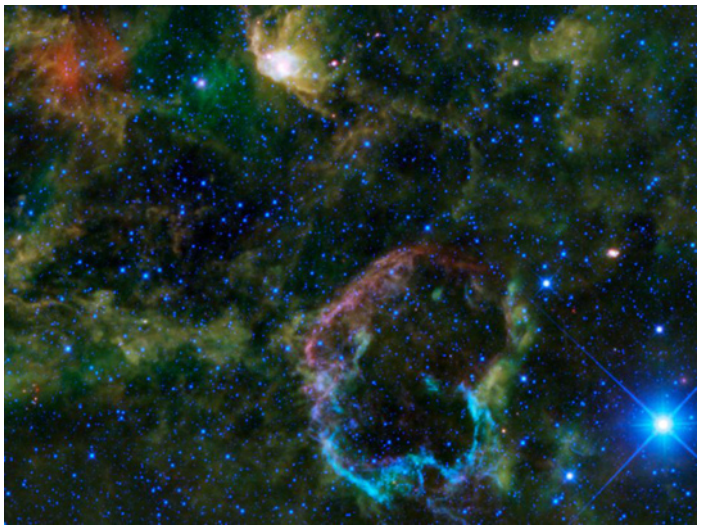
Winter Quarter at Foothill starts January 3rd. To enroll, please go to the college web site at: http://www.foothill.eduand click on "Apply and Register" in the Admissions menu, go to the admissions center on campus, or just come to the first class Jan. 3 or 4 in room 5015. For more information on the Foothill Astronomy Program, see: http://www.foothill.edu/ast

The Last Month In Astronomy

DEC-13-2010 ***Voyager Leaving*** Voyager 1 has been traveling for 33 years. Finally it is out so far that the solar wind has no outward motion. It is nearing 11 billion miles from the sun. The solar wind is still present but the interstellar wind is pushing it sideways. http://www.jpl.nasa.gov/news/news.cfm?release=2010-415



DEC-09-2010 ***WISE Colors*** The supernova remnant IC 443 has shown some unusual coloration when imaged by WISE, the Wide-field Infrared Survey Explorer. The infrared image was given representational colors (please don't say false-colored) and it shows that half of the shell has a different density and color and elemental makeup than the other half. It seems unlikely that the progenitor star was different in one half than the other so the difference must be due to differences in the material around the supernova. http://www.nasa.gov/mission_pages/WISE/multimedia/gallery/pia13449.html



DEC-02-2010 ***Billions and Billions*** No, Carl Sagan never actually said that. But he was trying to tell us how many stars there are in the universe. The math is fairly simple. If our galaxy has 4 x 10^11 stars and let's say that is typical and there are 10^11 galaxies, then you end up with 4 x 10^22 stars or 4 septillion. It turns out that number is a little low, maybe by a factor of 3. That's the conclusion of Pieter van Dokkum (Yale) and Charlie Conroy (Harvard). They look at elliptical galaxies such as the very large ellipticals found in the Virgo and Coma clusters. What they found is that the percentage of red dwarf stars is much greater than we have in the Milky Way galaxy. If these elliptical galaxies are typical, then these galaxies have 20 times as many red dwarfs as do spiral galaxies. http://www.skyandtelescope.com/news/111192389.html

NOV-30-2010 ***Planet Steam*** The star Gliese-Jahreiss 1214 is a dim M class star 40 light years away. It has a planet that is 6.5 Earth masses which was discovered in 2009. The planet, GJ1214b, is seen to transit its star once every 38 days and its atmosphere can be studied spectroscopically. That spectrum indicates that the upper atmosphere is dominated with water vapor or clouds. Because it is detected during a transit, the diameter can be estimated and thus the density which turns out to be 1/3 of the Earth's. That low density rules out a gas giant. http://www.skyandtelescope.com/news/111070634.html

It Must Be Astronomical ...

Loaners

The loaner program offers members a means to try scopes of various sizes and technologies before you buy. For more information please see the loaner program web page: http://www.sjaa.net/loaners

Dues Change

Effective January 1, 2011, the SJAA membership dues will be changed. The regular dues will remain at $20 but only for members choosing the electronic version of this newsletter. Those who want to continue with the print version will find that their dues are $30.

Astronomy Podcast

Check out the Astronomy Cast, a podcast about Astronomy. The hosts are Fraser Cain (from Universe Today) and Dr. Pamela L. Gay (from Southern Illinois University at Edwardsville). You can find the Astronomy Cast at http://www.astronomycast.com. Pamela Gay is also known as the StarStryder and she has a blog at http://www.starstryder.com/. If she doesn't have the record for most conferences attended ....

School Star Parties

Completed Events					
	Total Sched.	Good Sky	Partial Success	Cloudy Fail	Cancel at noon
Jul	1	1			
Aug	4	4			
Sep	0				
Oct	7	5	1		1
Nov	13	9	3		1
Dec	8	1	2	0	5
Total	*33*	*20*	*6*	*0*	*7*
Scheduled Events					
	Total	Firm	Workin'		
Jan	7	6	1		
Feb	5	4	1		
Mar	5	3	2		
Total	*17*	*13*	*4*		

As of mid-December

"Space isn't remote at all. It's only an hour's drive away if your car could go straight upwards." - Fred Hoyle

Publication Statement

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San Jose Astronomical Association,
P.O. Box 28243
San Jose, CA 95159-8243

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Articles for publication should be submitted by the 10th of the previous month. The PDF version is generally available by the 24th of the previous month and the HTML version by the last day of the previous month.

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San Jose Astronomical Association Membership Form

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☐ **New** ☐ **Renewal** (Name only if no corrections)

Membership Type:

☐ Regular — $20
☐ Regular with Sky & Telescope — $53
☐ Junior (under 18) — $10
☐ Junior with Sky & Telescope — $43

Subscribing to Sky & Telescope magazine through the SJAA saves you $5 off the regular rate. (S&T will not accept multi-year subscriptions through the club program. Allow 2 months lead time.)

☐ **I prefer to get the Ephemeris newsletter in print form (Add $10 to the dues listed on the left). The newsletter is always available online at** http://ephemeris.sjaa.net
Questions?
Send e-mail to membership@sjaa.net

Bring this form to any SJAA Meeting or send to the club address (above). Please make checks payable to “SJAA”.
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