Sonoma Skies

Newsletter of the Sonoma County Astronomical Society
A nonprofit scientific and educational organization

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Exploring Mars and Saturn with Dr. Eric Wegryn

On January 12, 2011, Dr. Eric Wegryn [1] shared his experiences regarding the Mars Pathfinder and Saturn Cassini-Huygens programs with members of SCAS. It was a revealing discussion centered on the science and technology behind these two planetary missions that helped to forge new discoveries in the Solar System.

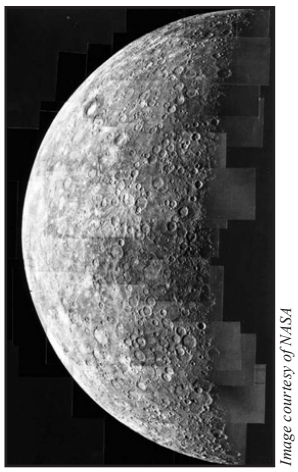

Image courtesy of NASA

Dr. Wegryn highlighted that we have experienced an extraordinary and unprecedented time in human history, a new age of discovery. He cited the fact that it wasn't until 2008 that a complete view of Mercury's surface was made until the Messenger [2] space probe mapped the entire planet. Even though Mariner 10 previously completed three flybys of the planet in 1974 and 1975, it was only able to map half of the planet, as shown here, owing to the planet's 3/2-spin resonance [3]. "Mariner 10 didn't stick around long enough to finish the job," he quipped.

The Mars Experience

Wegryn shared his joy of planetary exploration and the exploratory power of new probes, and the recent use of both earth-based and space-based telescopes (such as Hubble), to uncover more secrets of our Solar System. He shared his youthful joy of space exploration and early experiences with space flight. Wegryn served as a Rockwell-Collins aerospace engineer, responsible for the ascent guidance, navigation, and control (GN&C) of two space shuttle missions: Columbia on STS-40 and Endeavour on STS-49. Subsequent restlessness with "staring at the computer screen" caused him to rejoin the academic world. His studies at the University of Arizona and

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Exploring the Extreme Universe with Fermi

with Dr. Lynn Cominsky
SCAS February 9 Meeting, 7:30 PM
at Proctor Terrace School

For our February program we are pleased and fortunate to have Dr. Lynn Cominsky from Sonoma State University give her presentation on the ongoing Fermi gamma ray space telescope project.

In our current era of exploration of the universe, we now have the ability to "see" information from sources across the entire electromagnetic spectrum. Early astronomers were limited to what their eyes alone could see; visible light. We have much more sensitive eyes and ears that can see all the "colors" of our universe, and they all have different things to tell us. Gamma rays are the most energetic form of "light", coming from some of the most powerful and extreme processes across space.

Ironically, although gamma rays are the most energetic light photons, they are unable to penetrate our atmosphere. So until we were able to get detectors ("telescopes") above most of the atmosphere, we had little idea of what the gamma universe looked like. In 2008 the Gamma Ray Large Area Space Telescope was launched, and as is the pattern for these orbiting observatories, NASA waits until they are certain they're working before giving them names. GLAST was renamed Fermi to honor the great physicist Enrico Fermi.

As it's original title implies, Fermi is searching across the entire sky for gamma sources. Some of these sources are thought to originate in super massive black hole systems, super and

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LINKS TO WHAT'S INSIDE

President's Message

Patience is Ultimately Rewarded

Expecting the unexpected appears to be a constant refrain in astronomy. Two examples of late are at the forefront of my mind.

The Lunar eclipse of December 20th was clearly not going to be viewable. What a pity it was, too, since it would be at our zenith near midnight at full eclipse.

The day was cloudy and the evening only offered occasional brief glimpses of what was happening. I brought my camera out on a tripod to record the frustrations of trying to witness the lunar eclipse that was unfolding. I decided that I would use these cloud-versus-lunar-eclipse images at the January meeting to show that I had tried and what the results were.

As the event neared its culmination near midnight though, the clouds miraculously parted, allowing jaw-dropping views of the eclipsed moon along with the Pleiades and Orion. Of course, I did not have the proper wide-angle lens that would allow capturing the whole scene but I did my best and got some decent images. I am pleased that I continued to try to get some positive rewards from this lunar eclipse even though I was sure I was wasting my time.

A week ago, I acquired a Coronado II 90mm solar telescope. I had seen images of marvelous prominences along the edge of the Sun taken through the Coronado solar scopes and just had to get one of my own. I have had a Day Star H Alpha outfit that I have used for about 10 years with my 130mm refractor, but the views were only a shadow of what I had seen the Coronado scopes provide.

Yes, I know we are still lamely working our way into a new 11 year solar cycle that has not lived up to expectations so far, but at some point there has to be solar action worth viewing. In any case, for 2 days after I bought the instrument, the daytime sky was marvelously clear. In that period, I worked on finding the needed paraphernalia to mount the solar scope to one of my tripods. By the third day, I had what I needed and, of course the clouds then obscured the Sun.

After a few days the clouds parted but then I discovered that the Sun had no prominences along its edge. I even checked the Big Bear Solar Observatory and other web sites to see what views their fine scopes were obtaining to assure I had a true picture of the solar scene.

Once again, at least for now, nature conspires to find ways to prevent my witnessing an astronomical event that I seek. But, I know that persistence is the answer, so all I need to do is to keep a focus on my goal. Eventually, I will be rewarded or find gratification and beauty in what I am offered.

—Len Nelson, SCAS - President

FERMI *(from page 1)*

"hyper" nova explosions, pulsars, solar flares, and perhaps even from Dark Energy effects. Fermi has already made many discoveries, including the production of antimatter from Earthly thunderstorms, huge gamma ray "bubbles" coming from our galaxies central black hole, and much more.

Dr. Cominsky is a principal investigator with the Fermi project, and is its official press officer. Dr. Cominsky has been studying high energy astrophysics for over 25 years. After getting her BA in physics from Brandeis University in Massachusetts, she researched X-ray binary star sources. She went on to work with the Harvard Smithsonian Center for Astrophysics, doing graduate work at M.I.T., then post doctoral work at UC Berkeley Space Sciences Laboratory. She has been associated with the SWIFT gamma ray telescope, the XMM-Newton, Nustar and other space based high energy orbiting labs observing extreme ultraviolet as well as X-ray and gamma ray sources.

Lynn founded the Education and Public Outreach arm at Sonoma State University, where she currently serves as the Chairperson of the Physics Department. She is also the self-described "servant" to all the animals at her Little H-Bar ranch in Sonoma county.

We are happy to have "one of our own" here be such an important figure bringing the Extreme Universe down to us on earth's Sonoma County! Please join us!

—John Whitehouse

Telescope for Sale

Celestron SCT Ultima 8 –PEC with Starbright coating. Excellent condition. Optics appear to be pristine. This scope did not see much use in its 30 year life. Very nice scope for $235.

PEC drive (DC Servo Quartz Drive)
Celestron hand controller
Celestron 8x50mm right angle finderscope, mounted
Celestron 1 ¼" star diagonal
Lens caps
Heavy duty foam-lined carry case (exterior 14x22x32)
Telescope accessories
Pelican Case for accessories (hard black plastic, foam-lined (exterior 7x13x19)
Celestron Focus Motor (#94142 –PEC)
Celestron Declination Motor (#94141-PEC)
Celestron Radial Guider, model #94176
Celestron reducer/collerctor f/6.3, model #94175
Celestron tele-extender model #93646
Celestron Polaris guiding plate
Celestron balancing weight, threaded
Original instruction manuals for all parts.

Contact Len Nelson at 763-8007 *lennelsn(at)comcast.net*

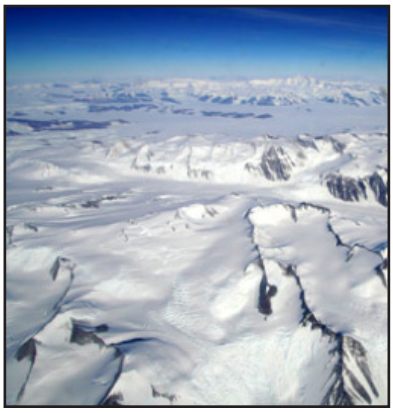
Telescope Raffle in February

At the February SCAS meeting we will be selling tickets for the Firstscope 80 AZ pictured at right. Here are the specs:

80mm (3.1") Aperture
Focal Length of 900mm
Focal Ratio of f/11
Fully Multi-Coated Optics
1¼" Accessories include a 25mm SMA Eyepiece and a 45° Erect Image Diagonal
High Quality 6x30 Finderscope
Sturdy, Adjustable Wood Tripod with Accessory Tray
Weight: 18 Lbs.

World's Largest Ice Cube and Particle Detector – An Update

On December 19, 2010, construction was completed on the IceCube Neutrino Observatory in Antarctica [1]. A cube of Antarctic ice ten football fields long on each side has been instrumented with over 5000 optical sensors to detect neutrinos coming from outer space.



Neutrinos are the most elusive of all known subatomic particles, dark matter discoveries notwithstanding. Fifty trillion neutrinos zip right through each of us every second, and only one per week actually interacts with the atoms in our bodies. A neutrino can easily pass straight through a trillion miles of lead, with only a 10 percent chance of "hitting" any of the lead atoms.

Neutrinos come primarily from the Sun, but also from supernovae and other spectacular cosmic events. Because they are almost unstoppable, we hope to use them to look where light cannot penetrate. For example, it takes thousands of years for photons (particles of light) to travel from our Sun's core to its surface, as they are continually absorbed and re-emitted. But neutrinos blast straight through, reaching Earth in just over eight minutes.

By using neutrinos, we can monitor the Sun's energy production in real time and be forewarned of coming changes in the amount of sunlight we will receive. Neutrinos will also give us an inside view of how stars explode. Even though supernovae can be billions of times brighter in visible light than our Sun,

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Social Amenities

Many thanks to Keith Payea for providing refreshments at the January SCAS meeting.

Events

Robert Ferguson Observatory

Public Observing Night

Saturday, February 26
Solar Viewing: 11 AM - 3:00 PM
Night Viewing begins 7:00 PM

The Observatory features three telescopes: A 14-inch SCT with CCD camera in the East wing, an 8-inch refractor under the dome and a 24-inch Dobsonian in the West wing. SCAS members may set up telescopes in the observatory parking lot to assist with public viewing. Auto access closes at dusk; late arrivals must carry equipment from the horse stable parking area.

Fees: No admission fee for the solar viewing, but donations are appreciated. The Park charges $8 per vehicle for entry. A $3 donation is requested from adults 18 and over for admission to the observatory during night viewing sessions.

Night Sky Classes—Spring Series

Classes begin at 7 PM. Series of six sessions held Jan. 25, Feb. 1, Mar. 1, Mar. 8, Mar. 29, and Apr. 5. Each class includes a lecture on the constellations of the season, their history and mythology, and how to find stars and deep sky objects within them. Includes observing. **Fees:** $75 for the series. (Single session fee is $23). 10% discount for VMOA members. Classes are held at the Observatory. For information or to register: (707) 833-6979, *nightsky@rfo.org*

New Docent Training

Become a docent with the Robert Ferguson Observatory! Many SCAS members are docents, so if you want to know why we love it, just ask! Training begins Sunday Feb. 20, 1-5 pm with an Orientation and Tour. Successive trainings will be held on Wednesday evenings, schedule to be determined. To sign up, email Colleen Ferguson at *nebulous(at)sonic.net*.

Rent the Ferguson Observatory!

Groups of up to 50 can be accommodated. Astronomer docents provide sky interpretation and operate telescopes, and you can stay up as late as you want! Make your reservation at least two weeks prior to your event. Best times for optimal sky gazing are around a week away from a Full Moon.

For information or to make a reservation, visit *http://www.rfo.org* or email George Loyer: *gloyer(at)rfo.org*.

Jane's "What's Up" Podcast

Jane Houston Jones produces a monthly "What's Up" podcast that features objects we can observe each month. Find Jane's podcasts here: *http://solarsystem.nasa.gov/news/whatsup.cfm*

SRJC Planetarium

"Stars Over the Land Down Under"
Concludes Feb. 20

"Target Earth" Begins Feb. 25

We may not realsize it but Earth is a spaceship orbiting around our star at some 67,000 mph and we are not alone! Asteroids and comets are among the many other objects vying for space in our solar system. These objectshave hit the Earth before and will do so again. Join us as we look at this sobering realization of how vulnerable we are.

Show times: 7:00pm Fridays & Saturdays, 3:00pm Sundays

"First Friday Night Sky"—Feb. 4

7:00 and 8:30 PM: Offered on the first Friday of January through May of 2011. Content varies, with emphasis on the stars, constellation, planets, and other interesting facts in or about the sky that night. No planetarium shows Feb. 5 and 6.

Admission is free; donations to support SRJC's Planetarium are appreciated. Seating will be on a first-come, first-served basis; so arrive early enough to pick up your free parking permit, return it to your vehicle, and arrive back in the planetarium by the scheduled start time. Info: 527-4372, *http://www.santarosa.edu/planetarium/*

Morrison Planetarium Dean Lecture Series

Feb. 21, 7:30 PM: "Planet Factories: Disks of Formation Around Young Stars"—Dr. Aaron Boley, Researcher at the Univ. of Florida

Dr. Boley is a theoretical astrophysicist working in the fields of planet formation, disk evolution, and early star formation. In this lecture, he will explore the formation of disks around newly-born stars, investigate how these disks evolve, and discuss their role in building the variety of planetary systems now known to exist.

Lectures sell out early, so reserve now. Call 800-794-7576 for reservations. Adults $12, Seniors $10, Members $6. *http://www.calacademy.org/events/index.php*

Taylor Observatory

Located in Kelseyville off Highway 29

Feb. 12: Public Event, 8-11 PM. "Learn about binary star systems and how their proximity to each other can lead to an extraordinary event"—Guest Presenter, Dr. Gerald deBane, professor of Astronomy at Santa Rosa J.C. The evening event includes a lecture, a planetarium show and telescope viewing.

These events are held even in cloudy or rainy weather, although telescope viewing will not be possible. There is a suggested donation of $3 per person. No reservation required. Info: 707/262-4121 or *http://www.taylorobservatory.org*

Events

Community Outreach
Event Horizons

A Busy February

Wow! January went by fast. We only had one event that was not rained out or completely fogged out. Notice I said, "not completely fogged out." While this past month has blessed us with many clear nights (or cursed us with a lack of rain) we did have our morning fog – up until the Miwok School Star Party on the 7th – when it was foggy all day. Still Len Nelson went to the school and gave two age-appropriate slide shows in anticipation of that evening's telescope viewing. With 6:00 o'clock rolling around and still no break in the fog, he and Eric Swanson returned to the school and did a 40 minute presentation and answered questions for the 125 students and parents that did show up for the school's Family Fun Night.

Before I go on to the listing the 5 events on the calendar for February (and 2 for March,) I want to take time to give thanks to all of the volunteers who have made the 15 SCAS star parties a success in 2010. We served schools and private events in Sonoma, Santa Rosa, Petaluma and Rohnert Park. This list does not include the Yosemite Star Party participants. Even when sky conditions were not favorable for telescope viewing, our volunteers would still set up a telescope or two in a multi-purpose room and answer questions about the club, the RFO and general astronomy. There were also 8 classroom presentations handled by Len and myself.

The people who have donated their time to make the SCAS public outreach possible during the past year are: Walt Bodley, Eric Swanson, Alan Stern, Loren Cooper, David Simons, Dickson Yeager, Emilio Ricci, John Whitehouse, Lynn Anderson, Alan Karbousky, Tim Slater, Derek Braud, Colleen Ferguson, Rick Belding, Tom Duggan, and Ted Judah. A special thank you goes to Len Nelson for not only sharing his telescopes and knowledge at these star parties, but for also riding herd on a number of our SPARKS winners and Young Astronomers at many of these events. Thank you all.

February Schedule:

First up in February is the annual Science Night at Rohnert Park's Evergreen Elementary on Friday, *February 4th*. This has been one of the events where even if the sky does not allow telescope viewing, we have had a presence in the multi-purpose room representing SCAS and what we do as a club.

The following Tuesday, *February 8th* is the Sonoma County Office of Education's Science Fair. Lynn Anderson will be acting as a judge for the astronomy entries and other physical science displays.

Another annual event, the science night at Windsor Creek Elementary School is scheduled for Thursday, *February 17th*. The following *Thursday, the 24th* has us at Sequoia Elementary in Rincon Valley.

Then we move into March, where we are scheduled to be at Oak Grove Elementary in western Santa Rosa on the 1st, and at Petaluma's Sonoma Mountain Elementary on the 8th. And then there is the Mark West School District Science Day on Saturday, March 12th for solar viewing and providing information about SCAS and the RFO.

Again, if you would like to join the list of volunteers for any of these events, email Lynn Anderson at *astroman(at)sonic.net* You don't need to have a telescope. Sometimes having a volunteer to help with crowd control, To keep track of who has what object in the eyepiece and direct the public to something they haven't yet seen, or to give start tours with a green laser (which you can borrow) or just to answer questions is a great help to the success of a star party.

—Lynn Anderson, SCAS Director of Community Activities

SETI Institute Colloquium

2/2: Cracking under the stress: Europa's orbit, tides, and fracture systems—Alyssa Rhoden, UC Berkeley

Europa's surface records a complex history of geologic activity including fracture systems driven by tidal stress, which varies daily as Europa executes its eccentric orbit. Obliquity, physical libration, and non-synchronous rotation would also contribute to the pattern of tidal stress on Europa. Hence, we can use observed fracture systems to constrain these rotational parameters. Using cycloids and strike-slip faults, Dr. Rhoden has been able to probe Europa's rotation state and uncover the first geologic evidence of non-negligible obliquity. Dr. Rhoden will present this case for obliquity and physical libration and implications for non-synchronous rotation and polar wander. In addition, she will present a model she has developed for a fault's response to tidal stress that accurately predicts the slip direction of 75% of strike-slip faults identified in an extensive survey of Europa imagery.

2/9: Biological and Physical Considerations of Unfrozen Water Films: Mars and Antarctic Dry Valleys—Aaron Zent, Planetary Science Division, NASA Ames Research Center

Recent work in the Antarctic has found viable microbes in the dry permafrost of University Valley, relying on only interfacial water to effect exchange with the environment. The discovery of nearly pure ice at the Phoenix landing site is a possible indicator of in situ ice segregation, a physical process that depends on the same films of unfrozen water. We have recently found that even at temperatures as low as 245K, the forces arising in these unfrozen films are sufficient to initiate lens formation. Models of the possible history of the martian high latitudes in particular, show that conditions favoring even thicker film development are likely to occur on the timescale of obliquity variations. We will review all of these recent results, and assess their potential implications for the habitability of the martian regolith.

2/16: Science Fiction as a bridge between Future Societies and the Contemporary Russian and American Cultures—Larisa Mikhaylova, Lomonosov Moscow State University

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SETI *(from page 5)*

Dr. Mikhaylova will discuss images from science fiction literature and films which have addressed human interaction in space (created by Frederick Pohl, Ivan Yefremov, Arthur C. Clarke, in Star Trek, Avatar, etc.). Is international cooperation essential for humans to move into the Universe – or not? Has the time arrived to build burgers on Mars? Dr. Mikhaylova will discuss the results of recent internet contests of SF about space in Russia and the 'Back to the Future' contest conducted by NASA. Ethical aspects of space exploration are manifold, and there is hope that looking at human conflicts from an extraterrestrial angle still may help to solve pressing problems today and create a livable future.

2/17 (Thursday evening at 7:30pm): EPOXI and Comet 103P/Hartley 2—Michael A'Hearn, Distinguished Professor, Astronomy Department, University of Maryland

The Deep Impact Flyby Spacecraft flew past comet Hartley 2 on 4 November 2010. Yet again a cometary flyby has led to numerous surprises that will yet again change our understanding of the role of comets in the formation of the solar system and our understanding thereof. This talk will highlight the new knowledge gained from the flyby. By the time of this talk, Stardust NExT will have flow past comet 9P/Tempel 1 (on 15 April PST) and the new data on the cometary nucleus onto which Deep Impact delivered its Impactor Spacecraft 5 years ago. Preliminary results from that flyby will also be described.

2/23: The Evolution of Saturn's F Ring—Rob French, Carl Sagan Center for Life in the Universe, SETI Institute

Saturn's F ring has brightened markedly in the last 25 years. It is twice as bright in the Cassini data as it was in the Voyager data from 1980 and 1981. We attribute this change to increasing perturbations by nearby Prometheus, which passes closer to the ring now that it did in the Voyager era, yielding more dust. Rob French will discuss the observations and analysis that led us to this conclusion.

Colloquiums run from Noon to 1 PM on Wednesdays. Location: SETI Headquarters at 189 N. Bernardo Ave., Mountain View *(map)*. Free. Lectures are available on YouTube at: *http://www.youtube.com/setiinstitute*

Interesting Links

Incredible Space Photos from the ISS by NASA astronaut Wheelock: *http://triggerpit.com/2010/11/22/incredible-pics-nasa-astronaut-wheelock/*

Lunar Eclipse Wallpaper Contest Yields Hundreds of Photos: *http://www.jpl.nasa.gov/news/news.cfm?release=2011-021&cid=lec_news#1*

Sofia flying telescope gives unique view of Orion: *http://www.bbc.co.uk/news/science-environment-12206941*

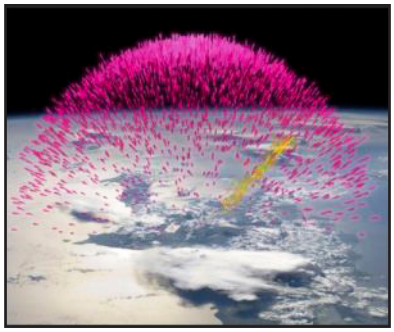
Paranormal behavior of amateur astronomers cartoon: *http://www.xtranormal.com/watch/8238401/*

Thunderstorms create beams of antimatter

by Heather Catchpole, CosmosOnline

A space-based telescope has detected beams of antimatter shooting out the top of thunderstorms, in what has been described as an "amazing curiousity of nature".

The data was collected from NASA's Fermi Gamma Ray Space Telescope. In some cases the thunderstorms were thousands of kilometres away, and the beams were detected only after they had travelled along the Earth's magnetic field and collided with the spacecraft.



Credit: NASA

Here the terrestrial gamma ray flash (pink) is 1.98 milliseconds old, and its electron(yellow) /positron(green) beam is reaching altitudes where it may intercept spacecraft, such as NASA's Fermi Gamma Ray Space Telescope.

"These signals are the first direct evidence that thunderstorms make antimatter particle beams," said lead author astrophysicist Michael Briggs from University of Alabama in Huntsville.

Lightning the likely cause of bursts

Fermi launched in 2008 to study similar high-energy bursts from space. In space, gamma ray bursts stem from high energy events such as the death of a star.

These beams, though, stem from terrestrial gamma-ray flashes, high energy bursts of gamma rays that occur in Earth's atmosphere and are most likely associated with lightning.

Fermi has detected 130 terrestrial gamma-ray flashes, which last about a millisecond, but scientists estimate 500 such flashes occur daily worldwide.

Fermi struck by high energy beams

The antimatter, which has the same properties of their matter 'twin' except with the opposite electric charge, is thought to be created when an avalanche of electrons are thrown up by a thunderstorm's strong electromagnetic field. When these electrons strike other atoms in the atmosphere they release a burst of gamma rays.

Travelling near the nuclei of other atoms causes the gamma rays to transform into an electron/positron pair (a positron is an electron's antimatter counterpart, with positive instead of negative charge).

Beams of high-energy positrons and electrons then travelled thousands of kilometres, guided by the Earth's magnetic field. When the positrons struck Fermi, it detected a high-energy gamma ray signal, indicating the matter in the spacecraft and antimatter in the beams had annihilated each other.

Reseachers argue how the flashes are made

"We are still arguing about exactly how [the gamma ray flashes] are made," NASA spokesperson Janet Anderson told Cosmos.

"We all agree that some form of relativistic runaway electron avalanche mechanism is going on somewhere inside or near thunderclouds, but beyond that there are many uncertainties."

Young Astronomers

Hello Young Astronomers

February is here and so are the great winter constellations that have been hidden behind clouds much of the time or shining brightly on a night that is just too cold to tolerate being out in. But, these wonderful winter sky spectacles are slipping toward the western horizon and the days are getting shorter and before you know it they will be lost to our view.

I refer to Orion—the Hunter, Taurus—the Bull, Gemini —the twins, Canis Major—Orion's hunting dog, and Auriga—the charioteer. Finding these constellations is only the start of your stellar quest. Each holds a number of wonders that will reveal themselves in a Striking Sparks telescope. Look especially for the Orion nebula (M42), the open star clusters in: Auriga (M36, 37 and 38), Gemini (M35) and Canis Major - (M41). For a real challenge, try to locate the Crab Nebula (M1) between the horns of Taurus. This is a super nova remnant that was observed glowing in the day time sky by Chinese and Arab astronomers in the year 1054.

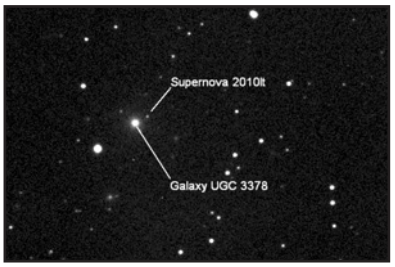
Between now and when daylight savings time begins (March 13), we will have quite a few school star parties. Your participation in these, as a volunteer with your Striking Sparks telescope, is eagerly sought. After March 13th, it begins to get dark too late for school star parties unless they are on a Friday night. So, February it is.

Look for requests that you help out the SCAS. Refer to Community Activities Director, Lynn Anderson's, list of schools where events will be held (see Page 5). If they are close to you, please try to come. The SCAS continues its awards program for those who participate. For each 5 events that you actively participate in you will receive an eyepiece to complement those you have. See me, Len Nelson, at each event or email me to let me know where you participated after an event so that I have documentation.

Lastly, if you are planning a local star party of your own and you'd like to have SCAS help, just let me know. We'd be delighted to assist you and, as always, please let me know should you have any questions.

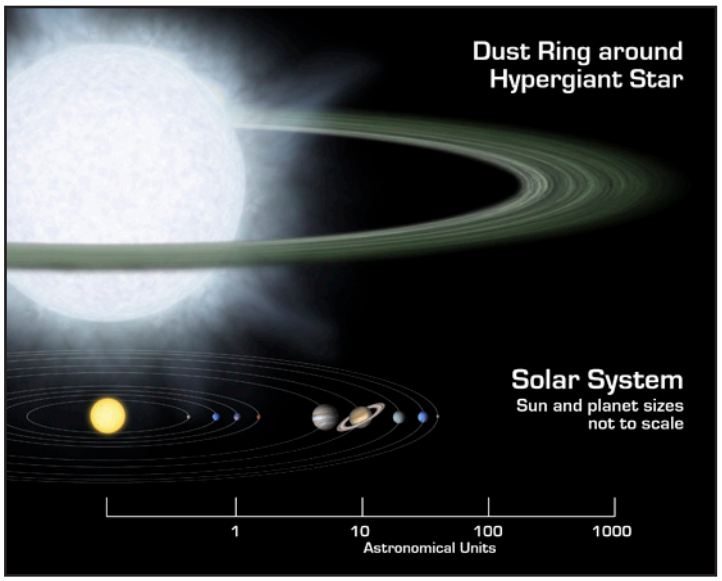
—Len Nelson, SCAS President

Youngest Supernova Discoverer



A 10-year-old amateur astronomer is the youngest ever to discover a supernova, according to the Royal Astronomical Society of Canada. Kathryn Aurora Gray of Moncton, New Brunswick discovered a magnitude 17 Supernova in galaxy UGC 3378, which is a magnitude 15 galaxy in the constellation of Camelopardalis, about 240 million light-years away. Supernova SN2010lt was imaged on December 31, 2010, detected on January 2, 2011, and confirmed on IAU Electronic Telegram 2618. This discovery is the third from the Abbey Ridge Observatory.

A recent paper in Nature suggests that the explosion is due to two White Dwarf stars merging. Young Kathryn reported the stellar explosion under the supervision of her father, Paul Gray, who has made six prior supernova discoveries, and family friend David Lane, who has found three others himself. The photos of galaxy UGC 3378 were taken using a telescope belonging to Lane.



Artist's rendering compares size of a hypothetical hypergiant star and its surrounding dusty disk to that of our solar system.

Planets in Strange Places

By Trudy E. Bell

Red star, blue star, big star, small star—planets may form around virtually any type or size of star throughout the universe, not just around mid-sized middle-aged yellow stars like the Sun. That's the surprising implication of two discoveries in 2006 from the 0.85-meter-diameter Spitzer Space Telescope, which is exploring the universe from orbit at infrared (heat) wavelengths blocked by the Earth's atmosphere.

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Planets in Strange Places *(from page 7)*

At one extreme are two blazing, blue "hypergiant" stars 180,000 light-years away in the Large Magellanic Cloud, one of the two companion galaxies to our Milky Way. The stars, called R 66 and R 126, are respectively 30 and 70 times the mass of the Sun, "about as massive as stars can get," said Joel Kastner, professor of imaging science at the Rochester Institute of Technology in New York. R 126 is so luminous that if it were placed 10 parsecs (32.6 light-years) away—a distance at which the Sun would be one of the dimmest stars visible in the sky—the hypergiant would be as bright as the full moon, "definitely a daytime object," Kastner remarked.

Such hot stars have fierce solar winds, so Kastner and his team are mystified why any dust in the neighborhood hasn't long since been blown away. But there it is: an unmistakable spectral signature that both hypergiants are surrounded by mammoth disks of what might be planet-forming dust and even sand.

At the other extreme is a tiny brown dwarf star called Cha 110913-773444, relatively nearby (500 light-years) in the Milky Way. One of the smallest brown dwarfs known, it has less than 1 percent the mass of the Sun. It's not even massive enough to kindle thermonuclear reactions for fusing hydrogen into helium. Yet this miniature "failed star," as brown dwarfs are often called, is also surrounded by a flat disk of dust that may eventually clump into planets. (This brown dwarf discovery was made by a group led by Kevin Luhman of Pennsylvania State University.)

Although actual planets have not been detected (in part because of the stars' great distances), the spectra of the hypergiants show that their dust is composed of forsterite, olivine, aromatic hydrocarbons, and other geological substances found on Earth.

These newfound disks represent "extremes of the environments in which planets might form," Kastner said. "Not what you'd expect if you think our solar system is the rule."

Hypergiants and dwarfs? The Milky Way could be crowded with worlds circling every kind of star imaginable—very strange, indeed.

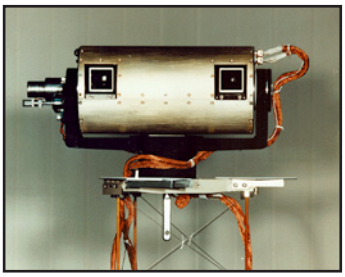
Keep up with the latest findings from the Spitzer at *www.spitzer.caltech.edu*. Kids and their grownup friends can enjoy beautiful images from Spitzer while playing Spitzer Concentration at The Space Place: *http://spaceplace.jpl.nasa.gov/en/kids/spitzer/concentration/*

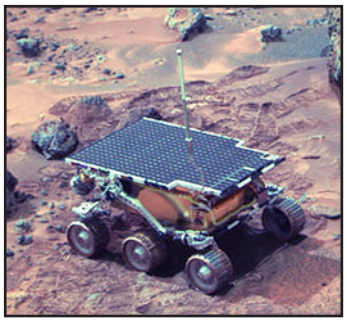
—Article provided by JPL/NASA

Mars and Saturn *(from page 1)*

work in planetary science led to a PhD and the opportunity to work on the Mars Pathfinder project [4]. Wegryn's contribution within the Lunar and Planetary Laboratory was on the imager mounted on the six-wheeled rover.

Mars has a slower rate of rotation than Earth at 24 hours and 39 minutes. Wegryn believes our circadian rhythms [5] can adjust. He believes the Mars scientists who "live and breathe on Martian time, which is measured in sols", have proved this Wegryn recalls waking up every day 39 minutes later than on the previous day, in order to work in accordance with the Martian day. His research was related to the Martian sky. Why



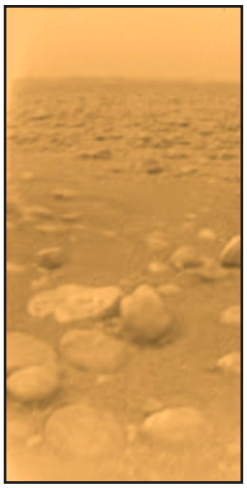


Imager above, Sojourner Mars Rover on right: Images courtesy of NASA

is it a rusty brown color? Unlike above Earth, where Rayleigh scattering causes the blue color of the sky, Mars' atmosphere contains fine-grained iron oxide particles, on the order of 15 microns in size, just like cigarette smoke. This gives the sky its brownish, rusty hue and the analysis was important to determine the rate of dust build-up on solar panels, which power robotic probes such as the Mars rovers. A heavy dust cover deprives the surface-bound probes from exploiting the power-giving sunlight. On Mars, it is fortunate that big windstorms regularly blow off a large amount of the dust build-up.

The Saturn Experience

The Cassini-Huygens mission to Saturn comprised an orbiter and a Titan lander. NASA and the ESA jointly developed the project. Wegryn worked as a post-doc student on the cameras integrated on both elements of the mission and found it interesting that the Huygens contribution of the Europeans featured an American camera developed at his University of Arizona; the same technology developed for the Mars Pathfinder mission.



Huygens image from Titan's surface—the only image from the surface of a planetary body outside the inner Solar system, courtesy of NASA

The car-sized Titan lander was designed to plummet through the Saturnian moon's atmosphere and crash into its surface. Huygens wasn't destroyed on impact as expected: it was able to capture pictures from Titan's surface before it stopped transmitting when its battery wore out after 90 minutes. The surface was softer than expected and appears to be similar to Earth's, but littered with water-ice, a term that Wegryn revealed as a humorous motivator to pursue academia, "I went into science so I could say 'water-ice,' not just 'ice'."

Titan was found to have a nitrogen-based atmosphere. Its surface features both lakes and rivers of hydrocarbons. Freezing surface temperatures prevent liquid water from existing. Fortunately the cold temperatures, in spite of the low gravitational pull of the distant Sun (only 1/6th Earth gravity), retain the gas molecules forming the atmosphere. The frigid Titan air doesn't allow moving air molecules to reach escape velocity, like occurred on Mars eons ago.

The Cassini orbiter [6] includes an infrared camera and a spectrometer to capture images and characterize elemental properties [7, 8]. It is the fourth space probe to visit Saturn and the first to enter orbit. One of the other moons being studied by Cassini is Iapetus, a two-toned black and white, walnut-shaped

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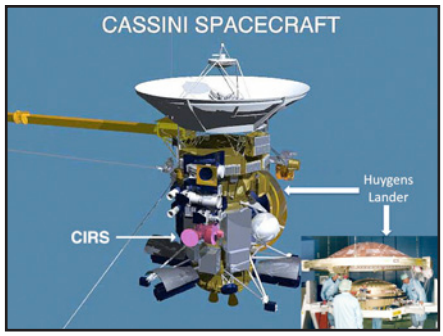
Mars and Saturn *(from page 8)*

moon, locked in a synchronous orbit of 79 days about Saturn. Seventeenth century scientist, Giovanni Cassini, correctly surmised that Iapetus has a bright hemisphere and a dark hemisphere, and that it is tidally locked, always keeping the same face towards Saturn. This means that the bright hemisphere is visible from Earth when Iapetus is orbiting the western side of Saturn, and that the dark hemisphere is visible when Iapetus is orbiting the eastern side.

The first Iapetus flyby occurred on September 10, 2007. Images were taken from 1,000 miles above the moon's surface. As Cassini was sending the images back to Earth, the probe was hit by a cosmic ray, which forced it to temporarily enter safe mode. All of the data from the flyby was recovered and sent to Earth.



Cassini Spacecraft showing Huygens lander and CIRS instrument, courtesy of NASA, ESA, and RKK

Explaining the two-sided coloring ensued. The white side was easy; ice-water reflects white light but absorbs infrared energy, giving this side of the moon its characteristic brightness. Spectral analysis confirmed its rock-water composition. The challenge was to identify the cause of the dark side, why was white light absorbed? Planetary scientists believe Iapetus is covered in a thin surface coating of some material. Spectral analysis revealed this substance to be PAH or polycyclic aromatic hydrocarbon [8]. Such hydrocarbons are big, complex molecules, ones that are necessary for life. Although it is too cold to harbor life, the basic building blocks for life are found there. However, this moon appears to be at the beginning of the process to convert simple molecules into more complex ones.


Iapetus taken by Cassini, courtesy NASA

There is a lot more to learn about all of our Solar System's planetary systems. Wegryn closed with a quote from Newton, "I was like a boy playing on the sea-shore, and diverting myself now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me."

—Submitted by R.K. Koslowsky, SCAS Member
http://worldperspective.bravehost.com/

Notes:

[1] Dr. Wegryn loves to travel and after receiving his BSE in Aerospace Engineering from the University of Michigan, he took off on a round-the-world jaunt. He came back to ultimately earn his Ph.D. in Planetary Sciences from the University of Arizona. Apparently exploring one planet wasn't enough, so he involved himself with both NASA and SETI contributing his efforts to various Space Shuttle missions, and the Mars Pathfinder and Cassini-Huygens planetary missions. His interest in geology has served him well in his explorations of other planets. Wegryn did his dissertation on Martian atmosphere, and was part of the team that discovered polycyclic aromatic hydrocarbons (PAHs) on the Saturnian moon Iapetus. In addition to his efforts as a research scientist; Wegryn is a very active educator. He is an adjunct professor of astronomy at Ohlone College in the East Bay, as well as having experience teaching math and science from the 6th grade to college levels. Wegryn has also taught educators at the Exploratorium and is a science correspondent there, including being part of their live broadcast of the solar eclipse from Turkey. Wegryn has a personal webpage in which he documents his travels and many interests. Among these, he is a private pilot, sailor, photographer, musician, avid hiker and much more. *http://www.wegryn.com/sci/index.htm*

[2] The first global map of Mercury was released in 2009: *http://www.nasa.gov/mission_pages/messenger/media/global_map.html*

[3] Mercury is locked into a 3/2 spin-orbit resonance where it rotates three times on its axis for every two orbits around the sun. The unusual rotation of Mercury was discovered by radar observations in 1965 by Gordon Pettengill and Rolf Dyce of Cornell University using the Arecibo radio telescope. Contrary to the predictions made by Schiaparelli in 1889, Mercury is not in synchronous rotation around the Sun (like the Moon around the Earth), but in a 3/2 spin-orbit resonance. *http://www.obspm.fr/actual/nouvelle/jul04/merc.en.shtml*

[4] "Mars Pathfinder was launched on December 4, 1996 from Cape Canaveral, Florida. Its 309 million-mile trip to Mars during 1996 and 1997 was NASA's greatest success in decades. It gave humanity its first real taste of space exploration since the 1969 Apollo moon landings. En route to the Red Planet, the spacecraft made four course correction maneuvers as it spun at a rate of two rotations per minute along its spin axis oriented toward earth. It landed on July 4, 1997 with millions of television viewers making the Mars mission the prime-time ratings winner." – An excerpt from R.K. Koslowsky's contribution to Research and Discovery: Landmarks and Pioneers in American Science (2008) edited by R.E. Lawson and published by M.E. Sharpe Press.

[5] A circadian rhythm is a roughly 24-hour cycle in the biochemical, physiological, or behavioral processes of living entities, including plants, animals, fungi and cyanobacteria.

[6] Cassini mission website: http://saturn.jpl.nasa.gov/index.cfm and Huygens mission website: *http://www.esa.int/SPECIALS/Cassini-Huygens/SEMTV82VQUD_0.html*

[7] Cassini's Composite Infrared Spectrometer (CIRS) is a remote sensing instrument that measures the infrared radiation coming from objects to learn about their temperatures, thermal properties, and compositions. Throughout the mission, the CIRS instrument will measure infrared emissions from atmospheres, rings and surfaces in the vast Saturn system. It will map the atmosphere of Saturn in three dimensions to determine temperature and pressure profiles with altitude, gas

coninued next page

Mars and Saturn *(from page 9)*

composition, and the distribution of aerosols and clouds. It will also measure thermal characteristics and the composition of satellite surfaces and rings.

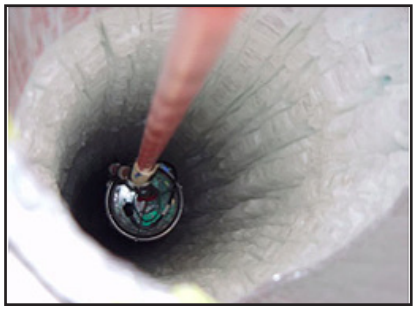
[8] The VIMS instrument aboard the Cassini spacecraft has detected near-IR spectral features on at least three of Saturn's satellites that are indicative or suggestive of organic molecules. One entire hemisphere of the satellite Iapetus is covered with low-albedo material that shows a spectral signature of aromatic hydrocarbons (3.3 microns) and the -CH2 stretching mode bands of an aliphatic component. Organics absorbing at 3.44 microns are suspected at the south pole of Enceladus, and also on the surface of Phoebe. Organic material may originate on icy bodies in the current epoch by various processes of energy deposition into native material, or they may fall to the surface from an external (probably cometary) source. Some organic material may be pre-solar, having originated in the interstellar medium before the formation of the Solar System. Using the techniques of remote sensing, its detection and analysis continues.

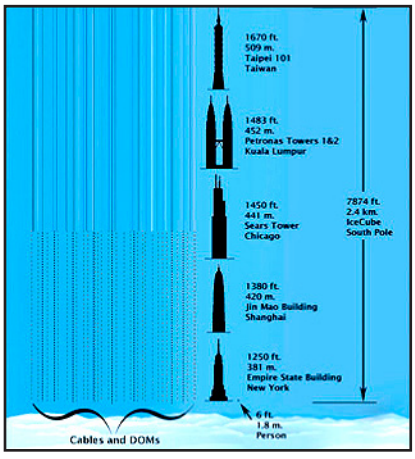
Ice Cube *(from page 3)*

we believe as much as 99 percent of all their explosive energy is in neutrinos. IceCube will let us see all we've been missing.

Antarctic ice is well-suited to making a neutrino detector, providing an enormous mass that is ultra-transparent. If a neutrino hits an atom in the ice, there might be a small flash of light that the sensors will detect from as much as 100 yards away. A high-energy neutrino may produce a trail telling us where it came from and what its energy was. Hopefully this will add a new dimension to our understanding of the universe.

IceCube was constructed by drilling 86 holes, each 1.5 miles deep, into the Antarctic plateau at the South Pole, 800 miles south of McMurdo Station near the coast. The University of Wisconsin-Madison leads this project and developed a special 4.8-megawatt hot-water drill.





Each completed hole was equipped with a string of 64 sensors before being allowed to refreeze. Construction began in 2006 with operations running round the clock during the short Antarctica summer, when the Sun shines for 24 hours a day.

IceCube is an international collaboration, but the U.S. funded 87 percent of the project's $279 million cost.

IceCube is expected to observe 100 neutrino interactions per day, and has already recorded one with over 100 trillion electron-volts (EVs) of energy, seven times the highest energy expected from the largest man-made particle accelerator, the LHC near Geneva.

We look forward to IceCube discoveries that are really cool.

*—**Written by Robert Piccioni** and adapted with permission from his newsletter www.guidetothecosmos.com;*
Edited by R.K. Koslowsky, SCAS Member
http://worldperspective.bravehost.com/astronomy.html

Notes:

[1] In 2002, the Nobel Foundation recognized Ray Davis and Masatoshi Koshiba for establishing the science of neutrino astronomy. Davis and Koshiba's experimental work led to great interest in designing and building neutrino-based telescopes, such as IceCube, used to probe the depths of the universe with a form of x-ray vision far better than actual x-rays. This is because neutrinos pass through intervening matter without significant distortion. Once undetectable neutrinos can now be captured and used to paint a picture of new cosmic sources. Furthermore, their multiple varieties (electron-neutrino, tau-neutrino, and muon-neutrino) can provide information about their celestial origins as some transform in mid-flight. By studying the ratios of neutrino flavors at the detector, the cosmic source that sent them can be better understood.

For more information, please refer to the Sonoma Skies Newsletter article "Astrophysics and the field of Neutrino Astronomy," R.K. Koslowsky, June 2010, Volume XXXIII No. 5, pp. 8-9.

[2] On November 10, 2010, Dr. Robert Piccioni brought humor and a light touch to a heavy topic – Albert Einstein's many discoveries including his two theories of relativity – at our SCAS general meeting. He humanized the man, voted by Time Magazine as the greatest person of the twentieth century, by sharing Einstein's first thirty years of failure and rejection and his subsequent success in redefining the physical world we live in. Look for the write-up on this meeting in the Sonoma Skies Newsletter article "Einstein for Everyone," R.K. Koslowsky, December 2010, Volume XXXIII No. 11, pp. 1-3.

[3] Images taken from *http://www.icecube.wisc.edu/info/neutrinos/*

February 2011 Observing Highlights

2/2 New Moon, 6:31 PM

2/4 Algol minimum at 0042

2/6 Algol minimum at 2132

2/6 Crescent moon near Jupiter

2/9 Algol minimum at 1821

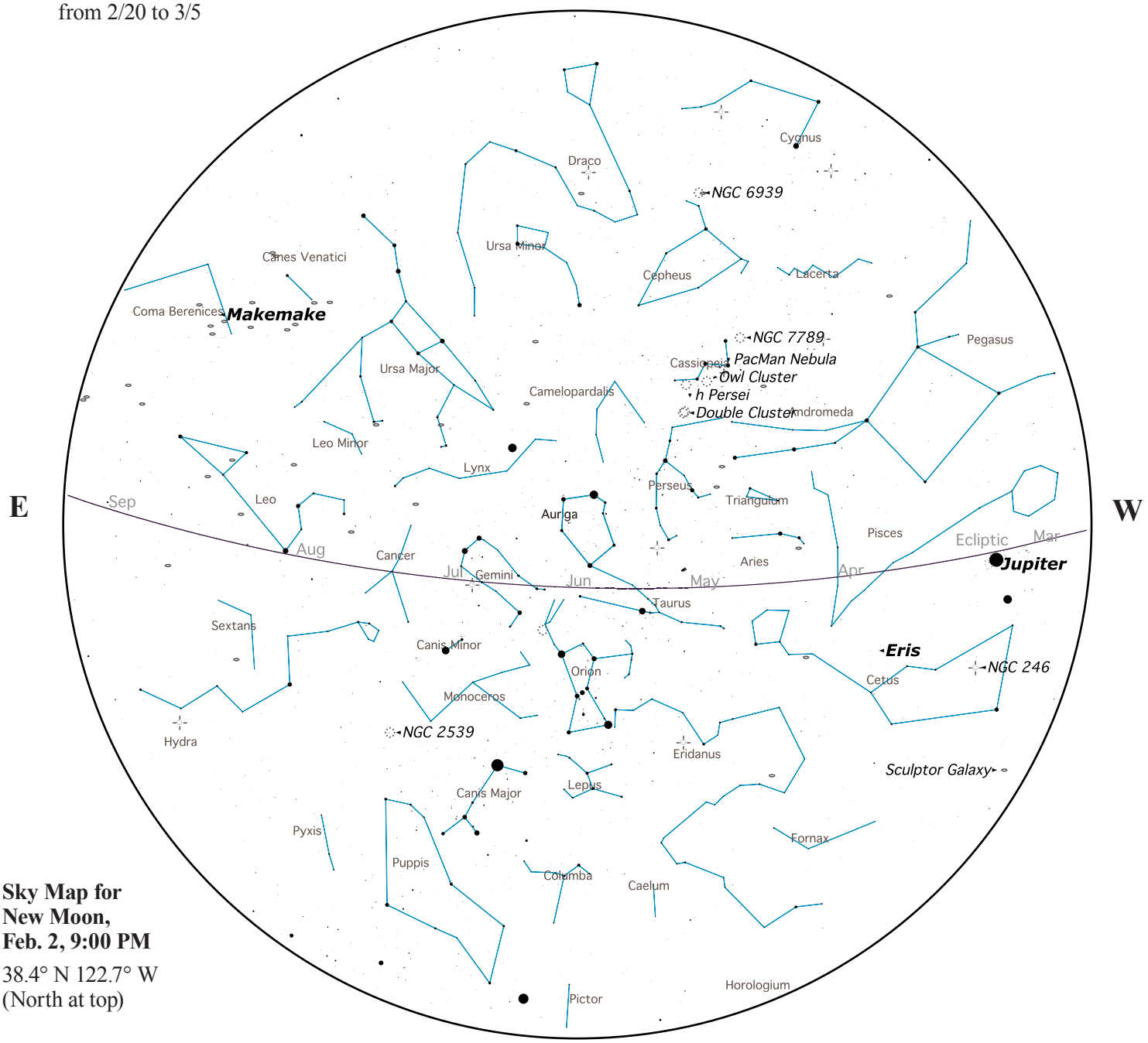
2/18 Full Moon, 12:35 AM. Full moon occurs about 23 hours before perigee. Large tides through 2/21

2/20 Zodiacal Light in West through 3/5. Zodiacal Light is a faint, tapering band of light that rises from the horizon along the path of the Ecliptic and which is caused by sunlight reflecting from fine particles in the plane of our solar system. You will need a very dark location with no light pollution in the west. Try looking at 7:30pm or so from 2/20 to 3/5

2/24 Algol minimum at 0227

2/26 Algol minimum at 2317

Saturn is emerging into its full glory! It will be up all night by late March as it approaches opposition in early April. Now is the time to start turning those telescopes to this perennial solar system favorite. The rings begin the year with about 10° of tilt, which decreases to about 7° in early June and then increases to nearly 15° by the end of the year. Saturn recently entered the southern celestial hemisphere, where it will remain for the next 14 years. This means that our view of Saturn here in the north will deteriorate somewhat for the next decade—a good reason to get out there and observe it now.



Sky Map for New Moon, Feb. 2, 9:00 PM

38.4° N 122.7° W
(North at top)

February 2011

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1 **RFO Night Sky Class** 7:00 PM	2 	3	4 **School Star Party** Evergreen Elementary Algol minimum	5
6 Crescent Moon near Jupiter; Algol minimum	7	8 **School Star Party** SCOE Science Fair	9 **SCAS Meeting** 7:30 PM Algol minimum	10 	11	12
13	14	15	16	17 **School Star Party** Windsor Creek Elementary	18  Large Tides	19
20 **RFO New Docent Training** 1-5 PM	21 Zodiacal Light in West thru 3/5	22	23	24  **School Star Party** Sequoia Elementary Algol minimum	25	26 **RFO Pubic Observing** Solar: 11-3 Night: 7PM > Algol minimum
27	28					

See Pages 4-5 for more detailed information on events.

SCAS Membership Application/Renewal

Annual Membership dues are $25 due June 1.
(New members joining after Nov. 30 pay $12.50)

Please complete this form and give to the Membership Director or a Board member with your check, payable to "SCAS," at the next meeting, or mail your dues to: SCAS, P.O. Box 183, Santa Rosa, CA 95402-0183.

❑ **New** ❑ **Renewal** ❑ **Family** (no extra charge)

Name(s): _____

_____

Email: _____
(Required for *Sonoma Skies*)

Address: _____

City/State/Zip: _____

Telephone: _____

I am interested in serving in one or more of these areas:

❑ School Star Parties ❑ SCAS Board

❑ Newsletter ❑ Striking Sparks

❑ Mentoring Young Astronomers

❑ Yosemite Star Party ❑ Other_____

New Members please note interests and hobbies you would like us to know about:

_____

_____

_____

New Members please share your reason(s) for joining SCAS, and how you heard about the club:

_____

_____

_____

Your dues include our monthly newsletter *Sonoma Skies*, membership in the Astronomical League and its *Reflector* magazine, discounted subscriptions for *Sky and Telescope* and *Astronomy* magazines, great guest speakers at our monthly meetings, the annual Star-B-Que, and opportunities to meet new and interesting people who share your passion for the night sky and many aspects of astronomy and science.

Welcome to the SCAS!

Sonoma County Astronomical Society (SCAS)

Membership Information

Meetings: 7:30 PM on the second Wednesday of each month, in the Multipurpose Room of Proctor Terrace Elementary School, 1711 Bryden Lane at Fourth Street, Santa Rosa, unless otherwise announced in this publication. The public is invited.

Dues: $25, renewable June 1 of each year. New members joining between December 1 and May 31 pay partial-year dues of $12.50.

Star Parties: See the Events section for dates and times.

Rental Telescope: Members are eligible to borrow the club's 80mm refractor with tripod. Contact any Board member listed below.

Egroup URL: Connect with other members about going observing, observing reports and chat about astronomy and news items from AANC and *Sky & Telescope*. Hosted by Keith Payea at *kpayea(at)bryantlabs.net*. Any SCAS member is welcome to join. Visit *http://groups.yahoo.com/group/scas* and click the "Join" button, or send an email to *scas-subscribe(at)yahoogroups.com*

Discount Subscriptions: For ***Sky & Telescope***, new subscribers may send a check for $32.95 payable to "SCAS", with your complete mailing address, directly to: Larry McCune, 544 Thyme Place, San Rafael, CA 94903. Once you have received the discount rate, you may renew your subscription by sending your personal check with the renewal notice directly to Sky Publishing. Discount subscriptions to ***Astronomy*** Magazine occur annually in October. Check *Sonoma Skies* for details.

Library: SCAS Librarian David Simons hosts a library of astronomy books that may be checked out by members at SCAS meetings, to be returned at the next meeting. Videotaped lectures on astronomy may be rented for $3 per month.

Sonoma Skies is the monthly newsletter of the Sonoma County Astronomical Society (SCAS). Subscription is included as part of membership. Articles and member announcements are welcome and are published on a first come, first served basis, space permitting, and may be edited. **The deadline for submissions is 7 days prior to the end of each month.** Mail to: Editor, SCAS, P.O. Box 183, Santa Rosa, CA 95402, or email *publications(at)sonomaskies.org*

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