



SAN FRANCISCO Amateur Astronomers

SHARING THE WONDERS OF THE UNIVERSE

April 1993

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The SFAA Board of Directors meets on the second Wednesday of each month. All club members are welcome at Board meetings. Please call 905-6445 for the time and location of the meeting this month.

The SFAA Bulletin is a forum in which club members may share their ideas and experiences in astronomy. We encourage you to participate and welcome your letters, sketches and articles on astronomical subjects. Please send your contributions to: SFAA Bulletin Editor, 190 Chilton Avenue, San Francisco 94131. Deadline is the 18th of the month before publication.

Pluto and Its Companions

The San Francisco Amateur Astronomers holds lecture meetings on the third Wednesday of each month at 8:00 P.M. at Morrison Planetarium, California Academy of Sciences, Golden Gate Park. On **April 21, 1993**, Dr. Dale P. Cruikshank of NASA Ames Research Center will speak on *Pluto and Its Companions*.

Dr. Cruikshank received his B.S. degree at Iowa State University, and his M.S. and Ph.D. degrees at the University of Arizona. In 1970 he joined the research faculty at the Institute for Astronomy of the University of Hawaii, where he had major responsibilities for the facilities at Mauna Kea Observatory. In 1988 he joined the Astrophysics Branch at NASA Ames Research Center, where he has been deeply involved in the Space Infrared Telescope Facility project, the Cassini mission to Saturn, and the Voyager and Phobos missions.

NASA is currently planning a mission to Pluto, in which two small spacecraft will be launched in 1999 or 2000, to fly by the planet and its satellite Charon in the year 2007. The mission will complete the preliminary reconnaissance of all the planets in the Solar System, and will open a window on an extraordinary planet-satellite system. Meanwhile, Earth-based studies of Pluto and Charon continue, with new discoveries related to the planet's atmosphere and the ices on its surface.

Other very new discoveries of small bodies in Pluto's region of the Solar System suggest a population of organic-rich bodies that are related to the comets and to the icy planetesimals from which Pluto and Charon formed. Dr. Cruikshank will review the latest findings on Pluto and its companions, as well as previewing the Pluto Fast Flyby mission.

Astronomy Day

The San Francisco Amateur Astronomers is planning a program to recognize Astronomy Day 1993 to be held on **April 24** at the California Academy of Sciences in Golden Gate Park. This program will provide us with an opportunity not only to talk about our favorite subject, but will enable us to let San Francisco know about our club. We plan to have several telescopes on hand for solar viewing and demonstrations. Several members are constructing a solar system scale model that will amaze and fascinate our visitors. Some members have already volunteered to demonstrate the model and talk about our club on the day of the event.

Will you help us? We need you to be there to talk to the visitors our exhibits attract. And we can use your ideas for other exhibits. We want to use the day to celebrate the fun of astronomy and to show off our great club. Please call Norma Zimmer at (415) 225-9935 and let her know you'll give your time to make the day a success.

Summer Programs At Mt Tam

In conjunction with our monthly star parties at Rock Springs, Mount Tamalpais State Park sponsors a series of public astronomy programs during the summer and autumn months at the nearby Mountain Theatre. SFAA member Tinka Ross has just released the following schedule of speakers for 1993:

- April 24 (8:30)** *Looking for ExtraTerrestrials*
Seth Shostak, SETI Institute

- May 22 (8:30)** *Star Stories*
Lucinda DeLorimier, Storyteller

- June 19 (8:30)** *Mass Extinctions?*
William Clemens, UC Berkeley

- July 17 (8:30)** *An Amateur Uses the Hubble*
Nancy Cox, SFAA

- Aug 14 (8:30)** *We Are Stardust*
Yvonne Pendleton, NASA Ames

- Sept 18 (8:00)** *The UFO Verdict*
Robt Sheaffer, Bay Area Skeptics



Star charts in the SFAA Bulletin are based upon The Sky for Windows available from Software Bisque. Photographs are from The Buil-Thouvenot CCD Atlas of Deep Sky Objects available from Sky Publishing.

March Madness

Each year around the vernal equinox it is possible to view most of the Messier objects within a single night. (The Messier objects are those contained in the list compiled by Charles Messier in the late 1700s and consist of 110 deep sky objects often viewed by amateur astronomers.) This year some of our club members decided to give the Messier Marathon a try.

The weather earlier in the week brought light rains to the area, but by the weekend clear skies prevailed. Ray Cash and I decided that Fiddletown offered better prospects than Fremont Peak, so we packed up our telescopes and headed out on Saturday. When we arrived we found Bill Cherrington, Art Owens, Steve Gottlieb, Joel Goodman and a few others there. Ira Stern arrived shortly thereafter.

Three of us were going to attempt the marathon, Ray, Ira and myself. We found a good spot and set up to begin at 7 P.M. at the end of twilight. Except for 4–5 tough objects at twilight and 4–5 at dawn, the marathon is not difficult. Observing 110 objects in nine hours of darkness dictates a pace of one object every 5 minutes throughout the night, but we found time to take occasional breaks nevertheless.

We were able to get M77, M31, M32 and M110 in the evening skies, but were unable to break through the light pollution of Sacramento to see M74 and M33. After this initial set back, we got on a roll, marching across the sky west to east picking off open clusters, globulars and galaxies. I had it easy with my LX200. Just punch in the M number and the telescope slewed to the object by itself. Ray and Ira used the more traditional method of star hopping. Naturally I was faster at locating the objects, but Ray and Ira managed to keep up quite well. The Virgo Cluster is always a

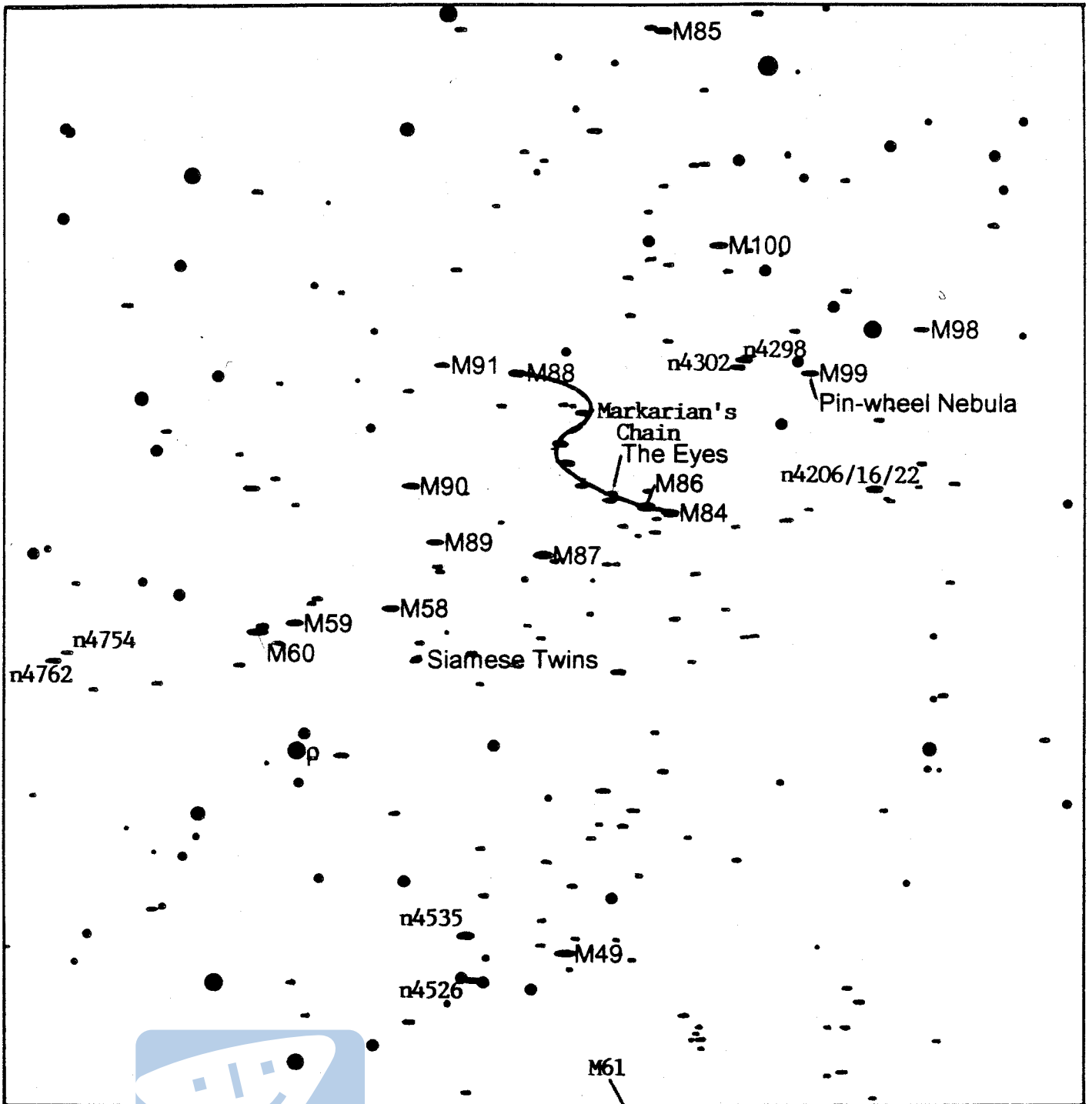
problem for star-hoppers, but a quick check of the book confirmed their sightings. By midnight we had logged about 65 objects and it was time for a break—some coffee, cookies and chips for sustenance. Then back to work as more objects rose into view from the east.

It started to get a bit chilly after midnight and, with the dropping temperature, dew was forming on exposed surfaces. Ray had no problem with his Dobsonian and Ira had a dew shield, but I was having quite a problem with my scope. Ray discovered that a regular large, paper shopping bag makes a perfect dew shield for a 10 inch, perfect fit, didn't even need to tape it on. After that I had no further problems.

Back to the grindstone. With Sagittarius up the big, bright globulars were easy. A few more open clusters and we were back down to the eastern horizon again. Now it was a race to see if the few remaining objects would clear the trees before the dawn's increasing light made them impossible to see. I was able to get M15 and M2 without much problem, but M72, M73 and M55 were playing peek-a-boo with me in the tree branches. M30 was still well below the horizon. I kept switching back and forth between them and managed to get them just as they cleared some branches. M55 and M73 were just faint smudges and I could just make out three stars in M72, but it was definitely there. By the time M30 rose far enough above the trees, it was too light to make out. 5 A.M. and we were finished!

Final tally—107 Messier objects in one night! (M74, M33 and M30 the missing objects) We all agreed that it was great fun and a very interesting experience.

—Dennis Tye



The Virgo Cluster

*"...a celestial wonderland of innumerable star cities,
twinkling across the millions of light years."*

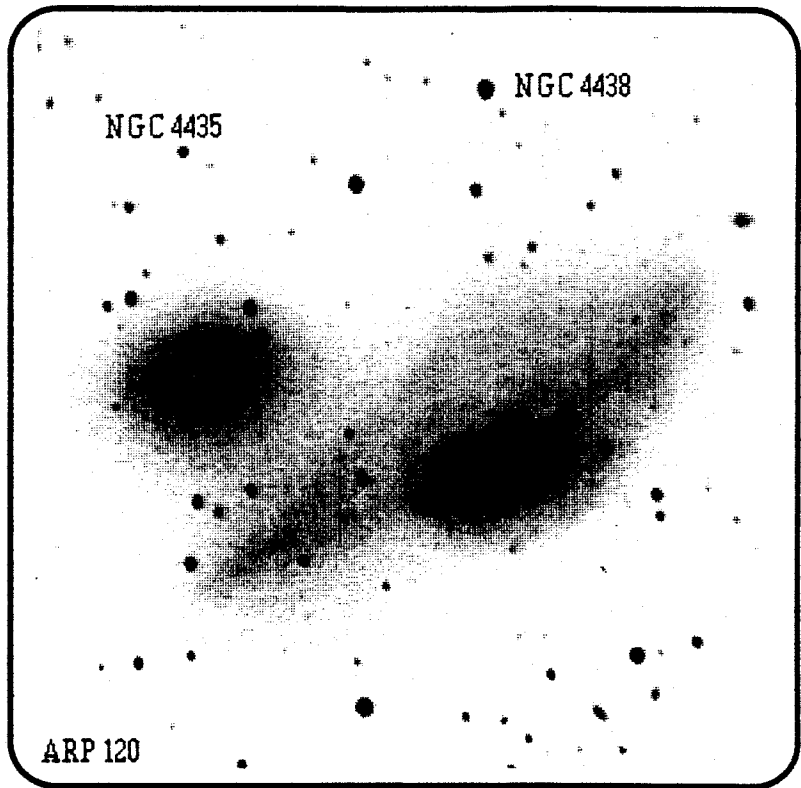
—Robert Burnham

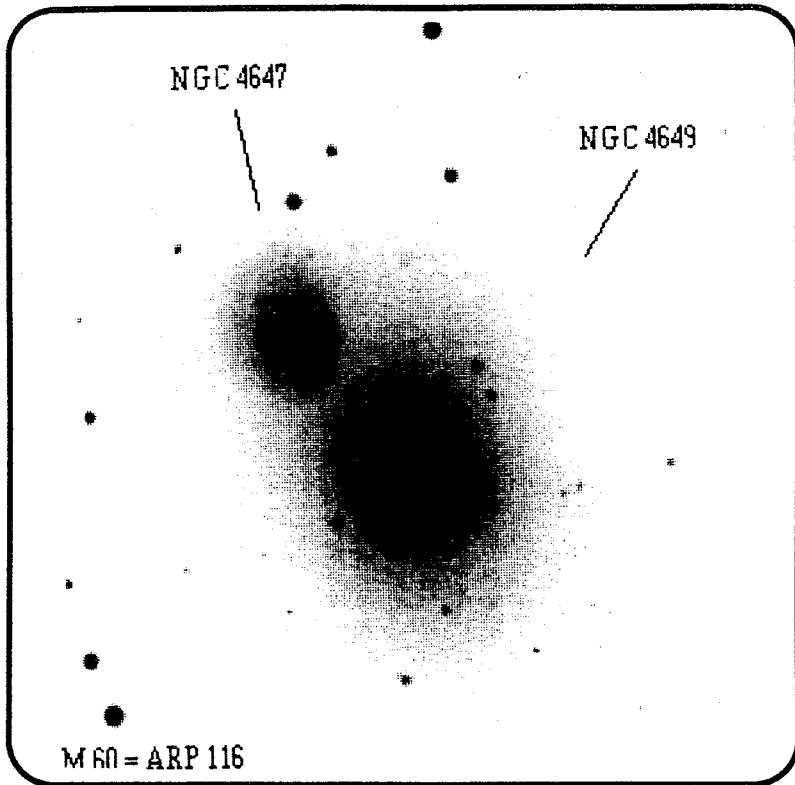
Exploring the Virgo Cluster

Spring is the perfect time to explore the Virgo Cluster. This part of the sky used to be called “the Realm of the Nebulae” because of the high concentration of deep sky objects here. Back in those days, not so long ago, astronomers had not yet realized that some faint fuzzies were clouds of gas within our own galaxy, and others huge collections of stars similar to the Milky Way itself.

The Virgo Cluster is the nearest rich galaxy cluster; the Milky Way is thought to lie on its outskirts. Estimates of its distance range from 40 to 70 million light years, or about 20–30 times as far away as the Andromeda Galaxy.

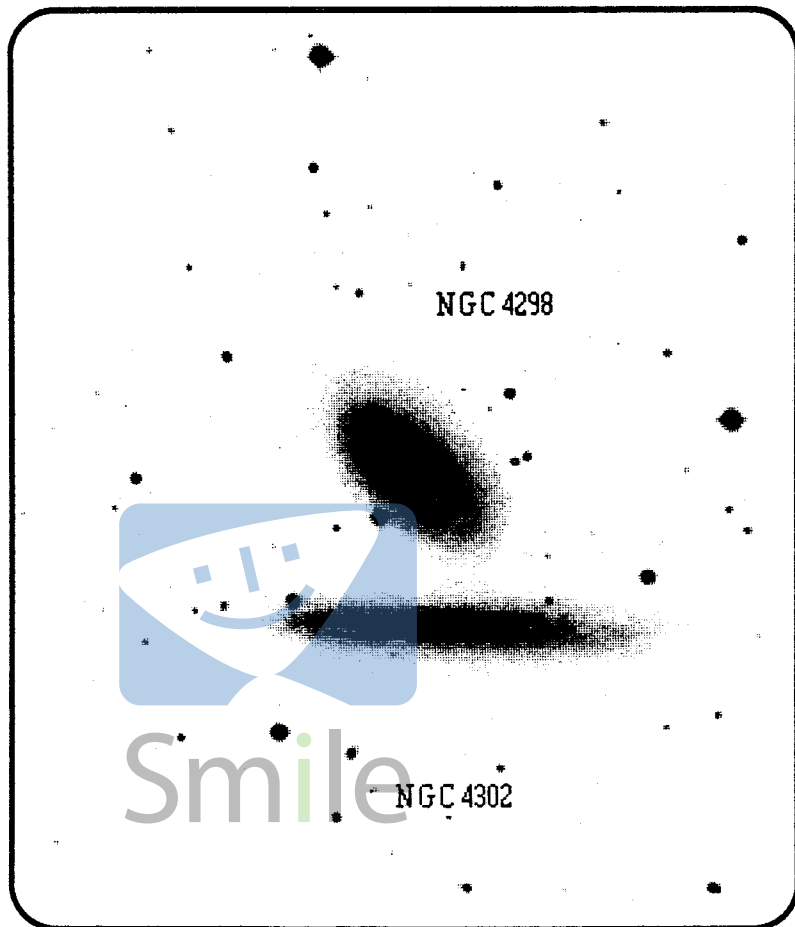
Three bright giant ellipticals dominate the center of the cluster. M87, also known as Virgo A, is famous for its (unobservable) optical jet. The other two, M84 and M86, lie close together in the same low power field, along with at least seven other fainter galaxies. The pair marks the beginning of *Markarian's Chain*, a string of about a dozen 11th magnitude galaxies stretching for around 2.5 degrees northeast to M88. The most interesting galaxies in the chain are NGC 4435/4438, nicknamed “The Eyes” by a famous observer of the last century, L.S. Copeland.





It's easy to get lost in the Virgo Cluster. Finding and identifying the many Messier objects here is a good exercise in keeping your bearings at the telescope. After logging the galaxies that Messier recorded, check out some of the galaxy pairs that are among my favorite objects in the cluster.

Two degrees southeast of M87 is a fascinating pair of interacting galaxies, known as "The Siamese Twins" (NGC 4567/4568). From there it's another two degrees east to M60 and its companion, and 2.5 degrees further east to a nice pair, NGC 4754/4762. The latter is one of the thinnest galaxies known.



Sweeping to the northwestern part of the cluster, just east of M99 is another impressive pair, NGC 4298/4302, a bright edge-on beside an elliptical. About two degrees southwest lie three more edge-on spirals (NGC 4206/4216/4222) in the same low power field.

South of the main cluster lies another rich concentration of galaxies centered around M49 and M61. A bright superimposed star lies near the nucleus of M49. (No, you haven't found a new supernova!)

Move your scope a degree east of M49 and you'll find another nice pair, NGC 4526/4535. The latter is known as "The Lost Galaxy" because of its phantom like appearance in the eyepiece.

—Jim Shields

A Deep Sky Journey

—Tom Kellogg

After traveling for 5 billion years some photons from the double quasar Q0957+561A/B tickled the nerve endings in the retina of my eye. Those photons arrived unchanged except for the bending effect of a gravitational lens caused by a galaxy cluster positioned between Earth and Q0957+561A/B. It seems unfathomable for a photon to exist for a half billion years longer than the age of our solar system! And even more unbelievable is the rarity of molecules and particles in space that allows the photon to complete its journey.

The date was February 14, the place Bell Springs Road, three miles east of Highway 101 and two miles north of Laytonville. It was the darkest sky I've ever been at with my 13" f/4.5 Odyssey I. A short article in S&T March '93 page 119 brought my attention to the famous double quasar. At 16th magnitude it was the faintest speck in my eyepiece (15 mm) and I couldn't resolve the 2 images whose separation is 6 arc seconds. If you aren't able to see the quasar your efforts won't go unrewarded

since it is located a few dozen arc minutes away from the fine edge on spiral NGC 3079.

The seeing was magnificent and the dark sky allowed for views of nebulae like I've never seen before. The Orion nebula seemed to extend for several degrees around. In fact the entire Orion belt and sword area seemed laced with wisps of nebulosity. I pointed to M-45, the Pleiades ("7 sisters" or "Suburu") for my best view ever of the nebulosity surrounding some of these stars. My heart was dancing with joy as I perused 36 of the 109 Messier objects, Mercury, Venus, Mars, Jupiter, Saturn and several NGC objects.

I tried for Pluto but its meager 14th magnitude light was washed out by the last quarter moon several degrees away. At 3,000 feet above sea level it was a snappy cold night but I stayed warm with ample layers of woollens and bubbling enthusiasm in celebrating with the Creator over the gloriously harmonious creation.

Solar System Workshop

The Association of Lunar and Planetary Observers (ALPO), together with The Chabot Observatory & Science Center, is sponsoring a workshop for Solar System observers on **April 30** and **May 1** in Oakland. The workshop will feature lectures and demonstrations on visual observations (drawings, intensity estimates, etc.), timing events, astrophotography, CCD and video imaging, as well as two observing sessions using Chabot's 20" and 8" refractors and other instruments. Workshop leaders include Don Machholz, Don Parker, Jose Olivarez, Mike Reynolds and John Westfall. Cost is \$20 per person, payable to Chabot Observatory & Science Center, and participation is limited. For more information, call (510) 530-3480.

Jupiter in April
by Fred Sammartino

I finally got my first good look at Jupiter this season. The Southern Equatorial Belt (the one with the spot) is gone again! And everyone thought it was here to stay! The "red" spot has been regularly changing its color and appearance over the last few years. Depending on the color of the spot, the disappearing belt makes it either easier or harder to see. If the spot is light, then it is easiest to see next to a dark belt, since it leaves a prominent "gouge" depression on the edge of the belt. If the spot is darker, then it stands out better against the lighter cloudtops.

When I saw Jupiter, the spot was a mid-salmon color, and stood out easily if you knew where to look. The appearance of the spot and belt will probably change during the months of this apparition, so make a point of checking out the details on the cloudtops of Jupiter during the summer to note any changes. The Northern Belt (without the spot) is particularly dark and thin, and looks more like a line than a belt. The Southern belt is actually visible if you look hard enough. It has just lightened in color and blends in with the neighboring clouds.

Since we are just after opposition, the moons will pull away from their shadows during the month. Here are the times when the moons will appear to pass each other in orbit around Jupiter. Not all of these "conjunctions" will be very close. Times are PST before, and PDT on and after Sunday, April 4.

Moon Close Conjunctions

(Eu=Europa, Ga=Ganymede, Ca=Callisto)

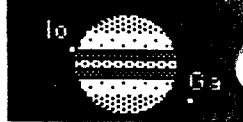
Ga-Ca: Fri, Apr 2, 1:15 AM	Io-Ga: Mon, Apr 12, 3:46 AM
Io-Eu: Sat, Apr 3, 9:30 PM	Io-Ga: Tue, Apr 13, 12:41 AM
Io-Ga: Sun, Apr 4, 11:51 PM	Io-Eu: Sun, Apr 18, 2:34 AM
Io-Ga: Mon, Apr 5, 9:47 PM	Eu-Ga: Mon, Apr 19, 1:19 AM
Io-Eu: Tue, Apr 6, 4:39 AM	Io-Ga: Tue, Apr 20, 3:25 AM
Eu-Ca: Sat, Apr 10, 12:07 AM	Io-Eu: Fri, Apr 23, 9:35 PM
Io-Eu: Sun, Apr 11, 12:31 AM	Ga-Ca: Tue, Apr 27, 12:47 AM
Eu-Ga: Sun, Apr 11, 10:26 PM	Io-Eu: Fri, Apr 30, 11:35 PM

Red Spot near central meridian

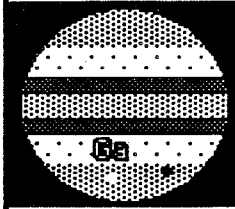
Fri, Apr 2, 4:01 AM	Sat, Apr 10, 9:28 PM	Thu, Apr 22, 9:21 PM
Fri, Apr 2, 11:52 PM	Mon, Apr 12, 3:15 AM	Sat, Apr 24, 3:08 AM
Sat, Apr 3, 7:43 PM	Mon, Apr 12, 11:06 PM	Sat, Apr 24, 10:59 PM
Sat, Apr 3, 8:43 PM	Thu, Apr 15, 12:44 AM	Tue, Apr 27, 12:38 AM
Mon, Apr 5, 2:30 AM	Sat, Apr 17, 2:23 AM	Thu, Apr 29, 2:16 AM
Mon, Apr 5, 10:21 PM	Sat, Apr 17, 10:14 PM	Thu, Apr 29, 10:07 PM
Wed, Apr 7, 4:08 AM	Mon, Apr 19, 4:01 AM	Sat, May 1, 3:54 AM
Wed, Apr 7, 11:59 PM	Mon, Apr 19, 11:52 PM	Sat, May 1, 11:45 PM
Sat, Apr 10, 1:37 AM	Thu, Apr 22, 1:30 AM	

Here are some moon configurations to look for during the month. Moons and spot pass right to left in front of Jupiter (reflecting scope view). Moons not shown are out of the field of view.

Thursday, April 8 - A transit of Ganymede, and occultation & eclipse of Io starts at 10:05 AM as Ganymede and Io close in on Jupiter from each side. Minutes later, Io is lost behind Jupiter.



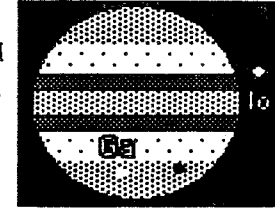
Io is the faster of the two and crosses all the way behind the planet in the time it takes Ganymede to only make it half way. Watch Io slowly emerge from Jupiter's shadow at 12:35 AM. Ganymede shadow visible.



12:30 AM

12:35 AM

Look for Ganymede floating above the dark polar region



At 1:30 AM, Ganymede finally exits transit. Shadow is still visible near central meridian.



Friday, April 9, 9:00PM.

Io shadow in mid transit. Can you see Io?



Eu

Ca

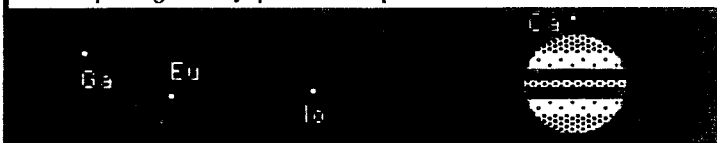
Later at 12:07 AM, Europe & Callisto in conjunction, red spot visible



Eu

Ca

Sunday, April 18, 11:20 PM - Here's something you don't see every day! Callisto passing below Jupiter's south pole in a missed transit.



Friday, April 23, 9:35 PM, Io and Europa pass by each other in orbit



Later at 11:50 PM, Io ready to start transit:



By 12:30 AM, Io's shadow is near the central meridian



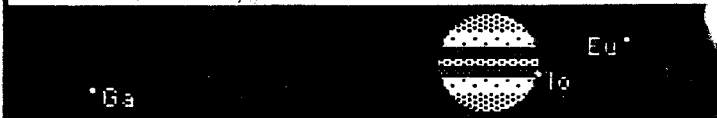
Friday, April 30
Europa slowly brightens to visibility as it exits from eclipse in Jupiter's shadow, directly above Io.

11:30 PM

11:35 PM



At 12:40 AM, Io is ready to enter transit. Shadow will be visible later.



Cosmic Distance Wars

—Joel W. Goodman

This piece could as well be entitled "will the real Hubble constant please step forward". It seems that astronomers agree about less and less these days, even about so sacrosanct a quantity as the venerable Hubble constant---the ratio between the speed of recession of other galaxies and their distances, which allows us to calculate the distance of any object in the universe from its easily measured red shift. Unfortunately, the Hubble constant is not the same to all astronomers, resulting in seriously divergent estimates of distances to familiar objects. For example, one camp in the pitched battle will tell you that the Virgo Cluster of galaxies is 50 million light years away while the other believes it is twice that distance. Both camps can't be right, but which one is wrong?

At the heart of the controversy is the calibration of the Hubble constant, which requires a direct measure of the distance to sample galaxies. Different groups of astronomers have used different methods for calibration, laying the groundwork for dispute. The classic method used Cepheid variable stars for calibration. Cepheids vary with a periodicity that reflects their intrinsic brightness, permitting calculation of distance from apparent brightness and periodicity. The calculated distance of the Cepheid and the red shift of the galaxy in which it resides yields a calibration point for the Hubble. The Cepheid approach yielded a universe with an age of about 15 billion years, which has been a generally accepted value for several decades. This sounds straightforward enough, but there is a hitch. Unfortunately, Cepheids are bright enough to be observed in only the nearest galaxies, limiting the calibration curve. To circumvent this limitation, astronomers have resorted to using type II supernovae for calibration. Type II's yield the most powerful and luminous stellar explosions---exemplified by the supernova in the Large Magellanic Cloud in 1987---permitting observation out to much greater distances than Cepheids. The strategy for calculating distance to a galaxy in which a supernova is spotted is based on measuring the angular size of the supernova on a photographic plate and comparing that figure to the supernova's actual size, calculated from its age and rate of expansion. The supernova approach yields a universe only half as large and old as the Cepheid-derived universe, perhaps 7.5 billion years. However, the supernova approach also has its limitations because supernovae are rare birds and have been observed in only a handful of galaxies. So along comes another research group with yet a third method: measuring the rotation rate of galaxies by observed Doppler shifts at various points within the galaxy. It so happens that the size (and brightness) of a galaxy is directly proportional to its rotation rate, which therefore furnishes an estimate of the galaxy's intrinsic brightness. A comparison of the galaxy's apparent and intrinsic brightnesses, in turn, yields an estimate of its distance. The great advantage of the rotation rate approach is that data is available for literally thousands of galaxies, providing a tremendous data base for calibration. To everyone's surprise, when galaxies in which supernovae have been seen (15 in all) were subjected to rotation rate analysis, the same Hubble constant was derived, indicating a relatively small and young universe.

(Continued on Page 11)

**The 13th Annual
Bay Area Astronomical Auction
May 1, 1993
at Houge Park, Sunset Drive, in San Jose
near Hwy 17 & Camden Ave.**

The San Jose Astronomical Association is sponsoring the 13th Annual Bay Area Auction and Swap Meet on May 1 in San Jose, and everyone is invited to take part. Doors will open at 1:00 P.M., the swap meet will last from 2:00–5:00 and the auction will begin at 6:00 P.M. There is plenty of parking and a number of restaurants along nearby Camden Avenue. Items for the swap meet do not need to be registered; just bring them along with you. Auction registration will be accepted on the day of the event, but you may pre-register by contacting J. Van Nuland, 3509 Calico Ave., San Jose, CA 95124. Clean out those unused treasures from the closet or garage, and bring them to San Jose on May 1.

Join us for the Third Annual

Grand Canyon Star Party

The Tucson Amateur Astronomy Association, in conjunction with the National Park Service, announces the Third Annual Grand Canyon Star Party, to be held June 12–19, 1993, on the South Rim near Yavapai Museum. This is a perfect spot for such an event, with spectacular scenery by day and wonderfully dark sky by night. The excitement, joy and gratitude expressed by the international crowd to whom you'll be introducing the night sky is very satisfying. Come for one night or all week, but be prepared for a lack of sleep, with the Canyon calling you by day and the star-filled sky by night.

Housing is critical in the summertime, so you should make reservations as soon as possible. For motels and lodges along the South Rim, call Fred Harvey, Inc., at (602) 638–2401. Campsites may be reserved by calling MISTIX at (800) 365–2267 no more than eight weeks ahead. There is no registration fee for the star party, but if you plan to bring a telescope, please register by sending a long self-addressed stamped envelope to TAAA—Grand Canyon, 1122 E. Greenlee Pl., Tucson, AZ 85719.



25th Anniversary

Riverside Telescope Makers Conference

It's always fun to visit the Riverside Telescope Makers Conference on Memorial Day weekend. This year the 25th annual conference will be held as usual on May 28–31 at Y.M.C.A Camp Oakes (eight miles east of Big Bear City). This location is 50 miles northeast of Riverside in the San Bernardino Mountains outside of Los Angeles, about an eight hour drive from the Bay Area.

Four package plans are being offered for meals and dormitory accommodations, ranging in price from \$64 to \$73. If you prefer not to wait in long lines for meals, you can eat at the snack bar and camp on the grounds for \$35. There is a \$10 discount if you register before May 1. The day use fee is \$10 per day. Only 400 meal plans and 800 camping plans will be sold.

This year Memorial Day weekend falls near first quarter moon; on May 28 moonset is at 1:11 P.M. People don't go to Riverside for great deep sky observing, anyway; they attend mostly to socialize, check out the latest trends in amateur telescope making and commercial equipment, and maybe do some horsetrading. One of the most popular events, the swap meet, is on Saturday morning in front of the meeting hall.

The conference also features talks on telescopes and equipment, a workshop on using modern interferometry for optical testing, and ATM merit awards to be presented on Sunday evening. For further information or to request registration materials, please call and leave a message at (909) 948–2205.

More on Cosmic Distance Wars

That should settle the matter, right? Guess again. Allan Sandage of the Carnegie Institution and his colleagues have applied yet a fourth approach and come up with the older and larger universe. They used type 1A supernovae, which are less powerful than type II, and used apparent brightness rather than angular size to gauge distance, on the assumption that the intrinsic brightness of type 1A supernovae is essentially invariant. This left them in need of calibrating their distance scale, but last year they detected a supernova and a Cepheid variable in the same galaxy, a fortuitous happening that enabled them to combine two independent yardsticks and come up with a confident distance estimate for this galaxy as well as for others in their type 1A supernovae catalog.

So which camp is right, young and small or old and large? The scales appear to be tipped at the moment in favor of young and small, but that may change with the next published paper. Just bear in mind the next time you observe the Virgo Cluster that those galaxies are somewhere between 50 million and 100 million light years away. Or maybe not.

- ★ March Madness
- ★ Exploring the Virgo Cluster
- ★ A Deep Sky Journey
- ★ Cosmic Distance Wars
- ★ Coming Attractions

Features

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

San Francisco Amateur Astronomers

SAN FRANCISCO AMATEUR ASTRONOMERS MEMBERSHIP APPLICATION

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Select one category:



- \$20 enclosed, individual membership
- \$20 enclosed, foreign membership
- \$25 enclosed, family membership
- \$25 enclosed, institutional membership
- \$5 enclosed, youth membership (under 18)

Make checks payable to San Francisco Amateur Astronomers and mail to:
 Treasurer, San Francisco Amateur Astronomers, 32 Penhurst Avenue, Daly City 94015.

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 six to 25 inches diameter.