# SJAA EPHEMERIS

VOLUME 3 NUMBER 1 OFFICIAL PUBLICATION OF THE SAN JOSE ASTRONOMICAL ASSOCIATION JANUARY, 1992

## January Speaker

Del Johnson

Our January speaker will be Ethan Wilson Cliffton, AIA. Mr. Clifton has graciously accepted this opportunity to tell us about himself and how he may provide direction and purpose in developing a design for our observatory. Since 1985, the architectural firm of Ethan Wilson Cliffton, AIAA has acted as a catalyst for planning and design teams which effectively and affordably address projects of complex scope, such as the Halley Hill Observatory. As a full service firm with a fluency of the sciences, his problem solving approach is based on experience in containment, thermal, vibration and radiation isolation, materials handling, and aerodynamics. Ongoing astronomical observatory projects keep the firm abreast of the most recent findings in mirror technology, seeing, infrared signatures and the internal and external aerodynamics of observatories and buildings.

Ethan Cliffton brings to his designs a depth of technical knowledge gained in more than seventeen years of experience. He has participated in studies for the NASA Space Station and Mars mission. With MBT ASSOCIATES Ethan was project Manager for a research complex at Lawrence Berkeley Laboratory. The complex consists of a silo housing the worlds most powerful electron microscope, the Atomic Resolution Microscope, and the Surface Science and Catalysis Laboratory. Concurrently he was Assistant Project Manager for the Keck Observatory, to house the world's largest telescope. Unique meteorology, including 150-MPH winds and savage ice storms, required special attention to operating systems, entry, and protection of the telescope. Subsystems for mirror and instrument module handling, and oxygenation of workspaces at the 14,000 foot elevation were special requirements of the design.

World wide travel has enhanced his professional development. Continued study maintains fluency in the sciences, while lectures and special teaching assignments communicates his skills and experience to other professionals, and to young people just beginning the long road to a technological future.

As you can see we have a wonderful opportunity to learn first hand what will be developing in the SJAA observatory project.

January 4: Star party at Grant Ranch with Halls Valley Group. Annular Solar Eclipse - Southern California

January 10: Public star party at Branham Lane Park.

January 11 8:00 P.M. General Meeting at Milpitas Library. Board of Directors meet at 6:30 P.M. preceeding the program.

January 18: Beginning Astronomy class. 8:00 P.M. at Milpitas Library.

January 25: Star party at Fremont Peak State Park.

February 1: Star party at Grant Ranch with Halls Valley Group.

February 8: 8:00 P.M. General Meeting at Milpitas Library. Board of Directors meet at 6:30 P.M. preceeding the program.

February 14: (Friday) Public star party at Branham Lane Park.

February 15: Beginning Astronomy class. 8:00 P.M. at Milpitas Library.

## FROM YOUR EDITOR

We begin the new year with several months of preparing your news letter behind us . I never have understood what Volume and Issue/No. meant or how it was used (and I know some of you will take the time to enlighten me), but I have decided to call each year a Volume and each Month a No. If that is unsatisfactory I'll listen to your ideas, but they better be good! Enough clowning. I'll continue to plea for articles. Maybe some one with great artistical skill similar to Jack Z's can help drawing a map to our observing sites. Hey! If anyone has locations they wish to share, I'll help to publish them. Perhaps a new survery of some of the sites Don Machholtz and Rich Page did years ago will be desired. Several groups could perform this.

Notice on page 3, we are starting a talk by C. Tombaugh. This will be continued until done, be one or two pages in length so it can be copied and placed in a standard note book.

**Remember this months meeting change to the Milpitas Library!**

## WHAT'S IN A DOME

Del Jonson

Recently I asked for SJAA input concerning the design features of the Halley Hill Dome. As You may recall, the dome is to be designed in a manner which would permit site-independent use and could be built by amateur astronomers with reasonable skills (and at a reasonable cost). The dome, to be designed by a SJAA team led by Ethan Clifton, will be not only built for the Halley Hill site, but will be made available to amateurs every where.

The question at this time is: "What features should be included in the design?"

The following has been suggested:

1. The non-rotating base of the dome shall have AC and/or DC power.
2. The base of the dome (which includes the door) can vary in height.
3. Provisions for holding eyepieces/ filters (wall mounted rack?).
4. Fold-down chart/writing area with built-in red and white light.
5. Fold-down bench.
6. Flush door sill (with red safety lights?).
7. Option of manual or powered dome rotation.
8. Independent pier.
9. internal dome rotation locks.
10. Sized to accommodate a 12.5", f6 Newtonian.

What has been overlooked? Call me, Del Johnson, at (408) 448-0239 and give me your suggestions.

## Henry Coe State Park Star Party

Paul Barton

The wind storm of the previous 2-3 days had swept out the smog clearing the skies nicely. The ranger had put a lock on the gate for SJAA, but several people bypassed it so Allen Nelms had to call on the ranger again to get in. Once there the site was clear and ready, but a bit windy, and the sky looked good. I kept thinking the wind will die down by 9-10 P.M. (yes, Santa will be here as usual, too).

By dusk there were five hopeful star gazers set up and ready to go. Around 5 P.M. I started putting on my cold weather gear. It was windy enough to blow dust in your eyes, however the sky continued to look good. The wind continued and by 10 P.M. it was gusting to 25 MPH or so and mostly out of the southwest. Dirt was flying through the air and some mirror covers were put back on. One Four Seasons Map book (Orion $13) was blown away. When it was recovered there was one less page.

One picnic basket was hauled down the hill (against the wind) and eviscerated by bandits wearing masks. Lady was asleep in her nice warm bed. Rich Nueschafer saw a bandit (racoon) up close, but neither bothered the other.

Around midnight the sky was so churned up one couldn't see much. The Trapezium would go in and out of focus during a 5-10 second period. One could only see 3 or 4 stars in the Trapezium. Jim Van Nuland left around midnight (it was that bad). The first time Jim has left that early in 10 years.

All in all it was a pleasant windy workout. I'll bet the next time Jim Baggot and Alicia and Bob will bring more polar expedition gear!

Attendees were asked: What are your objectives tonight?

Jim Van Nuland
M42 region.

Jim Baggot, Alicia, Bob
M42, M31, Galaxies as many as can be found, Comet.

Alan Nelms
General observing, galaxies, nebula, clusters.

Rich Neuschafer
Jupiter and galaxies tonight.

Paul Barton
Deep sky objects.

## Celestial Calendar

| Lunar Phases | Date | Rise | Tran | Set |
|---|---|---|---|---|
| NM 15:11hr | 04-01 | 0716 | 1158 | 1704 |
| FQ 18:33hr | 12-01 | 1106 | 1756 | 0042 |
| FM 13:30hr | 19-01 | 1731 | 0002 | 0706 |
| LQ 07:28hr | 26-01 | 0038 | 0609 | 1103 |
| **Nearer Planets** | | | | |
| Mercury ..... | 07-11 | 0546 | 1036 | 1523 |
| 1.33 A.U. | 17-01 | 0619 | 1056 | 1503 |
| Mag - 0.4 | 27-01 | 0642 | 1116 | 1546 |
| Venus ..... | 07-01 | 0423 | 0925 | 1424 |
| 1.20 A.U. | 17-01 | 0439 | 0935 | 1427 |
| Mag - 4.0 | 27-01 | 0453 | 0944 | 1432 |
| Mars ..... | 07-01 | 0609 | 1050 | 1527 |
| 2.36 A.U. | 17-01 | 0600 | 1041 | 1518 |
| Mag + 1.4 | 27-01 | 0549 | 1031 | 1510 |
| Jupiter ..... | 07-01 | 2125 | 0350 | 1014 |
| 4.70 A.U. | 17-01 | 2044 | 0309 | 0934 |
| Mag - 2.3 | 27-01 | 2001 | 0227 | 0853 |
| Saturn ..... | 07-01 | 0821 | 1320 | 1815 |
| 10.3 A.U. | 17-01 | 0745 | 1245 | 1741 |
| Mag + 0.6 | 27-01 | 0710 | 1211 | 1708 |

**SOL** Star Type G2V Mag - 26.72

| | | | | |
|---|---|---|---|---|
| 1903 - 2230 ... | 07-01 | 0711 | 1159 | 1642 |
| 1944 - 2100 ... | 17-01 | 0707 | 1200 | 1649 |
| 2032 - 1805 ... | 27-01 | 0700 | 1201 | 1658 |

**Astronomical Twilight**

| | | | | |
|---|---|---|---|---|
| JD 2,448,629.5 | 07-01 | 0532 | - | 1820 |
| 639.5 | 17-01 | 0529 | - | 1826 |
| 649.5 | 27-01 | 0524 | - | 1833 |

**Sidereal Time**

| | | | |
|---|---|---|---|
| Transit Right | 07-01 | 0000 | PST = 0657 |
| Ascention at | 17-01 | 0000 | PST = 0736 |
| Local Midnight | 27-01 | 0000 | PST = 0816 |

**Darkest** Saturday Night ..... Jan 04

| | |
|---|---|
| Sunset ..... | 1641 |
| Twilight End ..... | 1819 |
| Moon Set ..... ... | 1704 |

**TIMES & DATES ARE PACIFIC STANDARD**

**by Richard Stanton**

## Dr. Clyde Tombaugh's talk to the EAS

1989 March 4

President Roberts, members of the Eastbay Astronomical Society and guests, boys and girls, I appreciate being able to come here tonight to talk to you! — I have a little confession to make to you: for 59 years I've been a Plutocrat! — Most of you know, I imagine, about some of the discoveries of the earlier planets, like Uranus in 1781, Neptune in 1846, and finally Pluto in 1930. It seems that we get about one planet per century!

In the case of Uranus, it can be seen with the unaided eye, near the limit of vision — and I've seen it several times that way — and there are only about 7000 stars in the sky as bright or brighter than Uranus. Then we get to Neptune, and there are a good many more stars and it's not quite so easy. But, Adams and Leverrier did such a marvelous job in predicting its position in the sky that it wasn't difficult either. In fact for one of them, it was within one degree of where it was predicted, which was a remarkable mathematical achievement. One of the most amusing books I've read was the book about the discovery of Neptune, by Martin Grosser. How many have read it? ... You ought to read it — that is one of the most marvelous books of blunders you ever saw! I was both shocked and amused — at "how not to do it", you know.... It is the most entertaining story, and I advise you to read it if you can get it. Well at any rate, Neptune of course can be seen with a ONE-INCH TELESCOPE — it's only of the 8th magnitude; and with Leverrier and Adam's quite accurately predicted place, all they needed to do was to look in the immediate area of the sky, where they found it. Of course, they saw a small disk. It was found by Galle at Berlin in about an hour after they started looking! The amusing thing about this was that both Adams and Leverrier, young mathematical astronomers, COULD NOT GET ANY OF THEIR COUNTRYMEN WITH TELESCOPES TO LOOK FOR IT! This went on for months and months and months. Apparently, it never occurred to them that THEY MIGHT LOOK FOR IT FOR THEMSELVES — I don't understand that! And so finally Galle got it.

At any rate, now when we get to Percival Lowell, of course he became interested in this in the early part of the century (there were some others but Percival Lowell had done more study on this than anyone else). Lowell initiated some early searches in this century, photographic, without success. Now when we get to objects as dim as Pluto, or even as "Planet X" — which he thought might be of 13th magnitude — you have a very different problem: you have to pick it out among a GREAT NUMBER OF STARS in the sky. As it turns out there are 15 MILLION STARS IN THE SKY THAT ARE AS BRIGHT OR BRIGHTER THAN PLUTO. So, to pick that out among all those millions, you've got a tough job on your hands! It's like looking for a needle in a haystack, and a BIG haystack at that. I don't know just how many straws there might be in a haystack, but it would probably be a comparable number....

Percival Lowell passed away in 1916. They had just finished a 2-year photographic search, using a 9-inch wide angle camera from Swarthmore College; and they took about 1000 plates with it. THEY MISSED IT ON THE EXAMINATION OF THE PLATES — and after Pluto was found, they went back and they FOUND PLUTO'S IMAGE ON THOSE PLATES! So you see, Pluto's a pretty elusive little fellow! Now to give you an idea of the brightness of Pluto — its light would be equivalent to one candle at a distance of about 200 miles! That's dim!!! And a lot of other astronomers did take a dim view of it...!

Well, at any rate, I was in Kansas at the time; and, uh, I had built my third telescope, a 9-inch and it was of very good quality, and I made sketches of Mars and Jupiter and sent them to Lowell Observatory, and they could check it for accuracy with their current photographs on those dates. Apparently, it impressed them favorably enough that they quickly wrote back, asking a lot of questions and so on, and was I in good physical health and so on. Later I was to find out why they asked that —! So, very shortly I was invited to come to Flagstaff to operate a new photographic telescope; they said if I could come for a 3 months trial — I stayed 14 years! When I arrived at Flagstaff, Dr. Slipher met me at the depot, and so on; and that was quite a scary situation for me because we got hailed out that summer, no crops — I hired out to Neberlunas Combine — and with that hard-earned money I bought my one-way railroad ticket for 28 hours in the chair-car with not enough money in my pocket for a return ticket. Going a thousand miles from home, not knowing a soul, now that took a little nerve.... And as I approached Flagstaff I began to LOSE my nerve! Little did I realize what lay around the corner (for in another year) Finding a planet!

And so I was assigned to take these photographs, and then later....First they said "We'll get you to learn to take these photographs, and someone else more experienced will examine them to find the planet". Well they did a little blinking but not much and so I began to wonder what was going on — and finally one day Dr. Slipher came down to my office and said "Uh, we'd like for YOU to blink these plates." I shuddered. Why? Because I knew what was on those plates, all those hundreds of thousands of star images and I'll tell you I thought the job would be terribly difficult and tedious ... and it was! Now I really didn't feel very complimented about that, I felt horrified and overwhelmed with a sense of dread, to have to go through all that mess of stars! Believe me it was overwhelming.

Well, of course as you all know the story, I took the plates in January 23 and 29 and as shown as beautifully on the screen there, the shift of position was the only clue to identifying the new planet. The amount of the shift is inversely proportional to the distance, of course, and so the asteroids move faster than they, and so by knowing the amount of shift I expected to see, when I turned the next field of view in the eyepiece, there I saw the thing going back and forth and knowing the scale of my plates and so on, INSTANTLY I KNEW THAT THE OBJECT WAS BEYOND THE ORBIT OF NEPTUNE! And that was a tremendous thrill— and believe me folks it made my day!!!

**[To be continued next month]**

## Double, Triple, and Multiple Stars

Pat Donnelly

I have been just sitting here trying to think of something to write for the January issue of the Ephemeris . I'm sort of running out of ideas. (in fact if anyone has suggestions on potential topics for this column, please let me know.) As I was sitting here considering what I should observe tomorrow night(12/1), I remembered I should observe M-79. M-79 is the only globular cluster in the winter sky. It is in the constellation of Lepus (The Hare) just below Orion. Then two different ideas struck me. This article is one of the ideas.

Lepus, The Hare, is full of wonderful objects, including many multiple stars and M-79. To begin, the three brightest stars are triples. Alpha Leporis has two dim optical companions at separations of 36" and 91". Both stars are magnitude 11. I have seen this triple in a C8. Because of that, I suspect the dim companions may be brighter than magnitude 11. Beta Leporis has one true companion and an optical companion. Both companions are dim at magnitude 11. The closer companion is a true bound member of period 300 - 400 years. It is located a mere 2.5" from the primary. The third component is separated by 64" and is an optical companion. I have not been able to see the close companion. Gamma Leporis is the show piece of the trio. It has two components of magnitudes 3.5 and 6.0 separated by 95". The dimmer component also has a companion of magnitude 11 about 45" from the 6.0 magnitude star. I have seen this triple easily, and I suspect the dim 11th magnitude star is probably brighter than indicated.

Next to Alpha Leporis is h3780 or NGC 2017. It is a multiple star or a small open cluster. It consists of 6 to 8 stars brighter than magnitude 10 and two very close doubles. The brightest star is a close double separated by 0.9". This separation provides a good test of sky conditions. The stars are almost equal in magnitude at 7.3 and 7.8, which should be fairly easy to resolve. One of the other members consists of two magnitude 9 components separated by 1.6". The area is well worth some extended study.

After h3780 hop down to M-79, a lonely but otherwise interesting globular cluster. About 35' from M-79 is h3752, a very nice triple star. h3752 consists of a magnitude 5.5 primary and a magnitude 6.5 secondary at 3.1". There is a third companion of magnitude 9 about 1.0' from the primary. Hover, it is probably only an optical companion. M-79 next to h3752 is approximately 50,000 light years away. Since it is on the outer edge of the galaxy, M-79 would be visible in a 100 inch telescope from the Andromeda Galaxy.

As a closing note, because of the southerly declination of the constellation, try to observe the constellation near the meridian. It may not seem like much, but the few extra degrees in elevation will improve the quality of the object tremendously.

## February Speaker

Arranged by Bob Garfinkle

What does raisin bread and the Universe have in common? Come to the February 8th general meeting at the Milpitas Library and find out from our guest speaker Dr. David Schramm. Dr. Schramm is the Louis Block Professor of Physical Sciences at the University of Chicago. He is the co-author of the book, "Shadows of Creation". The book is reviewed in the January 1991 issue of Astronomy magazine by our own Bob Garfinkle. In that review Bob states, "Cosmology is the science of how it all began and where it's going. Like many people, I am fascinated by this subject and couldn't put this book down until I finished it."

Dr. Schramm's talk will cover the latest ideas in cosmology, including the continuing controversy of the "Big Bang" vs the "Steady State Universe". His talk will also cover how the universe might end Billions of years from now in either the "Big Chill" or the "Big Crunch". It all depends on the amount of dark matter we think is out there.

**Remember - In Janurary we will be meeting at the Milpitas Library**

## Grant Ranch Star Party

Paul Barton

Saturday, Dec 7th, was overcast early in the day, but indicated clearing with the wind from the North. By mid afternoon the sky was broken and clearing continuing to look hopeful. The sky actually cleared up pretty well by early evening — a few little sheep moving around. Every one had a good outing — stars were twinkling, temp in the 40's and a dry not much wind.

With great difficulty some sharp eyes could see M-1 at magnitude 9.0 with 11X80 binoculars on a stand. The four stars of the Trapezium could be easily seen with Wolf's 6" Vega. Present in part:

| | |
|---|---|
| Chris Kelly | 8" f/4 RFI |
| Paul Barton | 6" Vega |
| Bill Dellings | 4 1/2" Astro Scan |
| Denis Hutson | C8 |
| Craig Anderson | 12 1/2" Dob (very fine) |
| Del Johnson | |
| Ron Bricmont | |
| Stan Webster | |

Ranger Erica Crawford stopped by for a while. I also heard Tom Anderson off in the dark somewhere, and a couple of others I couldn't identify. It was a good outing.

## Fremont Peak outing

Paul Barton

Sunday, Dec 8th, the sky looked good. Sooo-o! actually the sky was very good for these times. On a scale of 1 to 10 the sky was about an 8. Nine or 10 skiers haven't been seen in these parts for years. Present:

Paul Barton 18" JMI

Dan and Chris Wright from San Leandro with an out standing 12 1/2" Dob which performed like a good refractor

John (-------) from Cupertino with a C-90

At least 2 others

The temperature was in the upper 30's, dry, with not much twinkles. Only 4 stars in the Trapezium. Gama Andromadae (10") split wide open. We thought we could see the cloud of which the Horse Head is a part, but no one had a H-II filter. Excellent outing.

## ASTRO ADS

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**Joe Perry**, a former member of the SJAA, announces the availibility of CCD images as shareware. The images are on IBM - formatted 5.25 floppies and 3.5 discs (DD and HD). The files are *.PCX or *.TIF formats and have been squeezed by LHARC. Asking $2 per disc and wants you to write for full inventory of available files. He is also promoting subscription to the CCD News, a periodical, at $6 per year. Joe can be reached at 2610 Belcastro St, Las Vegas, NV, 89117 Tel - 702-368-1884 12/91

**C-8**, 1974 Stock orange tube model with sand cast fork arms, excellent condition. Visual back, 1-1/4 diagonal, 8X50 finder, special coatings, wedge, tripod with Orion accessory tray, no eyepieces. Other than tray and finder, this scope has not been mutilated by modifications. $1100 Bill Dellings (510) 792-9206 1/92

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## The Presidential Papers

I missed last months bulletin deadline, so I shall be a bit more aware of dates and the passage of time. Lately it seems that the economy has hit everyone, many of us worry wether there will be an income to pay the bills and how we shall keep harth and kin together. The only solice I can offer is that hard times make strong people and societies, perhaps we needed a reset to get back to reality. We and our elected representatives have confused wants and needs and over taxed the system. What does this have to do with astronomy?

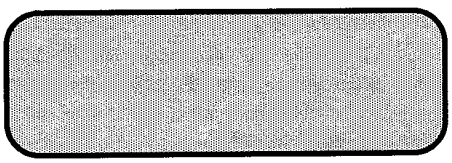
Perhaps if the winter fog ever clears, it might help a small amount to turn off the TV and take out the telescope. Come out to one or more of our public service events. As you know the SJAA will put on a presentation for just about anyone that has the timerity to ask. Over the past several months the club, actually a small band of hearty individuals , has provided telescopes and considerable expertise to varied groups about the south bay area. There have been several schools, cub scout groups, even the police athletic league. Every one of these events that I have attended usually had a few things in common, lots of eager kids eager to look at and through the telescopes. Many of the adults in the crowd have never seen a real astronomical telescope up close and personal. There seems to be much pleasure taken by the hardy souls willing to subject themselves to endless questions. I would urge you to miss a few of those holiday specials and get out to some of these events.

And now for something completely different. Last month I went up to Fremont peak a couple of times. I was surprized at how few winter time astronomers there are anymore. One evening I had the park all to my self. Another night there were three of us maniacs. The winter skies can be quite spectacular. One Saturday night Dave Barroso was setting up to do some observing with the 30" reflector , I casually asked if there would be any major objection to me mooching some photons. Well he gave in and I moved in. This turned out to be quite an evening, early on while we were waiting for it to get really dark, I wanted to look at Gamma Andromeda. Dave is in the process of observing every object listed in the entire NGC catalogue. Well he tolerated me and my proclivity for looking at big bright easy stuff, but only till it got good and he could get on with his observing program, Okay I said. Little did he know what evil lurks within. The air was good and Dave had collimated the scope that day so the images looked pretty good. There was some glare off the primary orange star so I stopped it down to 11 inches with the off axis stop. The blue secondary was a pretty ball, no diffraction rings but it was not boiling, actually it was pretty steady. Maybe some more magnification would be interesting. The 9mm Nagler seemed to do the trick, more power really shows the colors of bright stars well when the air is steady. Dave begrudgingly went up and took a look, "Yep! That's nice," and back to his book. While sitting up on the ladder I thought there was a separation in the blue secondary on one side. Humm!

Out of habit I always look for the tertiary, a dimmer green star off the secondary, I had never seen it before but had read about it, 1/2 arc second separation the books had claimed. Well there seemed to be a third star poking itself into the field from time to time and always in the same place. I have seen turbulent air scatter light into a false image many times before but those usually appear randomly around the real star. This one was always in the same spot.Pat Donnelly was working out in front of the observatory with his C-8, I invited him up for a look as he is an avid double/multiple star observer. After looking a bit he also made the usual comments about how nice a pair they were, but no mention of the tertiary. I asked him to take another look, that usually triggers a thought of something being afoot. Seeing is a sometimes thing, after several long moments he mentions the secondary being elongated and a sometimes separate image. After more study all three of us agree it is there, the right position, color and magnitude, seems we finally resolved Gamma Andromeda into a triple!

Later that evening I wanted to look at M-42, the Orion Nebula, Well as we had been working over a bunch of faint fuzzies (dim galaxies) Dave didn't object strenuously. So I swung the scope over and took a peek, nice VERY NICE! Out of curiosity we decided to see what effect the various Lumicon filters would have. The UHC turns the Trapesium stars turquoise, yuck! The O-3 filters made them green and red, garish, I prefer the normal unfiltered version. The seeing still seemed fairly good as the detail of the inner region was very clear. Trying the Meade 14mm ultrawide, a Nagler type large heavy eyepiece, and the Nagler 9mm were rewarded with wonderful vistas. The Meade gives moderate power with good eye relief without the kidney bean shadows the old Nagler 13mm had. It has become my favorite eyepiece. Eventually we found 5-6 very faint stars in the Trapesium area in addition to the normal 6 bright stars. Other objects were observed and logged on a wonderful winters evening. I strongly urge you to break out the winter clothes and try the winter sky.

Another random thought. As you know this fall we started to solicit funds for a solar filter project. Many of you have come forward with contributions. I cannot thank you enough for your support. I have been shamelessly hustling just about every club member for contributions for this fund. I know you don't need anyone else asking for money. It is a low pressure hustle, you can say no. Really. I am trying to get all of us, about 200 at last count, to contribute a buck a month, Yep, just $12 a year for one year. If we all pitch in we'll have enough next year. What do I want this money for you ask? A T-scanner I reply, a Hydrogen Alpha filter. I really want to add solar astronomy to our public programs. The H-a filter will allow us to safely show prominences to the general public. Our members will also be able to sign up and borrow it when not in use. According to the treasurer, Jack Peterson, we have $411.50 in the fund at the last board meeting. We are well on our way to success.....**Jack Z.**



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***PLEASE COME AND LISTEN TO***

***ETHAN CLIFFTON DISCUSS OUR***

***OBSERVATORY PROJECT***

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***Febuary we'll hear Dr. Schramm talking about Cosmology***

***March has the potential to hear Shlo Unruh of Lick Observatory***



EPHEMERIDES

| DATE (UT) | RA (2000) | DEC | ELONG | SKY | MAG |
|---|---|---|---|---|---|
| | PERIODIC COMET HARTLEY 2 (1991t) | | | | |
| 12-25 | 10h59.9m | -08°04' | 103° | M | 10.7 |
| 12-30 | 10h59.6m | -08°33' | 108° | M | 10.8 |
| 01-04 | 10h58.3m | -08°54' | 113° | M | 10.9 |
| 01-09 | 10h55.9m | -09°07' | 118° | M | 11.0 |
| 01-14 | 10h52.5m | -09°11' | 124° | M | 11.1 |
| 01-19 | 10h48.2m | -09°06' | 129° | M | 11.2 |
| 01-24 | 10h43.1m | -08°52' | 135° | M | 11.3 |
| 01-29 | 10h37.3m | -08°29' | 141° | M | 11.4 |
| 02-03 | 10h31.0m | -07°58' | 147° | M | 11.6 |
| 02-08 | 10h24.4m | -07°19' | 153° | M | 11.7 |
| | PERIODIC COMET FAYE (1991n) | | | | |
| 12-25 | 02h32.8m | +01°56' | 123° | E | 11.0 |
| 12-30 | 02h40.2m | +02°30' | 120° | E | 11.1 |
| 01-04 | 02h48.0m | +03°08' | 117° | E | 11.3 |
| 01-09 | 02h56.3m | +03°50' | 114° | E | 11.5 |
| 01-14 | 03h04.8m | +04°35' | 111° | E | 11.6 |
| 01-19 | 03h13.7m | +05°22' | 109° | E | 11.8 |
| 01-24 | 03h22.8m | +06°09' | 106° | E | 12.0 |
| | COMET SHOEMAKER-LEVY (1991d) | | | | |
| 12-25 | 16h26.9m | +38°50' | 67° | M | 11.0 |
| 12-30 | 16h40.9m | +39°16' | 68° | M | 11.0 |
| 01-04 | 16h50.5m | +39°59' | 69° | M | 11.0 |
| 01-09 | 17h08.9m | +40°16' | 69° | M | 11.0 |
| 01-14 | 17h27.0m | +40°30' | 69° | M | 11.0 |
| 01-19 | 17h44.7m | +40°42' | 69° | M | 11.0 |
| 01-24 | 18h01.8m | +40°51' | 69° | M | 11.0 |
| 01-29 | 18h18.3m | +40°58' | 68° | M | 11.0 |
| 02-03 | 18h34.2m | +41°04' | 67° | M | 11.1 |
| 02-08 | 18h49.3m | +41°09' | 67° | M | 11.1 |

Don Machholz (916) 346-8963

## Comet Commets

Don Machholtz

Two more comets have been discovered recently. Three faint comets remain visible to us. Beginning with this issue I'll supply only the Epoch 2000 coordinates for comets. Most visual observers have little use for the Epoch 1950 coordinates.

Periodic Comet Shoemaker-Levey 6 (1991b): Carolyn and Eugene Schoemaker and David Levey used the 18" Schmidt camera at Mt. Palomar to pick up this comet on Nov. 7. Early reports had it as bright as magnitude eleven, but it rapidly faded. The orbital period is 7.5 years.

Periodic comet Tsuchinshan 1 (1991c): T. Seki of Japan recovered this comet on Nov. 8 at magnitude 17. It is now fading.

CometSchoemaker-Levy (1991d): The Schoemakers and David Levy discovered this comet on Nov. 13 at magnitude 16. It is presently getting dimmer.

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