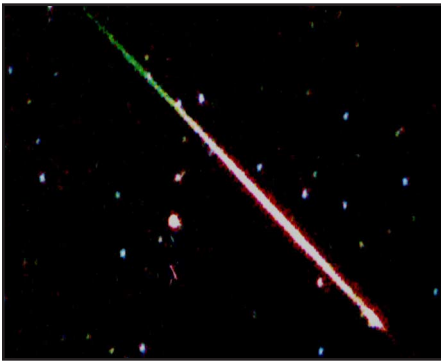




## The Leonids Light Up the Sky!



*Photograph by Tom McMahon*

The widely anticipated Leonid meteor shower was quite a show! In this article, reports from various SVASers watching from a variety of vantage points (even Australia!) are combined.

The Leonids are salted by the comet Tempel-Tuttle with a period of 33.2 years, which passed by the Earth in the spring of 1998 but is still producing a fine display. Temple-Tuttle has an elliptical orbit that goes out to Jupiter and is slightly inclined to the ecliptic. (See [http://www.digitalradiance.com/sng/tempel\\_tuttle.htm](http://www.digitalradiance.com/sng/tempel_tuttle.htm) for a 3-D view of Temple-Tuttle's orbit.)

The Leonids get their name from the location of the radiant, which is in the sickle of the constellation of Leo. For a meteor to be considered a "Leonid", its track should trace back to this radiant. In case you were wondering, the radiant is caused by the intersection of the Earth's orbit with the tangent line from the comet's orbit. If the comet's orbit is close to the ecliptic (like Temple-Tuttle's), the radiant will be primarily in the direction the Earth is moving in its orbit (which is toward Leo in November). A few meteors of the show were not on this track, so were not Leonids, just random bits of space dust.

The Leonids are known for producing

some bright meteors and many faint ones. Colors tend toward yellows because of the material in the meteor. (See <http://www-space.arc.nasa.gov/~leonid/> for more information on the spectrum recorded for over 50 meteors.) It is estimated that a piece of comet debris as small as 1 gram will produce a zero magnitude meteor (as bright as Jupiter)! This year's show had several that were at least a gram and a few that were ground lighters! Of course, most were the size of a grain of sand. One mentioned by Art Freeman sounded interesting – he reported seeing a meteor that spiraled down. While the numbers of meteors reported from various SVASers were good, they don't reach the peaks of the great meteor storms of the past (in 1966, estimates of 100,000 meteors per hour were recorded at the peak!)



*Photograph by Dave Buchla*

### Cedar Ridge – Dave Buchla

I watched with fellow SVASer Larry Harrison, and some friends from my observatory in Cedar Ridge. Like most northern CA observers, the sky was partly cloudy early on and it looked like it might be a bust! We did some observing of Saturn and Jupiter while waiting for sky to clear.

A little before 1 am, the sky had cleared when suddenly we saw a beautiful bright Leonid that went from one side of the sky to the other! Larry exclaimed "The show has started!" and we said, "That's one!" Soon we were seeing a meteor every five or ten seconds until about 2:30 am when the rate seemed to increase to one every second or two. The peak probably

lasted for 10 minutes. I ran into the house and got my son and wife out to enjoy the best part of the show. The pre-event hourly estimate from NASA Ames indicated an expected 2000 per hour (San Francisco), which I believe is about right for what we were observing during the peak.

The most memorable observation for me was when I saw three meteors in almost the same "track" and time in the north about 3 am. I have never been lucky enough to see three at once before. Another one, that other observers reported too, left a track for at least 10 minutes. Unfortunately, I had just stopped a photograph (in accordance with Murphy's law) and all I saw was the light on the ground! I knew immediately I missed a great one, especially from the excitement of my guests.

By 4 am, when Larry decided to leave, our "collective" count (everyone contributing) was 770 in the three-hour period from 1-4 am. I stayed up until 4:30 but stopped counting. While I can only imagine a true meteor "storm", this one was the best I've seen in many years of sky watching and one I'll never forget.

### Auburn Dam Overlook – Bud Bafia

The Leonid Meteor Show at the Auburn Dam Overlook turned out to be a great success. My estimate is that there were around 800 to a 1000 people there throughout the night with several hundred staying past 3 am. It was very, very cold and damp. There was a constant wind coming up over the ridge where most of us were. By 1 am there was no standing or seating room available on the ridge and people were still coming. The crowd was backed up all the way into the parking lot. We had random cloud cover coming from the southwest up until midnight, after which the clouds cleared out for good and the seeing was great. The valley filled

## President's Perspective



I am sure we will be seeing plenty of reports about the fantastic Leonid meteor shower but I just wanted to report my two cents. I will keep it very brief so that others can have their reports published. I have terrific memories of the evening and lots of very nice people to remember. I think these events bring out the greatest folks with the single goal to see the wonders of the cosmos. Did we ever see the wonders of the cosmos on November 17<sup>th</sup> along with possibly 2000 other observers? I later heard of cars reportedly parked blocks away from the site. As I was leaving, I even saw several visitors walking to their cars two blocks down Pacific. Maybe Bud Bafia or John

Anderson has the parking spot count for the lot to determine what our count might have been. All I know is there were many people with many questions.

At first glance, I saw a sea of cars parked and many coming and going. I could see a full parking lot and loads of people walking around. My thanks to those who resisted yelling about the many car headlights. The volunteers and the crowd were very behaved but a few visitors had a couple of hot toddies too many. I was amazed at the number who remained to see the main body of the shower. Even though many left by two o'clock, the main bulk of observers stayed till the chilly end.

I want to express my deepest appreciation to those who volunteered their time and telescopes to give our visitors a look at the night sky prior to the real

show. I can't begin to tell you how many people thanked the Society for doing such a wonderful thing for the public. I am not sure who showed up, as the evening got very busy for my viewing station and me. I do remember Bud and Joe Bafia, Dar and Rudy Pinson, Melanie Smith, and also John Anderson. My special thanks go out to Bud Bafia for his efforts and his undying support for the SVAS. He made several trips up the hill to arrange the event. He even needed to make special arrangements to have the bathrooms opened because someone (Parks District) forgot to take care of that SMALL detail. Thanks again Bud!!!

For all of you who attended the 2001 Leonid Meteor Shower, I don't need to say any more. For those of you who missed it, you will have to wait until 2099 for the next one.

*Walt Heiges*

## S.V.A.S. 672<sup>nd</sup> General Meeting – November 16, 2001

President Walt Heiges called the 672<sup>nd</sup> meeting to order at 7:41 PM. **New Members & Guests:** Welcome to all the new members and guests; Ralph Hall, Steve McGough, Mike Hampton, Bruce, David, Dough, Michael, Pat and Leo.

**Announcements:** Ralph Merletti reminded members that on Friday Dec 14<sup>th</sup> there will be a partial solar eclipse, about 14 percent, between 12:30 and 1:30 PM, and recommended that SVAS members get together and set up some public viewing for this event.

Chris Hulbe announced that the next college star party will be on December 14<sup>th</sup> at Rasmussen Park.

Chris also asked members having information about Art Leonard to send it to him. Chris is working on putting together a biography as a tribute to Art and his 70 plus years of contributions to astronomy. Articles for the newsletter are always needed. Please send them to Chris Hulbe and Dave Buchla.

Walt mentioned that the scholarship application letter is being sent out this month. The application can also be obtained from our website.

Walt announced that the SVAS has joined in a new program called "PLANET PALS" with POLLiWOGS.com. This program is designed for non-profit organizations to purchase nature related items over the internet. Members of the organizations receive discounts on each item purchased and the organization in return receives a donation from polliwog.com each quarter. The website, polliwogs.com, should be up and running very soon.

A special raffle will be held at the March annual meeting for a Cave Optic 8" Newtonian telescope with equatorial mount. Tickets are now available for \$1. As not all of our 300 plus members get to attend the monthly meetings, a set of 10 tickets is enclosed in this newsletter. The proceeds from this raffle will help support our society.

**Guest Speaker** Liam McDaid gave an excellent talk about Adaptive Optics and VLT (Very Large Telescopes), centered around the 100-meter telescope OWL (OverWhelmingly Large Telescope) the French are building. His talk presented the different viewpoints, pros & cons, advantages, and difficulties of building such a large telescope. Additional information can be found at [www.eso.org/projects/owl](http://www.eso.org/projects/owl).

Meeting adjourned at 9:31 PM.

*Bud Bafia  
Secretary, SVAS*



8" ASTROLA will be a raffle prize at our Annual General Membership Meeting.

## Special SVAS Raffle

To enter the raffle, return your raffle ticket stubs along with a check or money order made payable to SVAS.

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# Leonids

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with fog all the way up to the top of the ridge. At times throughout the evening, the fog would rise above the horizon but not enough to affect the meteor viewing. I believe the wind helped keep the fog off the ridge.

There were half a dozen telescopes there to entertain the crowd until the shower started. Walt had the Schultz scope, I had my 8", Melanie Smith had her new 12.5" Starfinder, John Anderson had his, and several other folks brought their scopes. Jupiter, Saturn, and the Orion Nebula provided excellent entertainment throughout the entire evening, especially after the clouds cleared.

The first sighting was around 12:30 am when a large meteor crossed from north to south. It left a trail from Leo to well past Orion. By all accounts (all the people I spoke to), this was the biggest and brightest of the entire evening. I did not get to see it as I was moving my scope between Jupiter and Saturn for a family to view. Actually, I missed the first dozen or so meteors for the same reason, as many people wanted to look through the scope. It seemed like every time I would be centering the eyepiece the crowd would start to Hooow & Oooow and I would only catch a glimpse or miss it completely. By 1 am when I was well frozen, I settled down in my chair to watch the meteors and just let people look through the scope on their own. The tracking was working great and it stayed centered on Jupiter.

I assume that the brighter and longer meteor trail means a larger size meteor. By my account, the majority (90%) of the larger meteors came from Leo's head and passed just beneath Orion's belt. There were also quite a few that seem to come from Orion heading west. The majority of the small or dim meteors seemed to be in the area of Leo's tail. They were mostly heading east to west. The peak occurred between 2:15 and 2:45 am. I counted anywhere between 6 and 12 meteors per minute. Some folks I talked to counted up to 16 per minute but not each and every minute. The meteors seem to come in spurts, not every minute during the peak. I would say 6 per minute during the 30-minute peak would be a good average. During the peak the meteors seem to be coming from everywhere. This made it frustrating to watch. You had to keep

moving your head to see the ones in the north, south or over my head and behind my back. I would estimate that I saw at least 450 meteors all night. This is not counting the ones I didn't see behind me or to far to left or right of me.

Some of the more spectacular meteors were: 1) Two very bright and colorful ones in parallel separated by about 3 degrees. They started together between Leo and Orion and ended at the same time in Orion. 2) Seeing six at once – two out of Orion, two to the right of Leo, one on the left of Leo and one to the right of Orion. 3) I was walking back from the bathrooms and this one was very bright and behind a faint cloud. It didn't have a long trail but it glowed very bright. And after it was gone, the sky behind the cloud continued to glow for some time. This one may have been heading straight toward us. That's what I thought anyhow.

## Auburn Dam Overlook – Stephen Berente

I arrived at Auburn at 10 pm. Channel Three was there with their "booed" spot light. A warm cheer was given when they finally left. On arrival, looking southeast a small opening in the sky was visible. It was looking a little grim. I set up my 10 inch f/5.6 dob on a lawn filled many curious observers waiting to see our long traveled cosmic visitors. I first viewed Saturn, its Cassini division was plainly visible. Next I viewed Jupiter, it was the best view yet of the giant. Jupiter's colors were boastful and three Jovian moons were detectable. By 1 am, 95% of the sky was clear. It was great, one green flash following right after a brilliant orange one. The Leonid show was plentiful and spectacular. I stayed until 2:30 am then called it a night.

## HGO – Charlie Coburn

Around midnight things started clearing up considerably and I started hearing what sounded like a fireworks show (Oooooohhhh... Ahhhh... etc.) I looked at my watch and it was 1:02am. Boy the prediction looked like it would be exactly correct.

As it turns out, I'd have to say that the model that showed a spiking curve peaking at 2:00 should be modified to show a sharp leading edge followed by a long tapering trailing edge. The show started strong and fast at 1:00 and I was still seeing meteors every 10 to 15 seconds

at 5:00am!

At 4:30 I noticed the Zodiacal Light extending well into Leo. It got quite bright causing the sky to be washed in a gray cone of light in the east (more south than the BurgerKing/Shell station glow, and cone shaped).

I think rather than try to give a meteor per hour rate, it would be more appropriate to tally oohhhs per minute. I'd say this was at least a 28 to 30 oohh per minute night!!! (And a good majority of the oohhs were for multi-meteor bursts.) It really sounded like a 3 hour fireworks show up there! Most people packed it in by 4:00.

## Truckee – Dave Ford

After considering all options, my wife and I headed for our ski club lodge in Truckee to watch the Leonids. We first got up at 12:30 am, but the sky was total soup--only Jupiter showed through the overcast. We tried again in about a half hour and the sky had partially cleared. In the next 2 hours and 10 minutes, we logged 405 meteors! I have never seen a display like it in 55+ years of observing. Even the clouds added rather than detracted from the viewing as the trails had a diffused effect when they went behind the clouds. Lots of 10 second plus smoke trails with many of the meteors. We saw bursts with 4-5 meteors visible at the same time.



SVAS member Joe Maloney (center), with astronomers David Levy (left) and Prof. Don McCarthy in Alice Springs, Australia, for the 2001 Leonids meteor event.

## Alice Springs, Australia - Joe Maloney

I observed the Leonids of '01 Meteor Heavy Rain from Alice Springs, Northern Territory, Australia. Central Australia was predicted to be the prime location for viewing this year's peaks, and, so far as I know, nowhere else in the world turned out to be better. There were 100 or so astro-travelers in Alice Springs for the

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# Leonids

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big event, including a team of NASA astronomers there for a truly scientific assessment of the rate.

Having traveled so far, and gotten our hopes so high, we were all unnerved when Saturday night brought dense clouds, unusual for this time of year in Central Australia, which is experiencing early summer in late November. We had a bus chartered and were prepared to travel 1,000 miles to get out from under the clouds, but, as of Saturday night, even that would not have sufficed. Fortunately, clear weather developed on Sunday, and no clouds crashed our party.

The particular group of which I was part, numbering about 30, was organized by the travel agency The Intrepid Traveler, and I would recommend them very highly. David Levy was the group's "Celebrity Astronomer", Donald W. McCarthy, PhD, of the Steward Observatory in Tucson Arizona, and Eric Hooper, PhD, University of Texas at Austin, also came along to provide technical commentary. We observed from a dry lake bed about 30 miles south of Alice Springs, a very dark location. The first meteors we saw, around 1:00 am (we had arrived about 12:45 am), were spectacular, seemingly headed straight for us, then passing directly overhead, then fading in the distance behind us, never burning out. We referred to these as the "Cruise Missile Meteors". The frequency of meteors built slowly, until about 2:00 am, by which time, and from that point until dawn, there were meteors anywhere in the sky you cared to look, all the time.

Looking to the Lion's Head as Leo rose in the east, the meteors actually defined the radiant for brief periods. By this I mean that, because meteors often came in groups of two or three, and because many left trails, there were brief periods when there were meteors and persisting meteor trails radiating in all directions from the central point in the backwards question mark of Leo, so that you could actually see the "point" from which all the meteors seemed to be radiating. Had this persisted for any length of time (which, unfortunately, it did not), the effect would have been like going to warp speed as observed from the bridge of the Enterprise.

Oddly, the meteors appearing in the

west seemed brighter, albeit less frequent. There were often groups of up to four very bright meteors on parallel courses appearing simultaneously. And, of course, all this action occurred against the backdrop of a sky that was utterly dark, breathtakingly beautiful, and completely novel. The southern third I had never so much as glimpsed. The middle third I had seen briefly on previous visits to Hawaii and the Florida Keys, but was hardly jaded to the sight. The northern third I had seen before, of course, but it was upside down. I had read that many times before, but seeing it was another disorienting matter altogether.

Dr. McCarthy is a scientist, and set out to narrate the meteor shower for posterity, dictating into a recorder. At first, he provided considerable detail about the brightness and location of each meteor. As the pace accelerated, however, he began to sound like that Italian tour guide in the Kodak commercial who speeds past thousands of years of history and architecture while providing an incomprehensible running commentary. "There goes a bright

one through the Southern Cross; another bright one through Orion, and past Sirius, directly overhead; there's three together passing through Eta Carinae; and another REALLY BRIGHT one passing through the LMC and SMC!!! THAT one just EXPLODED!!" Finally, he said, "oh, forget it".

My understanding is that, even from our ideal location, the meteor shower was not up to expectations. An hourly rate of 8,000 was predicted, but not reached. You could have fooled me. In any event, I saw thousands of meteors. Wendee Levy, David's wife, had a counter. She clicked on only those meteors she personally saw. Between 1:00 am and dawn, she counted in this reliable way more than 2,500 meteors.

Except for those fortunate few who saw the storm of '66, I saw more meteors than anyone else alive in the world has ever seen in one event. I got to see a giant slice of sky I'd never before seen, and may never see again. I got to visit a beautiful and wondrous nation. I associated with fine astronomers. What a great trip!

Compiled by Dave Buchla

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# Saturn Occultation Report

I observed the early morning lunar occultation of Saturn on September 10th from my residence in the Fruit-ridge area of South Sacramento. The sky was clear. I used a magnification of 111x on my 3" refractor. The planet appeared considerably dimmer than the bright limb of the last quarter moon. No surprise, since Saturn is approx. twice as far from the Sun as Jupiter, the ringed planet receives only 1/4 the intensity of sunlight that the largest planet receives. Around the scheduled time of disappearance - 5am PDT, I watched as Saturn was gradually swallowed by the moon at an oblique angle. I had some trouble trying to keep the scene in view, as the equatorial mount had not been put into the best position.

Reappearance was far more spectacular! At approximately 6:07am, part of the ring end was already noticeable when I spotted it at the same magnification. I had the mount in much better position now, and it was neat to see Saturn reappear in sections! At first, only an elliptical end of the ring system was visible - a unique aspect! Then gradually came the main ball of the planet, and finally the opposite end of the rings. Soon afterward, I pointed my scope at Venus to see a tiny dazzling disk. I also had good views of Jupiter, lunar craters and mountains. After sunrise, with 10x, I could still spot Saturn near the moon. However, later that morning, I could not relocate Saturn with 10x50s from my work site.

*Ralph Merletti*

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# Skywatcher's Diary: Dec., 2001

## Saturday, December 8

At the end of dusk, Orion begins his climb over the eastern horizon. Second-magnitude Bellatrix, the hunter's left shoulder, rises first. The other shoulder, Betelgeuse, pokes up next, followed shortly by the "belt" stars (Mintaka, Alnilam, Alnitak, in that order) and Rigel, the left foot. Three hours after sunset the remaining foot, Saiph, makes its appearance, and completes the well-known winter pattern of seven bright stars.

## Sunday, December 9

Tomorrow morning, before dawn, the crescent Moon stands 6 degrees (half a fist) to the upper left of Spica, the brightest star in Virgo. In addition to being the anchor for that zodiacal constellation, Spica is a useful marker for tracing the plane of the solar system. It lies within 2 degrees of the ecliptic, the imaginary line that represents the projection of that plane into space. The ecliptic runs between the Moon and Spica, tomorrow morning, but closer to the star. Regulus, in Leo, and high in the SW at that time, sits even closer to the ecliptic.

## Monday, December 10

Mars continues to hold forth as the brightest object in the southern early evening sky. The planet began this month as a zero-magnitude object, but has now officially dropped to 1st magnitude, registering in at magnitude 0.5. While offering a pleasing sight to the unaided eye, Mars is disappointing in a telescope. Earth has pulled far away from the Red Planet, compared to its closest approach last June. Consequently, Mars has become a small yellow-orange, featureless dot in amateur telescopes. The planet will continue to roam the SW evening sky, growing ever fainter, until June 2002, when it disappears into twilight as a 2nd-magnitude object.

## Tuesday, December 11

Jupiter rises at the end of evening twilight just to the right (south) of NE. This king of planets then dominates the sky until sunrise. It sits among the stars of Gemini, the Twins. Pollux and Castor, the brightest stars in that constellation, are 12 degrees (a fist width) to the planet's left. Jupiter is currently retrograding, so it is slowly slipping westward relative to the background constellation stars, and away from Pollux and Castor. Note its position relative to the surrounding stars, then look every week or two to detect its orbital motion.

## Wednesday, December 12

Tomorrow morning a thin "old" Moon, only 32 hours before New phase, hovers 8 degrees (a fist) to the upper right of Venus. The key to successfully spotting Venus is timing. The planet rises only 35 minutes before the sun. Start looking then, and wait for Venus to get high enough to find, probably about 10 minutes later. A flat, unobscured ESE horizon is necessary. Use binoculars to aid in initially spotting the Moon and planet against the bright dawn sky.

## Thursday, December 13

The Geminid meteor shower reaches its peak tonight. All of the excitement surrounding last month's spectacular Leonid shower may skew an observer's expectations. The Geminids are a

good, reliable shower, much like the Perseids in mid August. An average observer from a dark site should anticipate seeing one meteor every minute, on the average. While that number is a far cry from the one meteor every few seconds that Leonid observers were reporting last month, remember, the Leonid storm was a once-in-a-lifetime event. The absence of moonlight makes this year's Geminids definitely worth a looksee. The best time to observe is anytime after 10 p.m. until the approach of dawn.

## Friday, December 14

A solar eclipse occurs today, so what must be the phase of the Moon? Solar eclipses can occur only when the Moon is near New. This particular eclipse is annular, which indicates that at maximum eclipse the Moon cannot completely cover the "surface" of the sun. It leaves a bright ring of sunlight, the annulus, and consequently the feathery outer corona that is most often associated with solar eclipses will not be visible. For most of the U.S. the eclipse will be partial, and requires special eye protection to view safely. For the eastern U.S., including Michigan, the sun sets before the eclipse ends. The eclipse for us, therefore, occurs at a very low altitude. In Michigan the eclipse begins just after 4 p.m. EST, then reaches maximum near 5 p.m., when 25% or less of the sun is covered. Specific times for various cities and tips for safe viewing can be found at <http://sunearth.gsfc.nasa.gov/eclipse/ASE2001/ASE2001.html>.

Times of maximum eclipse: Detroit: 4:57 p.m. EST Kalamazoo: 5:01 p.m. Lansing: 5:00 p.m.

## Saturday, December 15

The thin crescent Moon, only 26 hours after New, can be spotted, with effort, just after sunset. Look low in the SW (7 degrees to the north of due SW) 25 minutes after sundown. Timing is critical since the Moon sets about 45 minutes after sunset. Use binoculars to help find the hairline crescent sitting just above the horizon. The appearance of the first crescent after New Moon marks the end of Ramadan, the Islamic month of fasting.

## Sunday, December 16

The crescent Moon is an attractive sight in the southwestern evening sky over the next several nights. Look an hour after sunset, or earlier if you wish a more colorful, but brighter, background. The Moon is passing through a faint part of the zodiac, the extreme eastern portion of Sagittarius and Capricornus. Consequently, Luna performs solo -- no other bright objects closeby. Mars is the bright star-like object considerably farther to the upper left. The Moon does not reach that planet's vicinity until Thursday.

## Monday, December 17

At the end of evening twilight notice the Summer Triangle. The three brightest stars on the western side of the sky comprise this pattern. In order of brightness they are Vega, Altair, Deneb. Why are they referred to as "summer," you may wonder, when all other traces of that season have vanished? That designation denotes the time of year when the group is visible all night long. Rather than considering the name inaccurate, allow it to remind you of a warm summer evening. It's worth a try.

## Tuesday, December 18

The sun enters Sagittarius today. As the Earth orbits the sun, our day star appears to travel through the portion of the sky known as the

# Skywatcher's

CONTINUED FROM PAGE 5

zodiac. The sun advances eastward about a degree per day, so that after a year it scoots completely around the sky. Today the sun appears to cross the boundary of Sagittarius, in which it remains until January 19. This is not the astrologers' Sagittarius that you read about in daily horoscopes. The sun passed into that sign on November 22, and leaves it December 21, according to those who follow the ancient superstition.

## Wednesday, December 19

At the end of evening twilight the crescent Moon sits 3 1/2 degrees (7 moon diameters) to the left of a 3rd-magnitude star known as Delta in Capricornus. Although bright moonlight may make the star difficult to pick out, success in doing so offers you the chance to find Uranus, also in the vicinity. Delta is the brightest star near the Moon. Binoculars may help you spot it. Notice a 4th-magnitude star, Gamma, 1 1/2 degrees (3 moon diameters) to the lower right of Delta. Uranus sits at a right angle from these two stars, 1 1/2 degrees to the upper right of Gamma. The planet is only 6th magnitude, so you will need binoculars to view it. If moonlight interferes, determine how to find Delta without the Moon nearby, wait a couple of nights until the Moon is well on its way, then try again.

## Thursday, December 20

The bright "star" to the upper right of the Moon this evening is Mars. Four and a half degrees (9 moon diameters) separate the two bodies. The 1st-magnitude star 16 degrees (a fist and a half) to the Moon's lower left is Fomalhaut, in the faint constellation of Piscis Austrinus, the Southern Fish. It is the lowest of all the 1st-magnitude stars we see from Michigan, rising only 17 degrees above the southern horizon, at maximum, from the middle of the state. Next lowest of the bright stars is Antares, heart of the summertime constellation Scorpius.

## Friday, December 21

The Winter Solstice occurs at 2:21 p.m. EST, welcoming in the official start of winter in the northern hemisphere. At the exact moment of solstice the sun stands directly over a location on the Tropic of Capricorn in the South Pacific Ocean off the coast of Chile. Today is also the shortest day/longest night of the year for us. The sun is above the horizon for about 9 hours out of 24. While plenty of winter weather still faces us, we can take solace in the knowledge that the amount of daylight begins increasing daily. We have withstood the darkest time of the year.

## Saturday, December 22

The Moon passes First Quarter phase today at 3:56 p.m. EST. If the sky is clear you should be able to find the Moon at that exact moment, even though the sun does not set for another hour. Look for Luna a third of the way up in the SE. Once the sky darkens, notice Mars 22 degrees (a fist width) to the right of the Moon, both objects in the south. The planet sets almost 6 hours after sunset, followed by the Moon nearly 2 hours later.

To obtain a star map showing this and other sky events, send a self-addressed, stamped envelope to Sky Calendar, Abrams Planetarium, Michigan State University, East Lansing, MI 48824.

## Sunday, December 23

With the rising of Sirius in the ESE 3 hours

after sunset, the Winter Hexagon is complete. Not a true constellation, the hexagon shape is created by tracing through many of the brightest wintertime stars. Begin with Rigel, the foot of Orion. Proceed to Sirius, 24 degrees (two fists) to the lower left. Then move 26 degrees to the left and slightly up to find Procyon, just above the eastern horizon. Next is Pollux, the brighter of the Gemini Twins, 23 degrees to the upper left. Climb 34 degrees higher to Capella. Then swing back 30 degrees to the right to reach Aldebaran. Finish off the pattern by returning to Rigel, 27 degrees to the lower right.

## Monday, December 24

Today and tomorrow are good days to check the accuracy of a sundial because the Equation of Time is near zero. In other words, apparent solar time (what sundials provide) and mean solar time (clock time) are equal. Normally the Equation of Time correction must be applied to the reading from a sundial in order to agree with your watch. The sundial can be as much as 16 minutes off. Now, however, if the sundial has been properly set for its longitude, no further correction is needed.

## Tuesday, December 25

While much of the western world celebrates Christmas, the Romans, before Christianity, observed Dies Natalis Invicti Solis, the Birthday of the Invincible Sun. The celebration recognized the sun's emergence from the depths of darkness. Its climb northward had begun once again, and with it, the promise of longer days and warmer weather to come. A number of the customs we observe this time of year have their origins in this ancient Roman holiday.

## Wednesday, December 26

The Big Dipper, a.k.a. Ursa Major, is circumpolar from mid northern latitudes. It is close enough to the North Celestial Pole that, as viewed in Michigan, the constellation never rises or sets as it swings around the sky. That group of stars, therefore, should be visible to us at all times of night, year round. The Big Dipper is now at its lowest around the end of evening twilight. Although technically visible, it becomes a challenge to find, particularly from an area with houses and trees closeby. Even from a remote location, unless the sky is exceptionally clear, several of the pattern's stars may be lost in haze near the horizon. Test your observing site. How many of the seven stars can you locate?

## Thursday, December 27

The Moon occults Saturn early tomorrow morning. After sundown tonight, take note of the Moon's position 4 degrees (8 moon diameters) to the upper right of Saturn. The Moon travels in its orbit roughly its own diameter every hour. By around 4 a.m. (in Michigan) the Moon passes in front of the planet, blocking it from view. Because the Moon is at waxing gibbous phase, 2 days before full, the left edge is still dark. The contrast between the dark lunar limb and the bright planet will make a dramatic event. Although binoculars provide a good view, use a telescope to get the full effect. For exact times of disappearance for various cities, consult <http://www.lunar-occultations.com/iota>.

Detroit times: Disappearance 3:57:09 a.m. EST, Reappearance 4:37:24 a.m. Kalamazoo times: Disappearance 3:55:08 a.m. EST, Reappearance 4:38:25 a.m. Lansing times: Disappearance 3:56:11 a.m. EST, Reappearance 4:37:00 a.m.

## Friday, December 28

If you received a new telescope recently, Saturn

and Jupiter -- on either side of the Moon tonight -- make wonderful targets to hone your observing skills. Saturn's rings are magnificent -- sure to delight everyone. The rings are currently tipped significantly toward us, making them easy to examine. Be sure to look for Cassini's Division, a dark "split" in the bright rings. Jupiter's cloud bands should be visible, if the night is clear, and the 4 major moons are easy. They look like stars aligned on either side of the planet. Check hourly to notice their shifting positions as they orbit Jupiter. When you use your telescope, remember to start with the lowest power eyepiece and increase magnification as the conditions and your experience dictate. If you have trouble pointing the scope, practice in daylight by sighting distant towers or buildings.

## Saturday, December 29

Overnight the Moon will be eclipsed, so what is the Moon's phase? Lunar eclipses occur when the Full Moon passes through the Earth's shadow. The eclipse is penumbral, so the Moon only enters the light, outer portion of the shadow. Frequently, penumbral eclipses are not detectable without instruments. This time, the Moon plunges deep into the penumbra, so the southern part of the Moon's disk should appear noticeably dusky at deepest eclipse (5:29 a.m. EST). The event begins 2 hours earlier, but don't expect to see much change until near maximum.

## Sunday, December 30

The just-past-full Moon rises 20 minutes after sunset. Jupiter is 6 degrees (12 moon diameters) to its upper right. Once the Moon clears the treetops, notice the bright stars Pollux and Castor -- Gemini Twins -- 8 degrees to the left of Luna and 5 degrees apart. Pollux is the lower of the brotherly duo. Tomorrow night the Moon doesn't rise until 1 1/2 hours after sunset. Then it sits 10 degrees (a fist) directly below the Twins.

## Monday, December 31

After you count down the new year tonight, step outside to catch a breath of fresh air and take in the magnificent scene. The brilliant winter stars are at their best around midnight, front and center in the south. This year they are punctuated by bright ornaments: the Moon, Jupiter, and Saturn, draped through Gemini and Taurus. The majestic hunter, Orion, stares down upon us as he has since before humans were around to acknowledge his presence. The steadfastness and beauty of the heavens have inspired humans for thousands of years. They can still work their magic, if we only allow them to do so.

The Skywatcher's Diary was prepared by David Batch. Each month, the Department of Physics and Astronomy at Michigan State University makes the Skywatcher's Diary available over the Internet. Please subscribe to their monthly Sky Calendar <http://www.pa.msu.edu/abrams/SkyCalendar/Index.html>.



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## WHOM TO CALL

**(916) SVAS-111 To save time, press:**  
 1-Last minute changes & updates for SVAS events  
 4-General Meeting information & location  
 5-Star party information & location

**SVAS Web Page:** <http://www.skywatchers.org>

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**Observatory Director**

Stuart Schulz 736-0449

**Telescope Making**

Cary Chleborad 457-9115

**Junior Astronomy Club**

Charlie Coburn 530-677-3214

### WHERE TO MEET (See below for directions)

General meetings are held on the third Friday of each month, 7:30 p.m. at **Sacramento State University (CSUS), Mendocino Hall, Room 1015, 6000 J Street, Sacramento, CA.**

To Subscribe to the SVAS email list, send an empty message to [svas-subscribe@yahoogroups.com](mailto:svas-subscribe@yahoogroups.com). Once subscribed, emails can be sent to [svas@yahoogroups.com](mailto:svas@yahoogroups.com).

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**Articles**—Manuscripts and letters are welcome preferably via email or 3.5" diskette, in Word or text format. Items may be e-mailed to [Chris Hulbe at hulbe3@home.com](mailto:Chris.Hulbe@home.com) or to [Dave Buchla at dbuchla@oro.net](mailto:Dave.Buchla@oro.net). **Deadline for the following month's newsletter is the Wednesday following the SVAS General Meeting.**

**Advertising**—Commercial non-personal advertising, business card through full page, is available. Contact Chris Hulbe at 967-3794 for information.

**Classified** advertising is free to members of SVAS. Submit ads to Chris Hulbe at 967-3794, [hulbe3@home.com](mailto:hulbe3@home.com).

## HGO

SVAS maintains the Henry Grieb Observatory (HGO) in the Sierras for members only.

Monthly star parties are also held at the site.

**For directions and regulations, please call President Walt Heiges at 684-3421**

## DIRECTIONSTO CSUS MENDOCINO HALL

From Hwy 50, take the Howe/Power Inn exit. At stop light, go straight across Howe. Go down two lights and turn right to enter the CSUS campus. Park in the parking lot across from the Hornet Bookstore. Mendocino Hall is located next to the Hornet Bookstore.



# Membership Renewal/ New Member Application

**Yes! Please renew my membership, or make me a new member of the Sacramento Valley Astronomical Society.**

**Renewal**                       **New Membership**

**General, \$25** — Enjoy monthly meetings, informative monthly newsletters, and awe inspiring views of the universe at monthly star parties.

**Observatory, \$75** — Enjoy all the benefits of a general membership plus private use of the Henry Grieb Observatory (HGO). Must be a member for 6 months or longer, and must be approved by the Board of Directors.

1 year     2 years     3 years

**Tell us about yourself...**

Name(s) \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ Zip \_\_\_\_\_

Telephone ( \_\_\_\_\_ ) \_\_\_\_\_

E-Mail Address \_\_\_\_\_

Yes, I would like to be contacted about volunteering.

I agree to abide to the terms and conditions\* governing use of the Henry Grieb Observatory property. I understand that failure to abide can result in revocation of use privileges and SVAS membership.

Signed \_\_\_\_\_ Date \_\_\_\_\_

\*A copy of the HGO Rules of Operation and Regulations will be available upon request to all members.

**Note:** The term of annual membership is March-to-February. Dues for new members joining from October 1st to December 31st will be \$15.00. New members joining in January or February will be advanced to March. NL Rev-8/18/2000.



Enclose payment and mail to:  
**Sacramento Valley Astronomical Society**  
 P. O. Box 15274  
 Sacramento, CA 95851-0274



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## SVAS Calendar of Events

Please call SVAS-111 to verify event locations, dates, and times.

### December

- 14 — **College Star Party**, Rasmussen Park, Cameron Park.
- 15 — **Star Party**, the winter site (open only to members and their guests).
- 20 — 7:00 pm. **Board Meeting**, Denny's at Watt & Auburn.
- 21 — 7:30 pm. **General Meeting**, (673rd) at 7:30pm, CSUS Mendocino Hall, Room 1015. Speaker: John M. Green, NASA Advanced Space Transportation Directorate.

### January

- 12 — **Star Party**, the winter site (open only to members and their guests).
- 17 — 7:00 pm. **Board Meeting**, Denny's at Watt & Auburn.
- 18 — 7:30 pm. **General Meeting**, (674th) at 7:30pm, CSUS Mendocino Hall, Room 1015. Speaker and topic to be announced.

### Outreach Star Parties

Please let Lynda Hall know if you can volunteer with your telescope. Contact her at 717-1170 or lyndahall1@hotmail.com.

### February

- 9 — **Star Party**, the winter site. Open only to members and their guests. Inclement weather means cancellation of the star party.
- 14 — 7:00 pm. **Board Meeting**, Denny's at Watt & Auburn.
- 15 — 7:30 pm. **General Meeting**, (675th) at 7:30pm, CSUS Mendocino Hall, Room 1015. Speaker and topic to be announced.

**General Meetings are held on the 3rd Friday of the month at CSUS Mendocino Hall (next to bookstore) Room 1015**

**Star parties are held on the closest Saturday to the new moon at the Henry Grieb Observatory (HGO) or at Rasmussen Park (Cameron Park) and are open only to SVAS members and their guests.**