

# ★ ABOVE THE FOG

• BULLETIN OF THE SAN FRANCISCO AMATEUR ASTRONOMERS •

VOL. 47, No. 10 – October 1999

San Francisco  
Amateur Astronomers



Sharing the Wonders  
of the Universe



**Information Hotline**  
(415) 566-2357

**Web Page**  
<http://www.zennla.com/sfaa>

## **A Letter from the President Al Stern**

Please join me in welcoming our new bulletin editor, Lorrie Boen. Until we are comfortable with the format and process, we will be trying different things as we attempt to get the bulletin out on time each month. I want to thank all those who provided input regarding this bulletin editor change.

As part of the transition to the new editorship, we learned that Don Machholz was interested in contributing his column to Above the Fog. We would like to welcome him as a regular contributor.

The SFAA Picnic was a success. The weather was perfect, the food was good (only one burger was lost to the ashes) and last, but most importantly, the people who attended had a good time.

Jane's column will cover our last Mt. Tam star party of the year. It sounds like it was a success as well.

That reminds me, the last city star party will be Saturday, October 16 at 6:00 p.m. Hope to see you there.

The election for club officers and board members will be held at the December 15 General Meeting. All those interested in running for office, please contact a current SFAA officer or board member, listed on page two.

## SFAA Officers 1999

*President* Al Stern  
(510) 728-1851

*Vice-President* Bill Stepka  
(415) 928-2367

*Treasurer* Chelle Owens  
(415) 479-5313

*Secretary* Renita Mock  
(415) 664-0230

*Honorary Director* John Dobson

### **Board Members**

Joe Amato  
Toney Burkhart  
Nancy Cox  
Mary Ann Levenson  
Art Owens  
Gordon Robinson  
Dennis Tye

### **Alt. Board Members**

Stacy McDermott  
Jim Webster

### **Star Party Coordinator**

Bill Stepka (415) 928-2367

### **Subscriptions & Membership**

Chelle Owens (415) 479-5313

### **Bulletin Editor**

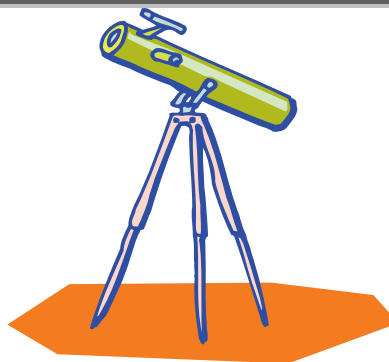
Lorrie Boen (415) 921-1432

### **Telescope Loans**

Ray Cash (415) 665-8666

*Above the Fog* is the official bulletin of the SFAA. It is our forum in which club members may share their experiences, ideas, and observations. We encourage you to participate, to submit your letters, drawings, announcements, articles and photos. We would also like to hear from our new members, about what you have done in the past, what other clubs you may have been with and, while you are at it, tell us about yourself. The deadline for the next issue is the last day of the prior month. Send your articles to Lorrie Boen to 765 Geary Street #302, San Francisco, CA 94109 or at [LorrenLee@aol.com](mailto:LorrenLee@aol.com).

## Club Telescopes



Long time member Ray Cash-LePennec has 3 loaner telescopes for club member use and is in charge of loaning them out. If you are interested in borrowing a club telescope, give Ray a call. There are many new members in the SFAA and they ask what kind of telescope to buy or use and this is a good way to get to know the Dobsonian type of scope and learn the sky as well.

## CLUB DATES

## SFAA Website Update

For those of you with online access, don't forget to visit the club's website. The bulletin board area especially is a great place to post info and ask questions. Go to <http://www.zennla.com/sfaa>.

### **Board Meeting**

November 10 – 7:00 p.m. Western Addition Library – corner of Scott & Geary Sts. SF

### **SFAA Club Meeting**

October 20 & November 17 at 7:30 p.m. Morrison Planetarium, Golden Gate Park

### **City Star Party**

October 16 at 6:00 p.m. – Last of the year

**Stacy's Stargazing Getaways**  
(Or "How I Am Learning to Neglect of All  
Chores and Responsibilities for an Evening")

by Stacy Jo McDermott

The night is clear and the atmosphere is steady. You look outside. You get that itch. It's a compulsion that needs to be sated, damn the dishes in the kitchen sink. You grab your telescope and binoculars and head out the door when it hits you. "Where am I going?" The backyard? Nah, the new neighbors just put up glaring floodlights. The front yard? Nope, the new sod hasn't root yet. "Oh well, it was a good thought" you think to yourself. But wait fellow stargazer! Never fear! There are a number of sites around the Bay Area that range from good to great for an evening or night out stargazing. Some places are very close and others require a bit of planning to make the experience worthwhile. Some of these will be quite familiar and some will be well kept secrets. This column will, hopefully, give you some inspiration, ideas and most important, accurate directions to each site that rate from "good" to "like wow". One site will be reviewed each month, either a close one (meaning that it is within a one hour drive of San Francisco, the known center of the universe) to one that requires a bit of planning. As much information as possible will be provided to give you a decent picture of a particular place.

Sites will be rated on various factors such as ease of access and travel (I'll let you know if you need to borrow Bubba's four wheel drive), darkness of sky (I won't steer you to a site that is lit up like an aluminum Christmas tree), fogginess where applicable and other points that will be included at the whim, memory and readability of the author's handwriting.

Overall points for the above categories will be determined for each site reviewed. One star means it's good but far from perfect (a pinch hit) and ten stars applied mean it's worth using those vacation days. Close destinations will be judged on the relative merits that is indicative to an urban setting and while further sites will be rated more

towards the perfect rural, dark sky setting. Of course, the reviewer may throw all ratings out the window and just give you a broad take on a place. With that disclaimer, let's look at this month's first site: Ft. Miley in San Francisco.

**Location:** The parking lot at the USS San Francisco Memorial in the Golden Gate National Recreation Area located one block north of the intersection at 48<sup>th</sup> Avenue and Pt. Lobos Street, just above the Cliff House.

One of the striking characteristics of San Francisco is its nighttime illumination. While very beautiful to behold in the eyes of locals and tourists alike, it can be a bane of the amateur astronomer's existence. One has to wonder what possessed the Board of Supervisors to approve halogen street lamps thus straddling our beloved ESSEFF with the affectionate but tongue-in-cheek nickname of "The San Francisco Nebula". Despite this seemingly insurmountable obstacle to a decent night of viewing, there sits a little gem of a site easily accessible by vehicle or public transportation (yep, I've gotten there on MUNI, with telescope, tripod and accessory case in tow). Ft. Miley is this gem of a site.

As you approach Ft. Miley, you will see a large, circular parking lot that looks over the entrance to San Francisco Bay, the Pacific Ocean to the left and a postcard view of the Golden Gate Bridge to the right. It is also the home of the WWII memorial dedicated to those men who fought on the USS San Francisco in the Pacific. The actual bow of the ship is the memorial itself. If for nothing else, it's worth it to go and look at this tribute.

The spaciousness of this area ensures more than enough set-up room for even the largest portable telescope. Heck, you could even set up the telescope from Lick Observatory if you could get it up here and still have plenty of room left over. Parking is ample so there is little chance of getting dings in your doors. The tree-lined land surrounding the parking lot does a great job of blocking out the halogen street lamps, thus giving you some decent, dark urban sky.

However, there is one drawback on the light issue and that is, car headlights. Remember that this is a parking lot. You will have to contend with the headlights of cars carrying tourists and locals alike coming up to take advantage of the picturesque-ness of the surrounding area. (repeat after me “Tourism is good for us”, see last paragraph).

When it comes to doing lunar gazing, planetary viewing and bright star/cluster/constellation seeing, Ft. Miley can't be beat as far as a site in San Francisco proper is concerned. But then, (and you knew there would be a but to this), there is the factor of FOG.

Now the fog factor does demote the rating for this site. In my experience, 7 out of 10 times that I have gone over to Ft. Miley, the fog has had this uncanny ability to know exactly when I have finished setting up my telescope, gotten my lounge chair in the perfect position and laid out all my comforts that I like to have while gazing, before it rolls in like a Howitzer tank. Before you can say hey, you can be enveloped by pea soup. It is one of the most frustrating aspects for Bay Area astronomers. However, there is a side to every coin. In this case, fog can be our friend; the trick is to get above it! It is very effective in blocking out the San Francisco Nebula from other sites in the Bay Area, which will be reviewed in the future.

All things considered, for easy access and relatively dark, urban skies, Ft. Miley is a good place to observe from. A small telescope

(refractor or something under 12” in aperture) and/or binoculars seem to be the optimum equipment to viewing but I've seen stunning sites through large Dobsonians set up here also.

Viewing at Ft. Miley also gives one an opportunity to share the wonders of the night sky with people who might not otherwise even think about looking up after gawking at the Golden Gate Bridge, which to me is the far best reason to add Ft. Miley to your list of places to go to.

Overall Rating:



Darkness:	4
Fog:	2
Sharing:	7
Ease of Access:	2

Other points considered for the four star rating:

The laziness factor – good for those of us who want to get out but are too lazy to even think about driving any place that requires a bridge toll.

Chore Neglecting Factor: This place is so close that even if you have 5 loads of laundry to do before the morning, you won't feel bad because you're not that far away and you'll only be gone for maybe a couple, three, four hours.

Also, if you get hungry while stargazing and all you have is some cash or a credit card, there are some good eateries nearby on Geary Avenue.

Morrison Planetarium's  
**Benjamin Dean Lecture Series**  
*presents*

A forum for emerging theories with insights into the process of contemporary astronomical research.

**October 26 at 7:30 p.m.**  
*The Elegant Universe*

The search for a unified theory of all the forces of nature is leading to remarkable developments in our understanding of space and time.

Dr. Brian Greene, Columbia University

DEAN LECTURE INFORMATION LINE at (415) 750-7141

## **ASTRONOMY in MARIN**

### **Winter Events Calendar**

#### **NOVEMBER**

Saturday, November 6<sup>th</sup> Star Party in Lagunitas+  
Friday, November 12<sup>th</sup> Moon/planet viewing in Fairfax++  
Sunday, November 14<sup>th</sup> Moon/planet viewing at Book Passage+++  
Saturday, November 27<sup>th</sup> Star Party in Lagunitas+

#### **DECEMBER**

Saturday, December 4<sup>th</sup> Star Party in Lagunitas+  
Friday, December 10<sup>th</sup> Moon/planet viewing in Fairfax++  
Sunday, December 12<sup>th</sup> Moon/planet viewing at Book Passage+++

#### **JANUARY**

Saturday, January 1<sup>st</sup> Star Party in Lagunitas (7 PM)+  
Saturday, January 8<sup>th</sup> Star Party in Lagunitas+  
Friday, January 14<sup>th</sup> Moon/planet viewing in Fairfax++  
Saturday, January 15<sup>th</sup> Moon/planet viewing at Book Passage+++  
Sunday, January 16<sup>th</sup> Moon/planet viewing at Book Passage+++  
Saturday, January 29<sup>th</sup> Star Party in Lagunitas+

#### **FEBRUARY**

Saturday, February 5<sup>th</sup> Star Party in Lagunitas+  
Friday, February 11<sup>th</sup> Moon/planet viewing in Fairfax++  
Sunday, February 13<sup>th</sup> Moon/planet viewing at Book Passage+++  
Saturday, February 26<sup>th</sup> Star Party in Lagunitas+

#### **MARCH**

Saturday, March 4<sup>th</sup> Star Party in Lagunitas+  
Sunday, March 12<sup>th</sup> Moon/planet viewing at Book Passage+++  
Friday, March 17<sup>th</sup> (St. Patrick's Day) Moon/planet viewing in Fairfax++

### **How to find the Star Parties**

+ Look for us behind the Swing Café in Lagunitas. Stay on Sir Francis Drake Blvd. Past San Anselmo and Fairfax, over the hill to Lagunitas. We set up behind the Swing Café. No facilities make your rest stop before. This is Marin's best dark sky site, when not clouded out. Come early and have dinner at the Swing Café.

++ At Cala Grocery, right side of Sir Francis Drake Blvd. Just past it's downtown. Volunteers set up on the public sidewalk out front. We start at twilight.

+++ This is the Corte Madera bookstore just west of Highway 101, one block North of its Cinema Theatre.

## First Tang-o on Tamalpais

by Jane Houston

Saturday night, October 9th was the final star party of the year in Mount Tamalpais State Park in Northern California. The star party is fronted by an astronomy lecture sponsored by the Mount Tamalpais Interpretive Association in the historic serpentine slab-seat amphitheater built during the depression. The Great depression in the 1930's, that is.

I love these public star parties because a great crowd attends the talk and then descends on the astronomers, 200, 300, sometimes even 400 strong. Lines snake from each telescope. We all really enjoy this time each month to share what we know with those who are anxious to learn and see some distant and ancient light up close and personal. And it is so much fun to set up next to new and old friends! There are always some students with clipboards, hoping to get some lab credit for their astronomy classes at a couple local colleges. Sky lovers of all ages scope-hop, returning to their favorites again and again, month after month, year after year. On this Saturday night, there were several students from the two John Dobson "Make your own Telescope" classes which began last week in San Francisco. I invited the two classes up to the mountain to poke around different telescopes before deciding on which size was best for them. Several students took me up on my offer. I think none of them will be making a telescope like the one Steve Overholt always brings: 30 inch Starship, which was giving some awesome views - better then ever!!

There were 25 scopes, and about 5 mounted and unmounted binos, that I counted anyway, on my walk through the parking lot at the height of activity. The students had about every Dob size to choose from, and about 20 SCTs and refractors too! What a choice of telescopes to choose from!

Toney Burkhart was using his brand new 13.1 inch "Millennium" telescope. Another Steve Overholt creation.

Now I have quite a collection of reflectors from two 6 inchers (one a sunscope named Dob Sun) up the range to 17.5 inches. I have one little Orion 80mm Short Tube refractor, but I've never entered the world of SCT's, until last night, that is.

On Friday, I drove down the California Coast, on the Pacific plate side of the San Andreas fault. It was a really scenic drive but my mission was to go pick up a telescope. A retiree and his wife were disposing of most of their belongings in order to move to Sun City, Arizona. They got my name from the San Francisco Orion Telescope and Binocular Store in San Francisco, where they purchased the scope. Thanks Orion guys!! I owe you one!

Anyway, the telescope they wanted to give me is an 80's? vintage C-8, with the bright orange tube and a milky white Schmidt corrector plate - now clean after some advice I got hours later from the Friday evening Telescope Making Workshop volunteers at the Chabot Observatory in Oakland California. I also picked up a 16 inch mirror blank, a suitcase of Celestron eyepieces and filters. Also, the sturdy equatorial wedge, funky locked-triangle tripod, observing stool and three big bags of astronomy books. The bags of books haven't even been cataloged yet, but I spotted Starlight Nights, The Adventures of a Star-Gazer by Leslie C. Peltier, some old Telescope Making magazines (including the one with my friend and local mirror maker Earl Watts on the cover called "How to Build a Dobsonian Telescope". That little booklet, a reprint from several issues of TM, has articles by Bob Kestner, Doug Berger's Das Edelweiss, which is now housed at the Hume Observatory in Sonoma County (the California Academy of Sciences) site.

One book that caught my eye was a 1978 hard cover "Apollo Over the Moon, A View from Orbit" which has hundreds of lunar photos. A 1973 Norton's Star Atlas, covered in a brown shopping bag book cover covered with plastic, indicates to me that this scope was well used once. Another lunar book, Pictorial Guide to the Moon, by Dinsmore Alter has over 200 photographs and drawings.

Well less than 24 hours after accepting the astro treasures, I was on my way to the monthly star party. First light, first new first light, that is, was

next on the agenda. I loaded the three scopes, "Little One" the Refractor, Strider, the reflector, and Tang, the brand new old orange SCT in my small car and off we drove, 100 miles to the mountain. My fiancée, Mojo, was positively drooling thinking about the night ahead. He was also excited about the C-8.

Set up was pretty fun for me. It helped that I set up between two other SCT's! I guess you can teach an old dog new tricks! It will take a little getting used to for me to aim that darn 6 x 30 finder. Oh, heck, I'll just put on a Telrad base and be done with it!

And it will be a lot of fun for this old Dob user to master some celestial mechanics. But I have to admit, observing the occultation of the star by Jupiter last night, showing lines by the dozen Uranus, and aiming at Saturn and a few dozen objects was pretty darn fun! I could run to my other two scopes, and nudge them into compliance, while Tang, juiced up, but draining my car battery, was tracking merrily though the Solar System and past it into the great universe out there.

I can't wait to sit and sketch the moon, without the "nudge nudge" I am used to incorporating into my sketching sessions. I wonder what that will feel like?

Tang will soon sport a little brass plate honoring the donors. I'll send them some stories of the adventures of Tang the Orange Telescope, and I'll send some pictures of the joy his gift will be bringing to many budding astronomers at Project Astro star parties, including the hundred or so that shared first light last night on Mount Tamalpais.

When my new friends settle in Sun City, they just might show up at the local astronomy club some night. I gave them a care package of information in exchange for their generous gift of Starlight Nights.

Oh, and one final word! Thanks to Bert for a jump start to get down the hill! Tang didn't have a charged battery and so I used the lighter in my car for 7 hours of star gazing. At the end of the night, I didn't have a charged battery either! My next scope neighbor Bert Katzung came to our rescue! That's what astro friends do! Next star party, the cafe latte is on me, pal!

---

## **Return of Periodic Comet Machholz 2**

by Tina Denetclaw

This November and December, Periodic Comet Machholz 2 will return within view.

P/1994 P1 (Machholz 2) was discovered August 13, 1994 by Don Machholz in Colfax, CA. He was scanning with a home-made (commercial optics) 10 inch, f/4 reflector at 36x. P/Machholz-2 is the 8th of 9 comets to date that have been first identified by Machholz. It returns every 5.23 years.

Soon after it was identified, P/Machholz-2 outburst (that is, it became much brighter due to splitting). In September, 1994 it was found to have 5 components in all, numbered A-E. It was the "D" component that had split. Rumors circulated at the time of its discovery that this comet might someday hit the earth, but these rumors were baseless.

Don Machholz lives in Colfax, CA with his wife, Laura, and sons, Matt and Mark. Directions for locating P/Machholz-2 will be found in the November issue of the Don's newsletter, Comet Comments, on the web at:  
<http://members.aol.com/cometcom/index.html>.

## COMET COMMENTS FOR NOVEMBER 1999

By Don Machholz

Comet LINEAR (1999 J3) heads south rather rapidly, while Comet Lee fades in our evening sky. Periodic Comet Machholz 2 reappears on its first return since it was discovered from Colfax, California in August 1994. At that time it outburst, and four secondary comets, labeled Components B-E, were found by amateurs using photography and CCD. In 1994 the comet was ahead of us in our orbit, this time it trails behind us, remaining at a declination of  $-11$  for several months. It was recovered by Robert McNaught on Aug. 3 at magnitude 21.

In the past month the SOHO satellite found two more comets entering the solar vicinity. One was found on Sept. 4, the second on Sept. 16. A new comet was found by Robert McNaught and F. Watson using the U.K. Schmidt Camera in Australia. It will remain faint as will a couple of instrument-discovered comets found recently. But another comet, 1999 S4 (LINEAR), is presently at magnitude 15 but may brighten up to naked-eye visibility by the middle of next year.

**COMET HUNTING NOTES:** Until three years ago, the search for Near-Earth Objects (NEO's) was carried out in both the Northern and Southern Hemispheres. Then, in 1996 the Australian government stopped the funding so the Southern Hemisphere search was shut down. In the meantime the Northern Hemisphere increased its search capabilities, especially with the addition of LINEAR, in New Mexico, about a year ago. Now the Southern Hemisphere search has been re-funded and should begin soon. Robert McNaught will manage it and all the equipment is being updated.

### EPHEMERIDES

C/1999 H1 (Lee)

Date(00UT)	R.A. (2000)	Dec	El	Sky Mag
10-09	23h50.6m	+42d22'	141d M	8.7
10-14	23h21.8m	+35d16'	142d E	9.1
10-19	23h02.0m	+28d51'	140d E	9.4

10-24	22h48.4m	+23d23'	135d E	9.8
10-29	22h39.0m	+18d51'	129d E	10.2
11-03	22h32.6m	+15d10'	123d E	10.5
11-08	22h28.4m	+12d09'	117d E	10.9
11-13	22h25.8m	+09d43'	111d E	11.2
11-18	22h24.4m	+07d43'	105d E	11.5
11-23	22h24.0m	+06d06'	99d E	11.8
11-28	22h24.3m	+04d46'	94d E	12.1
12-03	22h25.2m	+03d41'	89d E	12.4
12-08	22h26.7m	+02d48'	84d E	12.6

### 141P/Machholz 2

Date(00UT)	R.A. (2000)	Dec	El	Sky Mag
10-09	17h23.5m	-11d37'	66d E	15.2
10-14	17h32.8m	-11d44'	64d E	14.5
10-19	17h42.9m	-11d49'	61d E	13.8
10-24	17h54.0m	-11d53'	59d E	13.1
10-29	18h06.0m	-11d54'	57d E	12.4
11-03	18h19.0m	-11d53'	55d E	11.7
11-08	18h32.9m	-11d50'	54d E	10.9
11-13	18h47.8m	-11d46'	53d E	10.1
11-18	19h03.8m	-11d39'	52d E	9.4
11-23	19h20.8m	-11d33'	51d E	8.7
11-28	19h39.0m	-11d27'	50d E	8.2
11-03	19h58.5m	-11d25'	50d E	7.7
12-08	20h19.5m	-11d29'	50d E	7.4

### 1999 J3 (LINEAR)

Date(00UT)	R.A. (2000)	Dec	El	Sky Mag
10-09	07h53.5m	+06d13'	77d M	8.3
10-14	07h41.9m	-08d55'	82d M	8.2
10-19	07h26.8m	-26d03'	87d M	8.3
10-24	07h06.1m	-42d25'	91d M	8.6
10-29	06h37.1m	-55d39'	92d M	9.0
11-03	05h55.8m	-65d07'	91d M	9.5
11-08	04h59.2m	-71d08'	90d M	10.0
11-13	03h50.8m	-74d18'	88d M	10.5
11-18	02h43.2m	-75d16'	85d E	10.9
11-23	01h48.8m	-74d54'	83d E	11.4
11-28	01h10.4m	-73d52'	80d E	11.8
12-03	00h44.8m	-72d35'	78d E	12.1
12-08	00h28.2m	-71d16'	76d E	12.5

### ELEMENTS

Object:	Lee
Peri. Date:	1999 07 11.1725
Peri. Dist (AU):	0.708101 AU
Arg/Peri (2000):	040.7006 deg.
Asc. Node (2000):	162.6490 deg.
Incl (2000):	149.3533 deg.
Eccen:	0.99974
Orbital Period:	142,000 yrs.



Ref: MPC 35553  
Epoch: 1999 08 10  
Absol. Mag/"n": 6.5/4.0

Absol. Mag/"n": 12.0/7.5

Object: P/Machholz 2  
Peri. Date: 1999 12 09.2752  
Peri. Dist (AU): 0.748905 AU  
Arg/Peri (2000): 149.2991 deg.  
Asc. Node (2000): 246.1434 deg.  
Incl (2000): 012.8116 deg.  
Eccen: 0.751075  
Orbital Period: 5.22 years  
Ref: MPC 35815  
Epoch: 1999 12 08

Object: LINEAR (1999 J3)  
Peri. Date: 1999 09 20.1699  
Peri. Dist (AU): 0.9774750AU  
Arg/Peri (2000): 161.9509 deg.  
Asc. Node (2000): 229.0006 deg.  
Incl (2000): 101.6670 deg.  
Eccen: 1.0  
Orbital Period: 63,000 yrs.  
Ref: MPC 35553  
Epoch: 1999 09 20  
Absol. Mag/"n": 9.4/4.0

## **SFMOMA FULL MOON** Apollo Mission Photographs of the Lunar Landscape

In celebration of the 30<sup>th</sup> anniversary of the first moon landing, SFMOMA (San Francisco Museum of Modern Art) presents spectacular, rarely seen images originally shot by Apollo astronauts. These large-scale prints of unparalleled clarity capture the immensity of the lunar landscapes.

The exhibit is on display from August 20, 1999 to January 11, 2000.  
SFMOMA is located at 151 Third St., SF (415) 357-4000

Call for hours and days that the museum is open.

c/o Morrison Planetarium  
California Academy of Sciences  
Golden Gate Park, San Francisco, CA 94118

**San Francisco  
Amateur Astronomers**

**San Francisco Amateur Astronomers  
Membership Application**

Name: \_\_\_\_\_ Telephone: \_\_\_\_\_

Address: \_\_\_\_\_

email address: \_\_\_\_\_

**Select one category:**

- \$25 enclosed, individual membership
- \$30 enclosed, foreign membership
- \$30 enclosed, family membership
- \$30 enclosed, institutional membership
- \$ 8 enclosed, youth membership (under 18)

make checks payable to **San Francisco Amateur Astronomers** and mail to:

**Treasurer, SFAA, 13 Mabry Way, San Rafael, CA 94903**

Founded in September 1952, the San Francisco Amateur Astronomers (SFAA) is an association of people who share a common interest in astronomy and other related sciences. Our membership consists of people from all walks of life, educational backgrounds and ages. Many SFAA members own their own telescopes; some have been made by hand in local telescope-making classes and vary in size from 6 to 25 inches.