

SJAA EPHEMERIS

The Night between the Centuries

Guy Ottewell

Birth comes in darkness, flowers into day. The wave of dark we call "the night of December 31 / January 1" separates, as it rolls around the planet, a past space of light and a future space of light. As do all waves before and after; but in this case the past was a part of the Twentieth Century, the coming day is out in the Third Millennium.

This is an artificial count imposed on the eternal train of waves, no real transition. Yet it could be: it could be during this special night that you decide to become a different person — a poem is conceived — an insight leads to a new age. To show it could happen, it has happened before. The artificial transition of exactly two hundred years ago did coincide with such a real transition. There are insights that come at night because we are undistracted, half-dreaming, and there are out-sights that come at night for the physical reason that we are facing outward from the Sun. The night between the eighteenth and nineteenth centuries was one of the upward steps in our perception of the cosmos. Not one of the few greatest steps, but one of the sharpest.

The cosmos, once, was the vast earth we stand on and the ungraspable sky. The sky consisted of the misty air, and above that the seven lanterns that fidget like beings, Moon, Mercury, Venus, Sun, Mars, Jupiter, Saturn, and beyond them the ceiling of stars. In 1543 Copernicus rearranged all (Aristarchus had thought of it eighteen centuries earlier, but was dismissed): Sun in the middle; circling around it Mercury, Venus, Earth, Mars, Jupiter, Saturn, stars. Since then, it has remained only to feel the star-shell, sort it into such distances that the former cosmos dwindles to a grain within it.

And, nearer home, to sort the distances between the planets. They grow gradually farther apart, rather like the widening spiral of a nautilus shell: each is not quite twice as far outward as the last. Surely there is some divine regularity in this spacing? Johannes Kepler conceived (on July 19, 1595) the beautiful idea that if the planets are set in concentric spheres, then the five "Platonic solids" or regular polyhedra (tetrahedron, cube, octahedron, dodecahedron, icosahedron) could fit between them. In 1766, Johann Daniel

Titius of Wittenberg pointed out (in his translation of someone else's book) a less fantastic rule, which in 1772 Johann Elert Bode added as a footnote to a textbook of his own; it is known as Bode's Law or the Titius-Bode Law. If we call the distance of Mercury from the Sun 4, then Venus is at $4+3=7$, Earth $4+6=10$, Mars $4+12=16$, Jupiter $4+48=52$, Saturn $4+96=100$. It works quite well. Divide these numbers by 10 and you have the distances as we now

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SJAA Activities Calendar

Jim Van Nuland

February

- 2 Astronomy Class II, Hough Park, 7:30 p.m., Jay Freeman, *Binocular astronomy*
- 2 Hough Park star party. Sunset 5:34 p.m., 67% moon sets 2:38 a.m.
- 10 8 p.m. Hough Park, General Meeting: Dr. Kevin Zahnle, a theoretical physicist at NASA Ames Research Center, will speak on "Asteroid 4769 Castalia vs. Planet Venus: Home Movies of Big Bolides." Plus board election! Vote early and vote often!
- 15 Galileo born, 1564
- 16 Hough Park star party. Sunset 5:49 p.m., 31% moon 2:11 a.m.
- 17 Fremont Peak star party. Sunset 5:49 p.m., 22% moon rises 3:04 a.m.
- 24 Coe and Peak star party. Sunset 5:56 p.m., 3% moon sets 7:22 p.m.

March

- 2 Astronomy Class III, 7:30 p.m., hall, Hough Park, *Planetary Observing*
- 2 Hough Park star party Sunset 6:03 p.m., 51% moon sets 1:32 a.m.
- 10 8 p.m. Hough Park, General Meeting, Peggy Bernard will tell about the Vulcan Project.
- 16 Hough Park star party Sunset 6:16 p.m., 47% moon rises 1:55 a.m.
- 17 Fremont Peak star party Sunset 6:15 p.m., 38% moon rises 2:42 a.m.
- 24 Coe and Peak star party Sunset 6:02 p.m., 0% moon rises 6:44 a.m.
- 30 Astronomy Class IV, 7:30 p.m., hall, Hough Park, *The Moon*
- 30 Hough Park star party Sunset 6:29 p.m., 36% moon sets 0:30 a.m.

24 Hour News and Information Hotline: (408) 559-1221

www.sjaa.net

Night between the Centuries

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reckon them in "astronomical units" (Earth's as 1); not precisely, but within a decimal digit or so. In 1781 William Herschel discovered the first new planet, Uranus. It was indeed at $4+192=196!$ (or near enough). Bode's "Law" seemed confirmed as a fact of nature.

Except — what about $4+24=28$, the fifth position? There was no planet here! Only a suddenly larger and logically intolerable leap from Mars to Jupiter.

The missing planet's distance, obviously, was known, hence its speed of motion, and like the other planets it must move along the zodiacal band of the sky (whose center is the ecliptic). The serious search for it was organized by Baron Francis Xavier von Zach, in 1800. He divided the zodiac into 24 15-degree sections and assigned them to the astronomers of Europe. The most outlying, though in the best climate, was Father Piazzi, in Sicily; and one of the twists of the tale is that Piazzi had not yet learned of his role, and had not received the star-charts of the block of sky he was to search, by the end of the year; so that he did not know he was supposed to be helping solve the problem when he solved it. He was at work on a different project. As so often, someone like Herschel or Piazzi patiently surveying stars (or, in our time, asteroids) discovers something by what Horace Walpole called *serendipity* — in the manner of the fairy-tale Three Princes of Serendip or Ceylon, who sailed in search of one thing and kept finding others.

Bode's "Law" — unlike the universal laws of Newton that explained Kepler's laws of motion, that in turn explained Copernicus — was a descriptive rule that worked only so far. Though it seemed reconfirmed when Ceres was found at the missing position, after that it broke down. Neptune, when found in 1846 as a delayed consequence of the discovery of Uranus, was not at the next position but well short of it (not at 38.8 astronomical units but at 30); and Pluto, found as an even more indirect

consequence in 1930, was not at 77.2 a.u. but at 39 where Neptune should have been.

And Ceres was not "the missing planet." It was far too small; and then other small bodies began to be found in the same region; the first by Olbers in March 1802, another by Harding in 1804, another by Olbers in 1807; they continued to be given, like the planets, the names of great deities — Pallas, Juno, Vesta. Then came a hiatus of 38 years; but the discoveries resumed, with a vengeance, so that known

There was no planet here! Only a suddenly larger and logically intolerable leap from Mars to Jupiter

asteroids now number in the thousands, unknown ones probably in the millions. The status of Ceres is that it was the first and largest of this new class of bodies, rather as Pluto is now proving to be the first and largest of the "Kuiper Belt" or Transneptunians.

The story is one of coincidences

(Ceres was discovered on 1801 Jan. 1, definitely recovered on 1802 Jan. 1) and manifold aspects (the gap occupied by the asteroids also divides the inner "terrestrial" rocky planets from the outer "Jovian" gas giants). And it involves many of the mathematician-physicist-astronomers of the time: Bode himself; Lalande; Laplace; Euler, who "saw beauty bare" in that his simple equation ties together all shapes (the number of vertices minus edges plus faces minus solids equals one); Lexell, whose comet (even more than Brook's which we see this year) played dangerously close games with Jupiter and also with the Earth; Heinrich Olbers of the Olbers Paradox (if the universe is uniform and infinite the starry sky should be as bright all over as the Sun); and Gauss, who used the crisis to push mathematics as well as astronomy into an advance.

Footnote: On Oct. 19, 2000, while writing this, I found myself called downstairs by Professor of Chemistry Tony Arrington to a party for the Hundredth Birthday of the Photon. A crowd ate a cake on which an icing

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Lost and Found: Paul Mancuso brought a Foucault tester (made in the 1950's) to the January SJAA General Meeting. SJAA member (and one of the club founders) Walt Krumm made the tester, and Paul used it when testing his first mirror - a 6 inch f/5 high school project. Paul found the tester and some of Walt's calculations when cleaning out a closet recently. Photo by Jane Houston Jones

artist at a local store had had to trace the most elaborate design of his life, embodying the graphs and equations with which Max Planck founded quantum mechanics on this date in 1900.

[Ceres will have an opposition in 2001 on July 7, and should be visible all summer around Sagittarius. — Ed.]

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The Shallow Sky

Giants Start Sinking

Akkana Peck

The twin gas giants, Jupiter and Saturn, still rule the night sky. Still ensconced in the Hyades star cluster, they're surrounded by a myriad stars of roughly the right magnitude to be confused with planetary moons. Using a small telescope, can you tell the moons from the stars? Hint: color and steadiness (the moons should twinkle less than nearby stars) should help set them apart from nearby point-source stars.

This month is a good month to watch the giants before they start sinking into the sunset sky. This has been a fascinating Jupiter apparition, with the Great Red Spot showing redder than it has in years, lots of turbulent activity in the SEB separation trailing behind the spot, white rifts appearing and disappearing from the North Equatorial Band, a new thin tropical band appearing in the north, and numerous though faint festoons streaming into the equatorial zone. It changes from day to day — don't miss it!

Saturn has also been very interesting: its generous ring tilt makes the gap in the A ring much easier to see than in past years, and there's been some nice color in the banding on the planet. As we race ahead of Saturn

in our shorter orbit, we should be able to watch the shadow of Saturn on its own rings grow throughout the month.

Turn to look to the western sky, and you can't miss Venus, blazing to its greatest brilliancy of the year, magnitude -4.6, on the night of the 22nd. If you haven't pointed a telescope at it yet, or even if you have, late February is a good time to do so: it's still high enough to get a good look, but it's moving into crescent phase and growing rapidly larger. You may be able

to see it change over a period of a week or two: keep watching! If you start early, while it's still high in the sky, look for the difficult greyish markings on the surface of its clouds, or for the even more elusive "ashen light" that some observers swear sometimes illuminates the dark side of Venus. No explanations for this phenomenon are really satisfactory: it could conceivably be volcanic or atmospheric activity on Venus, or it could be purely imagination on the part of the observers who have reported it. I haven't seen it myself, and I'm not convinced it exists — but you can bet I'll be looking for it just in case!

Early risers (or people staying up late) can get a preview of this year's Mars opposition. The red planet rises after midnight and is already starting to grow and show small amounts of detail. In addition, it's quite close to Antares, whose similarity in color and brightness earned it its name, the "Rival of Mars" (Ares being the Greek equivalent of the Roman god Mars); don't miss the battle

as Mars passes its rival and grows brighter in the process. On the morning of February 21, it passes very close to Beta Scorpii; the two

should make a nice sight in a telescope.

Mercury, Uranus, Neptune and Pluto are not well placed for observing this month.

February is also the beginning of the season for looking for the zodiacal light. This faint band of light, extending upward from the horizon at sunset (or at sunrise at other times of year) and following the ecliptic, is caused by dust and debris orbiting the sun in the plane of the ecliptic — think of an extremely wide belt of microscopic asteroids. It's very faint and very large — think Milky Way — so you usually need very dark and transparent skies to see it. Take a look!

This has been a fascinating Jupiter apparition, with the Great Red Spot showing redder than it has in years.



Jane Houston Jones and Dr. Jeff Moore discuss the Galileo project at the January SJAA general meeting. Photo by Morris Jones

Highlights and Pielights

Dave North

On February 13, the moon will look as if it is nearly straight overhead. This is the "highlight" day of the month — the moon's greatest northern declination.

It will look almost full to the uninitiated, but those of us who've been watching it carefully will know it's there are still a few days yet.

The terminator will be running through an area that's not as popular as many — at first glance, it seems like there's nothing much near the terminator.

One of the more spectacular sites is now about a day old: the Aristarchus Plateau with its incredible collection of rilles and the wonderful Schroter's Valley (Vallis Schroteri, for those who must).

The eastern section of Rima Sirsalis will be peeking out, but it will be better tomorrow.

But what's well placed tonight?

First, Galileo! This is an ideal night to find this unobtrusive little crater, named for the first person to publish descriptions of telescopic observations of the Moon.

It will be right about in the center of the disk, very near the terminator. It's visible in just about any scope with glass lenses, and won't look a much different from worst to best.

Why, you might ask, such a paltry crater for such a great name? Because of the influence of the Vatican. It was ... safer to name a small crater in an obscure part of the moon. Why take chances with burning at the stake?

Okay, that's a fun hors d'oeuvre, but what's for dinner?

Cheese.

To be precise, The Thin Cheese. One of the most interesting craters on the Moon, really.

If you let your gaze drift south past the monstrous Oceanus Procellarum, until you're at the termina-

tor just a bit north of Clavius (you know Clavius, right?) you'll see a group of three large craters.

The largest is Schickard — almost the rival of Clavius, with obvious darkening in the floor caused by the infamous Mare Material, a basaltic lava.

Just south of it is the wonderfully apellated Phoclydes, about half it's size, but also with some faint traces of lava flooding.

Sandwiched between the two and slightly closer to the terminator is our main target: Wargentin.

Now there's a satisfying lava flow: it comes all the way up to the brim! It looks like a pie, or to the astronomish

wags who nicknamed it, a thin round of cheese. Of course, they were playing on the folk humor that the moon is made of green cheese.

Never could figure out that one myself, since it isn't green...

So what happened? Best guess is this particular crater was formed over a weak spot, over a volcano waiting to happen.

When it did, the lava started flowing, and it flowed until it just barely filled up the crater ... no more, no less. One of those fascinating coincidences that we see so often.

The level of the "floor" of the crater is, in fact, about 1000 feet above the mean surrounding terrain!

If you look closely, you can see small wrinkle ridges and other deformations in the lava fill, but the real chal-

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Fellow lunatics Craig Wandke (left) and Robert Garfinkle trade notes on the Apollo space program at the January SJAA general meeting. Craig presented slides from his trip to Space Camp in Huntsville, Alabama. Photo by Morris Jones

lenge is to see if you can find anyplace where the lava flowed over the edge, or any obvious sign of a rim that sticks above the interior flow.

Thin cheese indeed! It's Hot Rock Pie! Good though...

Wargentin? He was the director of the Stockholm Observatory in the late eighteenth century. Stockholm may not seem like the best place for astronomy, but it's not all that far from Tycho's observatory, place of some of the most important observations ever. Can't be all that bad.

Besides, he was also a statistician back when that was a newish game. Also, in the only picture I've seen of him, he wore a silly wig (at least, the artist stuck it on him).

I tried on a sillier wig over the new year's break, but I think it did more for me than that old white powdered thing did for him.

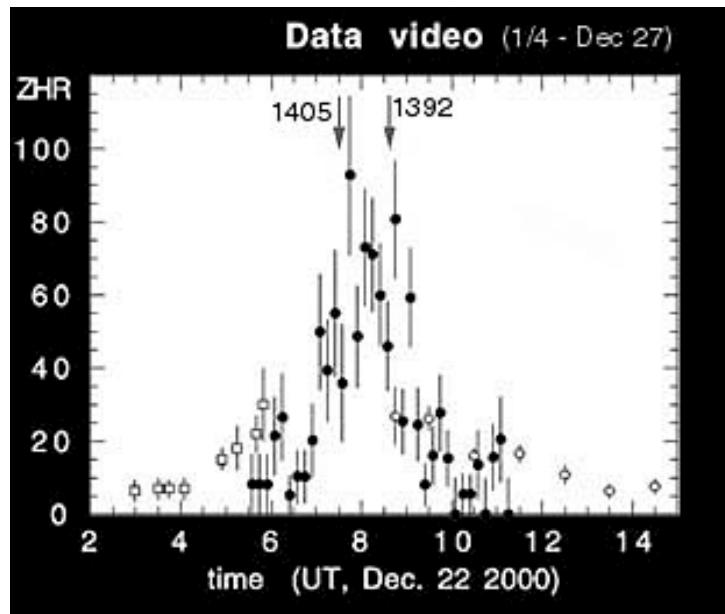
But enough of that.

The shower was observed by us from California, using video imaging and spectroscopy techniques. Present were Peter Jenniskens, Ming Li and Duncan McNeill at a site near Parkfield, and Pete Gural, Mike Koop, Mike Wilson, and Chris Angelos at the San Antonio Lake camp-ground near King City. Local weather allowed observations

between about 5:40 and 11:00 UT. Results await data analysis, however several relatively bright Ursids were seen (magnitude +1 to -1), some of which may have been recorded by the low-resolution spectrograph. A zero magnitude Ursid left a half-second duration wake. Six intensified cameras at each site recorded the variation of flux and Ursid light curves. Some very minimal visual observations between operations of equipment are reported below and suggest a ZHR of about 50 half an hour after the peak, comparable to the Perseid shower in summer.

Observations of the December 22 Ursid outburst show that the relatively fresh ejecta of comet 8P/Tuttle bear much resemblance in morphology to the similarly fresh Leonid storm dust of comet 55P/Tempel-Tuttle. Both show an early release of sodium atoms, relative to magnesium atoms, thought to be caused by a falling apart in many fragments after entering the Earth's atmosphere and thus exposing volatile minerals.

More 2000 Leonid reports:
<http://leonid.arc.nasa.gov/live.html>
More 2001 Ursid reports:
<http://leonid.arc.nasa.gov/leonidnews29.html>



Ursid counts from three intensified video cameras positioned at Parkfield, CA. Open symbols show visual counts by Dutch (left) and Japanese (right) observers (Updated: Dec. 27).

Meteors

Meteor Field Notes

Dr. Peter Jenniskens

Leonids 2000 confirm models that predict storms in November 2001/2002

First analysis of the flux measurements during this year's Leonids show all dust trail encounters as predicted by the current shower models. Not only is the timing close to observed value, but also the level of activity is much as predicted. This gives further support to similar predictions for November 2001 and 2002, when meteor storms of 6,000-7,000 Leonids/hr peak rates are predicted as compared to 3,700 Leonids/hr for the 1999 storm.

Early Ursid results — December 22, 2000

The Ursid shower did flare up significantly between 5 UT and 9:30 UT, December 22, 2000 with a peak around 7:20 (+/- 10) UT, close to the predicted maximum at 7:29 UT.

Upcoming School Star Parties

Jim Van Nuland

School star parties are great fun! Sign up with Jim Van Nuland if you can participate at a school star party. Visit his web page at

<http://www.svpal.org/~jvn/>

Feb. 13 — John Muir Middle, Daytime.

Feb. 28 — Rosemary Gardens / Bachrodt School

Mar. 1 — Laurelwood Elementary, E. San Jose

Mar. 6 — Randol Elementary, SE San Jose

April meeting: Annual Swap Meet and Auction; Sunday April 8, Hough Park

Astronomy Club Conference Set For April 7

April 7th is the date for the annual one day conference sponsored by the AANC, the Astronomical Association of Northern California. This year the event will be held at the new Chabot Space and Science Center in Oakland. The theme this year, The Northern California Astronomy Club Conference, will showcase the astronomy clubs and give everybody the opportunity to exchange ideas and get to know each other.

Astronomy clubs from all over Northern California will give brief presentations of their unique club activities or pretty much what ever they'd like to talk about. Everyone will be able to see and hear about the telescope restoration of Rachel, Leah and the Transit Telescope. There will be plenty of time to check out the new Chabot, of course! Everybody will receive a ticket for the planetarium

show, and some of the day's events will take place in the planetarium. There will be workshops for astronomy club newsletter editors, and much more.

There will be a speaker or two, and more information will be available soon.

One special planned feature will be the first (annual?) Full Moon Day-time Indoor Messier Marathon, using the Ask Jeeves Planetarium Zeiss Universarium Mark VIII star-ball projector (and binoculars).

Pre-registration by April 1 is \$20 for adults, \$10 for ages 10-18. Registration is available at the door for \$25. More information is available online at <http://www.aanc-astronomy.org>.

For more information about Chabot Space and Science Center, including directions, please visit the website <http://www.cosc.org/default.htm>



SJAA member Alex Crichton works with John Dobson to do final figuring on his 12.5" mirror. Alex participated in John's Fall 2000 classes at the California Academy of Sciences, and completed his mirror here at a "telescope finishing party" held by Jane Houston Jones and Morris Jones. Alex showed his completed 12.5" dobsonian at a recent January Hough Park star party. Photo by Morris Jones.

Celestial Calendar

February 2001

Richard Stanton

Lunar Phases:	Date	Rise	Trans	Set
FQ 06:02 PST	01	11:06	18:18	00:31
FM 23:11 PST	07	15:55	00:11	07:31
LQ 19:24 PST	14	00:19	05:27	10:25
NM 00:21 PST	23	07:45	12:38	17:39

Nearer Planets:	R. A.	Dec.
Mercury, 0.64 a.u., Mag. -1.7		
07 07:23 12:57 18:32	22:03.3	-08:57
17 06:13 11:38 17:03	21:23.3	-11:35
27 05:31 10:48 16:04	21:10.0	-14:36

Venus, 0.48 a.u., Mag. -5.5		
07 08:51 15:07 21:23	00:10.1	+03:38
17 08:22 14:51 21:21	00:34.1	+07:52
27 07:47 14:27 21:07	00:50.0	+11:20

Mars, 1.31 a.u., Mag. +0.1		
07 01:29 06:33 11:37	15:35.8	-18:12
17 01:15 06:15 11:15	15:57.5	-19:27
27 01:01 05:57 10:53	16:18.6	-20:30

Jupiter, 4.90 a.u., Mag. -2.3		
07 11:44 18:53 02:05	03:57.9	+19:49
17 11:06 18:16 01:29	04:00.4	+19:58
27 10:30 17:40 00:54	04:04.1	+20:11

Saturn, 9.12 a.u., Mag. +0.8		
07 11:26 18:24 01:26	03:29.6	+16:52
17 10:48 17:46 00:49	03:30.9	+17:00
27 10:10 17:09 00:12	03:32.9	+17:10

SOL Star Type G2V	Intelligent Life in System ?
Hours of Darkness	
10:30 07 07:05	12:22 17:39 21:24.1
10:10 17 06:54	12:22 17:50 22:03.4
09:48 27 06:41	12:20 18:01 22:41.6
	-15:15 -11:55 -08:17

Astronomical Twilight:

JD 2,451,947	07	Begin	End
957	17	05:27	19:17
967	27	05:14	19:27

Sidereal Time:

Transit Right Ascension at Local Midnight	
07 00:00 = 09:02	
17 00:00 = 09:41	
27 00:00 = 10:21	

Darkest Saturday Night: 24 Feb 2001

Sunset	17:57
Twilight End	19:24
Moon Set	19:24
Dawn Begin	05:18
Hours Dark	09:55

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SJAA Loaner Scope Status

All scopes are available to any SJAA member; contact Mike Koop by email (loaner@sjaa.net) or by phone at work (408) 473-6315 or home (408) 446-0310 (Leave Message).

Available Scopes

These are scopes that are available for immediate loan, stored at other SJAA members homes. If you are interested in borrowing one of these scopes, please contact Mike Koop for a scope pick up at any of the listed SJAA events.

# Scope	Description	Stored by
1	4.5" Newt/ P Mount	Tim Roberts
6	8" Celestron S/C	Lee Barford
7	12.5" Dobson	Doug Hendricks
23	6" Newt/P Mount	Raghu Srinivasan
24	60mm Refractor	Al Kestler
30	7" f/9 Newt/Pipe Mount	Mike Koop
31	8" f/8 Dobson	Robert Morgan

Scope Loans

These are scopes that have been recently loaned out. If you are interested in borrowing one of these scopes, you will be placed on the waiting list until the scope becomes available after the due date.

# Scope	Description	Borrower	Due Date
3	4" Quantum S/C	Bob Havner	2/2/01
10	Star Spectroscope	Steven Nelson	3/9/01
11	Orion XT6 Dob	David Findley	3/9/01
13	Orion XT6 Dob	Li Chung Ting	3/15/01
16	Solar Scope	Jack D. Kellythore	2/26/01
19	6" Newt/P Mount	Iikka Kallio	3/15/01
27	13" Dobson	Bill Maney	1/22/01
28	13" Dobson	Michael Dajewski	3/2/01
29	C8, Astrophotography	Doug Graham	3/18/01

Extended Scope Loans

These are scopes that have had their loan period extended. If you are interested in borrowing one of these scopes, we will contact the current borrower and try to work out a reasonable transfer time for both parties.

# Scope	Description	Borrower	Due Date
2	6" f/9 Dob	John Paul De Silva	?
8	14" Dobson	Andrew Pierce	4/6/01
9	C-11 Computar	Paul Barton	Indefinite
12	Orion XT8 Dob	Nick DeMonner	2/27/01
15	8" Dobson	Daron Darr	3/7/01
21	10" Dobson	Ralph Seguin	Repair
26	11" Dobson	David Cameron	3/8/01
32	6" f/7 Dobson	Sandy Mohan	3/8/01

Waiting List

8" Celestron S/C, Al Kestler; Orion XT8 Dob, Steve Sergeant

Note: Do you have space to store a scope or two? Please contact me and let me know so that we can store scopes on short notice.

Submit

Members are encouraged to submit articles for publication in the SJAA Ephemeris. Send articles to the editors via e-mail to ephemeris@sjaa.net.

To subscribe to or unsubscribe from the SJAA Mailing List send email to sjaa-request@sjaa.net with a blank subject line followed by a single text line that says "subscribe" or "unsubscribe"

San Jose Astronomical Association Membership Form

New Renewal

Membership - \$15

Junior (younger than 18 years old) - \$6

Sky and Telescope - add \$30 to membership

(Sky & Tel will not accept multiyear subscriptions)

Make checks payable to "SJAA"

Bring this form to any SJAA Meeting
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Observational Astronomy Class
February 2, 7:30 p.m.
General Meeting, Elections,
Dr. Kevin Zahnle
February 10, 8:00 p.m.