SJAA EPHEMERIS

SJAA Activities Calendar

Jim Van Nuland

(late) December

21 Winter begins 4:04 a.m.

27 Dark Sky weekend. Sunset 4:58 p.m., new moon sets 5:11 p.m. Henry Coe Park's "Astronomy" lot has been reserved.

January

2 Houge Park star party. Sunset 5:01 p.m., 36% moon sets 11:13 p.m. Star party hours: 7:00 until 10:00.

10 General Meeting at Houge Park. 8 p.m. Our speaker is Dr. Ruslan Belikov of NASA/Ames, Searching For Other Earths

16 Astronomy Class at Houge Park. 7:30 p.m. The topic will be Telescopes & Eyepieces.

16 Houge Park star party. Sunset 5:15 p.m., 58% moon rises 11:57 p.m. Star party hours: 7:00 until 10:00.

17 Dark Sky weekend. Sunset 5:16 p.m., 48% moon rises 12:57 a.m.

24 Dark Sky weekend. Sunset 5:24 p.m., 1% moon rises 6:59 a.m. Henry Coe Park's "Astronomy" lot has been reserved.

30 Houge Park star party. Sunset 5:31 p.m., 21% moon sets 10:09 p.m. Star party hours: 7:00 until 10:00.

February

7 General Meeting at Houge Park. 8 p.m. Elections for the Board of Directors. Our speaker is Dr. Dave McKay of NASA/Ames, "What We Have Learned From the Mars Phoenix Lander"

14 Dark Sky weekend. Sunset 5:47 p.m., 66% moon rises 11:48 p.m.

20 Astronomy Class at Houge Park. 7:30 p.m. The topic will be Advanced Chart Reading.

20 Houge Park star party. Sunset 5:53 p.m., 12% moon rises 4:59 a.m. Star party hours: 7:00 until 10:00.

21 Dark Sky weekend. Sunset 5:54 p.m., 7% moon rises 5:32 a.m. Henry Coe Park's "Astronomy" lot has been reserved.

The Board of Directors meets before each general meeting. Call the hotline for the exact time.

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

The Curious Case of SGRs

Paul Kohlmiller

A star which ends with a bang, a supernova, leaves behind substantial evidence – a supernova remnant (SNR). The SNR will include a black hole if the progenitor star had a sufficiently high mass (at least 20 times the mass of the sun). Stars with less than the requisite mass will leave a neutron star behind.

A typical neutron star is 1.5 times as massive as the Sun but only 20 km in diameter. As implied by the name, the star consists mostly of neutrons (Chandra/Harvard Website). Their progenitor stars were rotating and now, like the ice skater performing a spin and pulling in their arms, they are spinning very fast – several times a second.

The fast rotational speed contributes to a magnetic dynamo effect. Radiation is beamed along the axis of the magnetic axis – close to but not quite the same as the axis of rotation. This beamed radiation may point in our direction at times and we see it as a pulse of electromagnetic radiation. It can be in almost any part of the EMR spectrum from radio waves up to gamma-rays. We call these stars pulsars. They were originally called LGM for Little Green Men because the period of time between pulses, seconds down to milliseconds, was so constant that it seemed they must be artificial. There are more than 1000 known pulsars.

Nearly all pulsars are detected in suboptical wavelengths: microwaves and radio waves. A few are higher but it must require a lot of energy to emit at the most energetic wavelengths. These higher energy pulsars are found in the optical wavelengths, X-rays and gamma-rays. Some are called DINs for Dim Isolated Neutron stars that may emit in optical wavelength. Another group is called the Anomalous X-ray Pulsars or AXPs. And then there are those that emit in gamma-rays, the Soft Gamma-Ray Repeaters or SGRs.

All of these higher energy pulsars appear to have extremely strong magnetic fields, possibly 1000 times stronger than the already strong fields around normal neutron stars. The strongest magnetic fields created in a laboratory is 10^5 gauss. Anything stronger and you will destroy the magnet and probably the entire laboratory.

Continued on page 3

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National Aeronautics and Space Administration
www.nasa.gov

This Jet Propulsion Laboratory/Caltech float was in the 2008 Rose Parade in Pasadena, California. It celebrates "50 Years of Space Exploration." The "rocket" is launching Explorer 1 on January 31, 1958, America's first satellite to reach Earth orbit. Also see spaceplace.nasa.gov/en/kids/float.

JANUARY 2009

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
2009 is the International Year of Astronomy! Make this your year to discover the universe!			**National Get Organized Month.** Start with a Spitzer Slyder puzzle and organize the pieces of a space image.	1 **Saturn's rings** discovered in 1610 by Galileo Galilei. Could a spaceship land on Saturn's rings? **New Year's Day**	2	3
4 FIRST QUARTER **Earth at perihelion,** the time of year when it is closest to the Sun. Why do planets go around the Sun?	5	6	7 **In 1610, Galileo** discovered Jupiter's four largest moons. See how all the moons in the solar system compare.	8	9	10 FULL MOON
11 **Amelia Earhart** became the first woman to fly solo across the Pacific in 1935. Born a bit later, she probably would have wanted to be an astronaut.	12 **Martin Luther King Day**	13	14	15 **The Stardust mission** return capsule brought samples of Comet Wild 2 home to Earth in 2006. How did it capture the samples?	16	17 LAST QUARTER **Ben Franklin's birthday**, 1706. Ben played the violin. Maybe he played a fine one made during the "little ice age."
18	19	20	21	22	23 **In 1960, the bathyscaphe Trieste** descended 35,810 feet to the deepest known point in the ocean. We can also study the ocean from space!	24 In 1986, **Voyager 2** was the first spacecraft to fly by Uranus and its moons. What did Voyager see?
25 NEW MOON **Observe the Weather Day** and don't forget about space weather! It affects us in powerful ways.	26 **Chinese New Year**	27	28	29 **National Puzzle Day.** Solve some word find puzzles about Earth air, land, water, and life.	30	31 **Explorer 1** launched in 1958. (See image caption above.) Another recent Rose Parade float celebrated many current JPL space missions.

Month of January: spaceplace.nasa.gov/en/kids/spitzer/slyder
Jan. 1: spaceplace.nasa.gov/en/kids/phonedrmarc/2002_april.shtml
Jan. 4: spaceplace.nasa.gov/en/kids/phonedrmarc/2002_july.shtml
Jan. 7: spaceplace.nasa.gov/en/kids/sse_flipflop2.shtml
Jan. 11: spaceplace.nasa.gov/en/educators/teachers_astronaut_images.shtml
Jan. 15: spaceplace.nasa.gov/en/kids/stardust/aerogel.shtml
Jan. 17: spaceplace.nasa.gov/en/kids/ulysses
Jan. 23: spaceplace.nasa.gov/en/kids/misr_tsunami
Jan. 24: spaceplace.nasa.gov/en/kids/vgr_fact3.shtml
Jan. 25: spaceplace.nasa.gov/en/kids/goes/spaceweather
Jan. 29: spaceplace.nasa.gov/en/kids/earth/wordfind
Jan. 31: spaceplace.nasa.gov/en/kids/float

The Last Eclipse ... Ever?

Akkana Peck

January skies are surprisingly bare of planets.

Saturn rises in mid-evening and is up for the rest of the night, transiting a bit past 3 am at just under 60 degrees. The ring tilt is less than a degree — almost edge-on. How visible are they? The rings, composed of small rocky/icy particles ranging from dust sized to several meters in diameter, are less than a kilometer thick, so they disappear when edge-on. But at what angle do they disappear? Watch Saturn over the next month or two and find out.

The rings will widen from now until mid-summer, then they'll rapidly close until they're exactly edge-on during the first week of September. But here's the bad news: Saturn is a daytime object in September. So January is actually your best chance to see Saturn with nearly edge-on rings.

In one sense they might be more interesting now than they would have been in September: the angle the rings present to us, on Earth, is different from the angle they present to the Sun. Why does that matter? Because as long as the rings aren't edge-on to the sun, they'll create a shadow on the planet. In September when we ourselves cross the ring plane, the rings will also be pretty much edge-on to the Sun (less than .4 degrees). But this month, the angle of the rings to the Sun is a bit over 3.3 degrees (compared to the roughly .8 degree tilt we'll see from here). That means you might be able to see the shadow of the rings on the planet, perhaps without seeing the rings themselves. It's not much of a shadow, but it might be enough to be visible, and we wouldn't be able to see it in September even if the Sun didn't get in the way.

Why does the ring tilt change with respect to the sun? Why are the rings' shadows always changing like that? It's Saturn's "axial inclination" — the tilt of the planet's axis with respect to the plane of its orbit. It's the same effect that causes Earth's seasons, but Earth's axial tilt is only 23°, while Saturn's is a healthy 26.7°. So when you watch changes in the shadow of Saturn's rings on the planet, you're watching Saturn's slow progression through its seasons. And you thought that Mars was the only planet where we could see the seasons progress!

Meanwhile, Venus continues its excellent evening apparition, with dim Uranus also hovering in the evening twilight. Uranus is mostly too faint to see in twilight, but on the evenings of January 21st and 22nd, Venus passes about a degree and a half northwest of its dimmer neighbor.

The Curious Case of SGRs
Continued from page 1

A magnetar has fields of at least 10^14 gauss. Perhaps 1 in 10 neutron stars wind up in the magnetar state. It is also possible that a neutron star may flip between being a typical pulsar and a magnetar.

They are also quite rare. There are 4 confirmed SGRs discovered so far and two other candidates are still being analyzed. About 10 AXPs have been discovered. DINs are a new category but an object named SWIFT J195509+261406 was recently discovered. This is the first star that acts somewhat like an SGR/AXP but in the lower energy levels. It could be an object that lies between SGRs/AXPs and DINs. After the optical bursts, some infrared bursts were detected and then the object ceased any bursting behavior. There are no signs of a SNR or massive stellar cluster near this object. (ESO Website)

But the history of SGRs is also quite strange. We are not surprised by the fact that astronomers found one, then a couple, then a few, then dozens of extrasolar planets. We kind of expect discoveries to be done this way – find one, perhaps by mistake – then find many. This has also been true for pulsars, black holes, gamma-ray bursts and supernovae – all things that would seem to be somewhat related to SGRs. But the first SGR was found in 1979 by the Russian Venera spacecraft that was then en route to Venus. Two other SGRs would be found that year. No other SGRs would be confirmed until 1998 and none have been confirmed since then.

One hypothesis regarding SGRs is that they are an older form of AXPs. Although gamma-rays are more energetic than X-rays, it might be the case that emitting gamma-rays is something a magnetar does just before it loses that extra strength magnetic field - a dying gasp if you will.

What evidence is there that SGRs are older than AXPs? First, the SGRs have been found farther away from an SNR, indicating that more time has elapsed between the supernova event and when the SGR is found. Second, the SGRs rate of rotation is slowing more quickly than is the case for AXPs. It is thought that the rotation speed decreases more quickly for older pulsars. Third, SGRs have a greater propensity for briefly flaring up - perhaps another indication of that last gasp of a magnetar.
One such flare caused a significant disturbance in the earth's ionosphere. (Paper by Mandea and Balsis)

And, of course, the rarity of SGRs might be an indication that it is just a transient state along the road to stellar senescence. But the number of such objects is so small that it is hard to draw solid conclusions.

NASA Space Place

What Happened to Comet Holmes?

Dr. Tony Phillips

One year after Comet 17P/Holmes shocked onlookers by exploding in the night sky, researchers are beginning to understand what happened.

“We believe that a cavern full of ice, located as much as 100 meters beneath the crust of the comet’s nucleus, underwent a change of phase,” says Bill Reach of NASA’s Spitzer Science Center at the California Institute of Technology. “Amorphous ice turned into crystalline ice” and, in the transition, released enough heat to cause Holmes to blow its top.

Anyone watching the sky in October 2007 will remember how the comet brightened a million-fold to naked-eye visibility. It looked more like a planet than a comet—strangely spherical and utterly lacking a tail. By November 2007, the expanding dust cloud was larger than Jupiter itself, and people were noticing it from brightly-lit cities.

Knowing that infrared telescopes are particularly sensitive to the warm glow of comet dust, Reach and colleague Jeremie Vaubaillon, also of Caltech, applied for observing time on the Spitzer Space Telescope—and they got it. “We used Spitzer to observe Comet Holmes in November and again in February and March 2008,” says Reach.

The infrared glow of the expanding dust cloud told the investigators how much mass was involved and how fast the material was moving. “The energy of the blast was about 1014 joules and the total mass was of order 1010 kg.” In other words, Holmes exploded like 24 kilotons of TNT and ejected 10 million metric tons of dust and gas into space.

These astonishing numbers are best explained by a subterranean cavern of phase-changing ice, Reach believes. “The mass and energy are in the right ballpark,” he says, and it also explains why Comet Holmes is a “repeat exploder.”

Another explosion was observed in 1892. It was a lesser blast than the 2007 event, but enough to attract the attention of American astronomer Edwin Holmes, who discovered the comet when it suddenly brightened. Two explosions (1892, 2007) would require two caverns. That’s no problem because comets are notoriously porous and lumpy. In fact, there are probably more than two caverns, which would mean Comet Holmes is poised to explode again.

When?

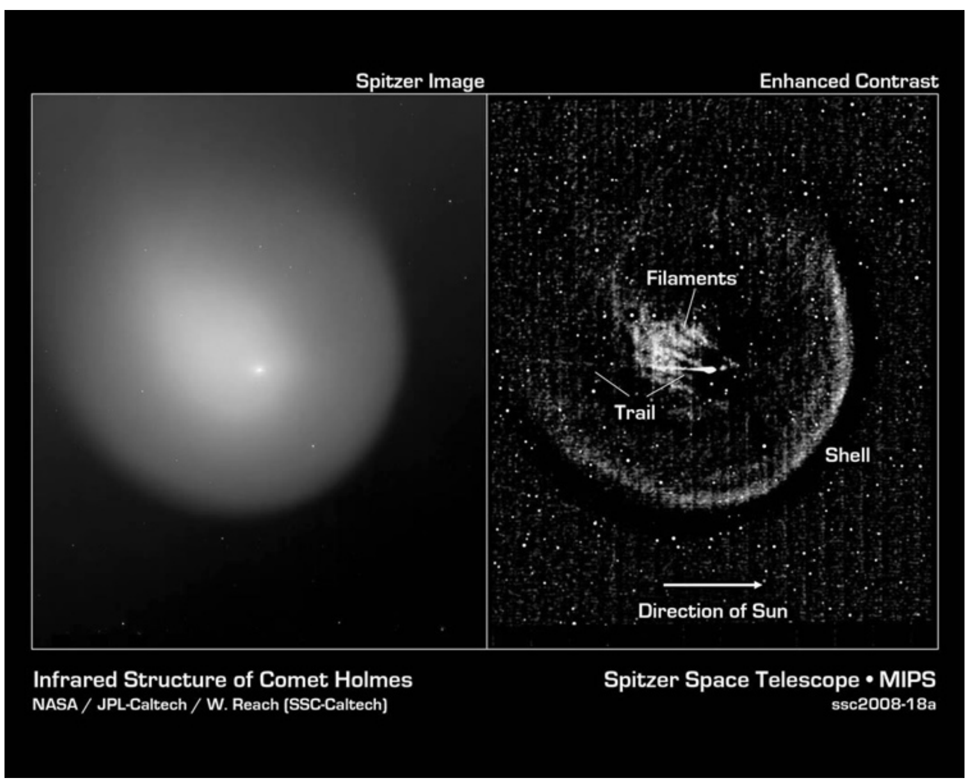
“The astronomer who can answer that question will be famous!” laughs Vaubaillon.

“No one knows what triggered the phase change,” says Reach. He speculates that maybe a comet-quake sent seismic waves echoing through the comet’s caverns, compressing the ice and changing its form. Or a meteoroid might have penetrated the comet’s crust and set events in motion that way. “It’s still a mystery.”

But not as much as it used to be.

See more Spitzer images of comets and other heavenly objects at http://www.spitzer.caltech.edu. Kids and grownups can challenge their spatial reasoning powers by solving Spitzer infrared “Slyder” puzzles at http://spaceplace.nasa.gov/en/kids/spitzer/slyder.

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



Comet Holmes as imaged by the multiband imaging photometer (MIPS) on the Spitzer Space Telescope. The enhanced contrast image at the right shows the comet’s outer shell and mysterious filaments of dust.

Observe or Image the Moon for NASA

Steven Nelson

Many of us have observed the Moon and tried to take pictures or look at an extreme libration (tilting) that shows areas not usually seen from Earth. Dave North has always impressed me as the SJAA's local loony expert. NASA is planning to crash a rocket into either the north or south pole area of the moon to look for traces of water. These observations are being supported by amateurs. There were contributions by several California astronomers in early December. Turns out I assisted the NASA AMES astronomer on one of her first research runs - when she was an undergraduate at UCSC in the early 1980's. So keep posted on how things went on the website at the end of the article.

Excerpts from "LCROSS Public Observation Campaign Program Overview"

NASA's Lunar Crater Observation and Sensing Satellite (LCROSS) Observation Campaign is seeking assistance from amateurs to develop a library of digital images of the lunar poles under varying phase and librations.

With a scheduled launch date as early as Apr. 24, 2009, the current plan is to impact the North Pole during the August-September time frame. If the target pole changes to the South Pole, Faustini crater becomes a favorable candidate crater for the LCROSS impacts. The floor of Faustini is believed to be older and probably possesses a fine-grained regolith (soil) that is more easily lofted into sunlight as opposed to a rocky-bottomed crater floor.

To prepare for the LCROSS impacts of a permanently shadowed crater, Dr. Diane Wooden of NASA's Ames research Center is developing targeting protocols for ...IRTF atop Mauna Kea on the Big Island of Hawaii. ...

To ensure that the scattered light of the ejecta cloud enters the spectrometer's entrance slit, the positioning of the telescope needs accurate to about 0.5 arc seconds. Most moderate to large telescopes have positioning uncertainties larger than this and rely on nearby guide stars to improve their pointing accuracies. However, for the moon, guide stars are not practical. Instead, Wooden and her colleagues need to point to recognizable craters near the poles and offset to the position of the impacts.

During the months leading up to the launch, amateur astronomers are encouraged to image the north and south poles of the moon. The goal is to obtain images that determine the scale of recognizable features observed in the wider field of view on amateur telescopes when compared with the higher spatial resolution near-infrared IRTF images. A secondary goal is to compare the dynamic range of images that allow the verification of detection of subtle variations in topography and albedo. This exercise also may help amateurs to prepare for obtaining images of the impact plumes. The impact plumes will occur in shadowed regions, but these shadowed regions likely will be adjacent to lit regions The coordinates for preferred locations for LCROSS impacts within permanently shadowed craters, as of October 2008, are given below. Crater A and F are in the north polar region and Faustini and Shoemaker are in the south polar region.

Crater A: 84.45 N, 62.2 E Crater F: 86.2 N, 38.4 E
Faustini: -87.5 (S), 83.1 E Shoemaker: -88.3 (S), 43.4 E   ...

Amateur astronomers have the opportunity to create a useful reference imaging data set for the LCROSS impact. They can be helpful in the development of an amateur astronomer atlas of the lunar poles at different lighting and libration conditions. Images taken under different phases produce subtle shifts in crater shadows that affect determination of "crater centers" in images. This can affect the determinations in the offsets between these reference craters and a target crater. Furthermore, images taken during phases on the opposite side of full moon may reveal subtle features that are useful in refining the pointing accuracy.

The message goes on to tell the details of reporting observations and downloading images.

For more information about the LCROSS Observation Campaign, visit:

http://lcross.arc.nasa.gov/observation.htm

Amateur discussion at http:/groups.google.com/group/lcross_observation and you can image cashcraft_20081208127etseq2.jpg from the files for that group.

The Last Month In Astronomy

DEC-11-2008 ***JWST Testing Cool*** The first of the 18 segments that form the mirror for the James Webb Space Telescope is ready for cryogenic testing. The testing will involve temperatures down to -414 degrees F. http://www.astronomy.com/asy/default.aspx?c=a&id=7732

DEC-09-2008 ***CO2 found*** The Hubble Space Telescope has discovered carbon dioxide on an extrasolar planet. The planet, HD 189733b, is way too hot to harbor life. However, the detection proves that the CO2 detection is possible. If the same technique works on a more-Earth like planet, it may indicate organic processes are at work. The CO2 is found using spectrum analysis in the near infrared range. Previous research has found H2O and methane in the atmosphere of the same planet. http://www.jpl.nasa.gov/news/news.cfm?release=2008-230

DEC-04-2008 ***Mars Science Lab Delayed*** The expected 2009 launch of the Mars Science Laboratory is cancelled. The next time the lab can be launched is in late 2011. The 2009 date had to be forfeited because the lab will not be finished and tested in time to make the October launch. The lab will be 10 times as massive as the current Mars rover and be able to handle rougher terrain and move at faster speeds. http://www.jpl.nasa.gov/news/news.cfm?release=2008-226

NOV-30-2008 ***STS-126 Lands*** The Shuttle Endeavour landed in California on November 30. The shuttle was later flown back to the Kennedy Space Center at a cost of $1.8 million. However, there were no extra fees for luggage. The shuttle Discovery is scheduled to launch Feb. 12 to deliver the last set of solar panels to the ISS. Then, on May 12, Atlantis is scheduled to complete the Hubble repairs. http://www.nasa.gov/mission_pages/shuttle/shuttlemissions/sts126/index.html

NOV-29-2008 ***Chandrayaan-1 Starts*** The Indian Space Research Organization's lunar orbiter has started making observations. It released a proble that impacted near the south pole on November 14. Two different spectrometers were turned on in late November. More instruments will be turned on during December. http://www.sciencedaily.com/releases/2008/11/081124131241.htm

NOV-26-2008 ***Glycolaldehyde-ness*** A sugar molecule, thought to be critical in the origin of life, has been detected in a part of the galaxy where habitable planets are likely. Previously, the glycolaldehyde molecule has only been detected near the center of the galaxy, a bad neighborhood for supporting life. The detection was made using a radio telescope in France called IRAM. The researchers are from the University College London and is funded by the UK's Science and Technology Facilities Council. http://www.sciencedaily.com/releases/2008/11/081125090344.htm

NOV-18-2008 ***Space-based Internet Tested*** A new Internet-like network has been developed for use in space. Rather than use TCP/IP, the new network uses DTN, Disruption-Tolerant Network protocol. The packets of information are stored unless they can be successfully transmitted to the next node. This new protocol was developed by a partnership between NASA and Vint Cerf, a VP at Google. http://www.jpl.nasa.gov/news/news.cfm?release=2008-216

NOV-14-2008 ***Electrons and Magnetars*** A magnetar is a neutron star. A neutron star is a remnant of a supernova, a star so dense that a teaspoon of it would weigh a hundred million tons. Such a star becomes a magnetar when it has a strong magnetic field that is starts to twist the crust of the star. Research using the XMM-Newton and Integral spacecraft has found evidence of large electron currents around these magnetars. This means that there is now a link between an observed phenomenon (the high magnetic field) and a physical processes (the electron current). http://www.astronomy.com/asy/default.aspx?c=a&id=7608

Editors' Note – At the February general meeting, the members of the SJAA vote on the open seats on the SJAA board. At the following board meeting in March, the board members elect the officers. Candidates for the board may have short statements placed in the Ephemeris. All such statements are presented "as is" to the greatest extent possible and do not represent an endorsement by the SJAA Ephemeris staff, the SJAA board or any other SJAA members.

The editors did receive one such statement for the January issue of the Ephemeris but a decision was made to print this and any other statements in the February issue since that is when the election takes place. As mentioned above, all statements will be printed without any editorial corrections except to save space (recommended length is 200 words or less). The deadline for the February issue is January 10th.

Telescope Loaner Program

The loaner program offers members a means to try scopes of various sizes and technologies before you buy. It is one of the real jewels of being a member of the club. Scopes are available for all experience levels.

The inventory is constantly changing. As of this writing (early November) these scopes were available.

Scope Number	Scope Description
42	11x80 Binoculars
49	3.5" Orion StarBlast
43	4.5" f/8 Orion XT Dob
44	4.5" f/8 Orion Skyview Newt
37	4" Celestron Flourite Refractor
51	120mm Orion 120ST
13	6" f/8 Orion XT Dob
34	8" f/10 Dynamax S/C
14	8" f/8.5 Homemade Dob
35	8" f/6 Meade Newt on EQ Mount
40	8" Celestron Super C8+ S/C
12	8" f/6 Orion XT Dob
45	10" f/5 Dob (Earletron)
33	10" f/4.5 Orion DSE Dob
47	12" Meade Lightbridge
7	12.5" f/7 Homemade Dob
39	17" f/4.5 Zeiders Truss Dob
10	Star Spectroscope

For up to date information please see the loaner program web page: http://www.sjaa.net/loaners

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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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Membership Type:

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

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Bring this form to any SJAA Meeting or send to the club address (above).

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