

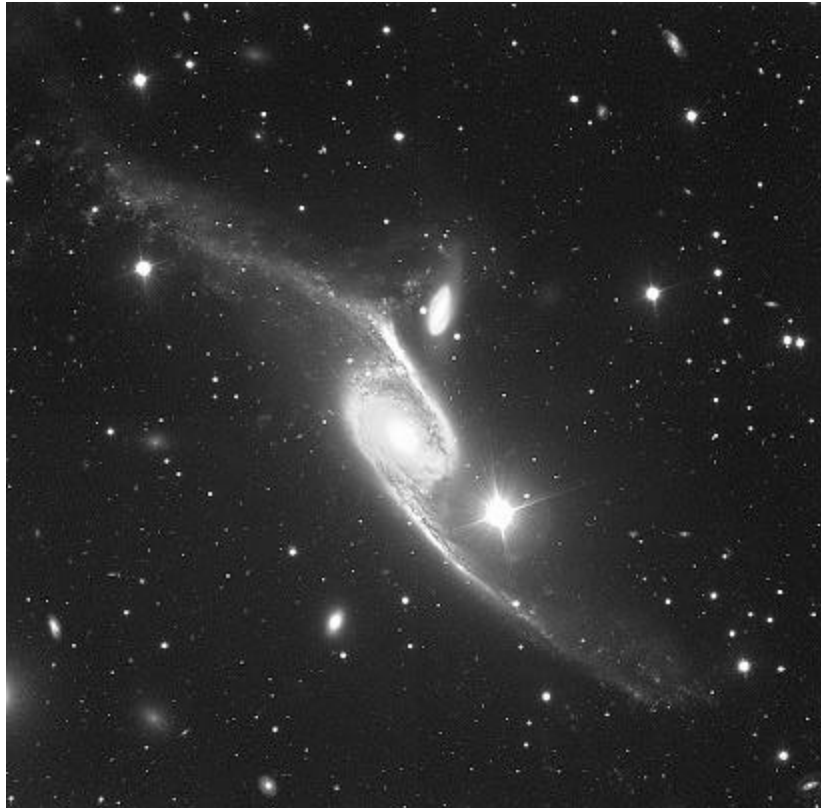
SIRIUS ASTRONOMER

NEWSLETTER OF THE ORANGE COUNTY ASTRONOMERS
See our web site at <http://www.chapman.edu/oca/>

June 1999

Free to members, subscriptions \$12 for 12 issues

Vol. 26, No. 6



Located in the southern constellation Pavo the Peacock, almost 300million light-years away and over 7 arcmins wide is one of the largest barred, spiral galaxies NGC6872, significantly disturbed by the passage of IC4970 through it (located just above the center. To the lower right lies the overexposed image of another Milky Way star. The image was taken by FORS1 on VLT's 8.2-meter Antu (formerly UT1). "FORS" stands for "Focal Reducer/low dispersion Spectrograph." The full field measures 6.8 x 6.8 arcmin². Courtesy ESO.

CHAPMAN MEETINGS

The next meeting of the OCA is on Friday, June 11, at 7:30pm in the Science Hall of Chapman University in Orange. The free and open meeting will feature Dr. Scott whose talk is entitled "Near-Infrared Imaging, Near the Diffraction Limit with Meter Class Telescopes." There will also be a "What's Up?" presentation by Chris Butler, "Astronomy News" by Russell Sipe, and a raffle.

STAR PARTIES

The Silverado site will be open for observing on Saturday, June 5. The Anza site and Observatory will be open Saturday, June 12. Come prepared for cold weather --- dress warmly --- and if in doubt, check the satellite weather pictures before leaving town or call the observatory.

COMING UP

May 22nd is ASTRONOMY DAY!! Volunteers with telescopes are needed. Place & Time: Carl Thornton Park, Santa Ana, 7:30pm. The Orange County Fair is in July. Weeknight assistance is needed. Please contact Jim Benet, the Outreach Coordinator, at (714) 693-1639 or by email to jimbenet@csi.com for more info on both activities.

The President's Message

by Wayne P. Johnson (aka Mr. Galaxy)

As I write this article it seems like summer is still in doubt here in California with the marine layer creating overcast and foggy conditions resulting in chilly humidity (38 degrees F at Anza last night with lots of dew!). My recent trip to Arizona, New Mexico and Texas, however, left no doubt that the hot season has indeed arrived. Arlene and I signed up for the Texas Star Party a couple months ago before I realized (to my horror) that the OCA General Meeting was right in the middle of the TSP. It was a difficult choice, but I was confident that the meeting would run smoothly enough under VP Russell Sipe's capable supervision. It sounds like it did. Thanks, Russell!

By the time this article appears in the newsletter (I'll try to stay in the past tense, though this letter may be published early on the OCA's website), many of you will have enjoyed two of the local May Conferences: the IAPPP-West Symposium for the photometry (measuring brightness variations in celestial objects) and CCD enthusiast, and the mother of all conferences, the Riverside Telescope Makers' Conference (RTMC).

This year was the 18th annual IAPPP meeting. It has traditionally been a fairly small gathering (about 75 people) for the technophile who enjoys remotely controlling the observatory, finding out about new CCD imaging techniques and measuring star or asteroid brightness accurately enough to be reported in the professional journals. Though it is a small (but NOT exclusive), enthusiastic meeting with people from around the country, the IAPPP-West Symposium was, as always, a pleasant respite from the maelstrom known as the RTMC!

This year at the RTMC we were fortunate to have as our main guest speaker, Harrison Schmidt, the only geologist to go to the moon and, so far, one of the last people to have walked on Luna. Although the Texas Star Party had about 600 people in attendance, the RTMC had an attendance of about 1,600 attendees because of the many activities involved in the event. Along with telescoping while at the RTMC, which was "limited" to lunar and planetary observing because of the nearly full moon, there were numerous talks and discussion forums for the neophyte and expert alike along with many vendors and the very popular swap meet, not to mention the many interesting telescopes and friends!

On the home front, Minor White and I, along with new member, Myke Collins, have been upgrading the software capabilities of the 22-inch Kuhn telescope at Anza. Minor has written some instructions for using the new software and has given a copy to Chuck Lodoza. The new Telescope Control Program (TCP) is very similar to the old program, but has an expanded database that includes the planets and some of the brighter stars to make navigating around the sky easier. It also allows for simpler initializing of the telescope. Users no longer have to use lookup tables to find out the local sidereal time (LST). Chuck will incorporate these new instructions into his telescope training program. If you are a Star Member and you volunteer to help operate the 22-inch telescope or just want to use it, be sure to touch bases with Chuck to be sure about the new software. There are operating instructions for using it once you are in the program.

Last, but not least, thanks to Jim Benet and all the volunteers who helped out at the Astronomy Day event at Thornton Park. We'll need help at the Orange County Fair in July, too.

Clear skies to all!

M110---A Neglected Galaxy?

by Francesco Finizio

M110...its destiny to be the last entry in the Messier catalog, to be small and, if it wasn't enough, to have as its neighbor galaxy big, shining, tyrannical and cannibalistic M31, attracting all the attention, pictures, studies and consideration.

Monsieur Messier, after discovering the galaxy on August 10, 1773, and including it in a "fine drawing" of the Andromeda Nebula in the year 1807, forgot to include it in his catalog of nebular objects. A couple of years ago I was in search of a good example of galactic interaction, hoping to find a very accessible nucleus, possibly in a non-steady state condition. My attention was attracted by M110, despite the sparsely available information that depicts this galaxy as an elliptical or dwarf spheroidal.

The way I have selected to investigate the shape and structure of this galaxy was to view first the overall area with rich field pictures and mosaics at increasingly long exposures, in order to catch faint extensions between M31 and M110. **Fig.1** has been assembled from up to 24 single exposures of 5 minutes each, with a small Celestron Maksutov working at 350mm f4, and a Meade Pictor 416XT camera in full resolution mode. It shows very clearly a "bridge" between the two galaxies; the glow on the upper left corner is the outskirts of M31. It is evident that the



Fig 1 : 2 hours of exposure, obtained by stacking 24 pictures with 5 minutes integration time. Meade Pictor 416XT and Celestron 500mm Maksutov telecompressed to 350mm f4. North is on the right. The field is 66.5"x44.3", with 5.2"/pixel and 73.1 Years-Light/pixel.

galaxy's entire volume is almost doubled with respect to what can be seen on the conventional photographs; two faint arching halos pointing in opposite directions are easily recognized, indicating the direction of the galaxy rotation.

Fig. 2 is a mosaic of three pictures, obtained with a Meade 10" SCT at 980mm focal length and the CCD camera in 2x2 binning mode. It shows better details of clumps of stars and dark clouds out of the elliptical glow. As a further step, I took several exposures at a focal length of 2540mm f10 with both the Meade 10" SCT and the CCD camera working in 2x2 binning (**Fig. 3**) and in full resolution mode (**Fig. 4**).

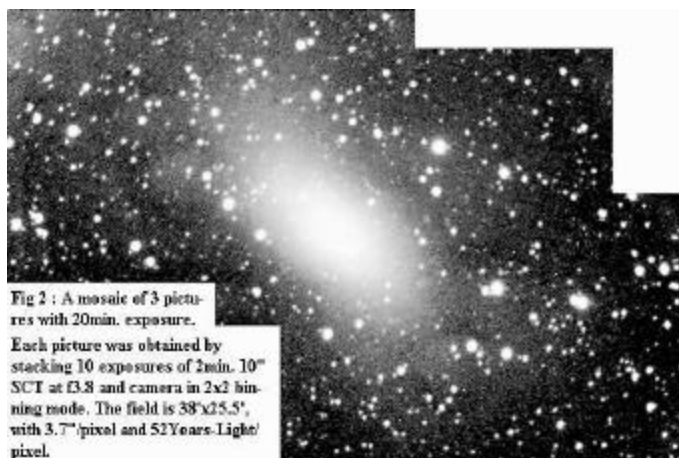


Fig 2 : A mosaic of 3 pictures with 20min. exposure. Each picture was obtained by stacking 10 exposures of 2min. 10" SCT at f3.8 and camera in 2x2 binning mode. The field is 38"x25.5", with 3.7"/pixel and 52Years-Light/pixel.

I was peering into the nucleus with this set-up, getting two surprising results. The first is a very compact star-like nucleus, shining through a shroud of dark clouds so close to the nucleus that they disappear when the picture enhancement subtracts the galaxy glow. This result becomes evident when, during the picture elaboration, the peak brightness of

the nucleus is maintained below the pixel's saturation level. This feature was checked in several nighttime sessions with exposures at both full resolution and 2x2 binning mode.

I believe that the bright compact object is the real nucleus of M110 and not a star interposed between the galaxy and us. It is easy to demonstrate this by increasing gradually the brightness and the contrast of the picture. It becomes evident that the supposed nucleus expands, gradually filling the space between the dark clouds, while the real stars remain point-like sources. The optical performances of my telescope do not allow reducing the airy disk below certain limits; checks with different telescopes, both refracting and reflecting, are in course. One of these checks, made with a Torus 14.5" Cassegrain telescope and an SBIG ST8 CCD camera in full resolution, is shown in **Fig. 5** (Courtesy of Arnie Rosner).



Fig 3 : 20min exposure. Meade 10" SCT at f10; camera in 2x2 bin. The field is 6'x9' with 1.42"/pixel.

The set of pictures, taken during the winter of 1998, shows a compact object with an elliptical shape with the brightness increasing significantly on the central pixels. If it is possible to confirm the evidence that the actual size of the nucleus matches the definition of a "point-like" source, then a black hole would be the perfect candidate to explain this unique feature. In that case, M110 will give us one of the more directly observable galactic-sized black holes. These objects are usually heavily shrouded by glowing plasma and by millions of old stars orbiting close to the nucleus; we can very often only infer their existence by measuring their effects on the surrounding objects. In the case of M110, the powerful gravitational pull of M31 has probably stripped the nucleus area to the point that the black hole is almost "naked." The dark clouds are the second of the amazing features

visible in these pictures.

I have found several records of previous observations of these dark clouds. Almost everyone has noticed the more external and big dark clouds seen in the long-exposure pictures. It seems that no one has enhanced the pictures as I did, showing the cloud pattern closely surrounding the nucleus. Where are those clouds? Are they really closely bound to the nucleus or are they just in between the nucleus and us? It is difficult to answer these questions by merely looking at the pictures. The overall texture looks chaotic; the only area where the clouds seem to follow a scheme is the area surrounding the nucleus. A loose ring, interrupted on the right side (M31 is in the left side), seems to envelop the nucleus, with the upper and markedly the lower sides more dense.

The space between the nucleus and the ring seems to glow in a peculiar way with respect to the surrounding areas. It is evident that when the picture brightness and contrast are gradually increased, this area represents a discrete precise brightness step between the nucleus shown at its minimum dimension and the entire dark cloud ring saturated with light. Furthermore, the contrast of this ring is very low, as if we were spotting it through a screen of M110 central stars. These observational characteristics, if confirmed with better instruments and cameras, will be a strong argument in favor of placing the ring structure actually in contact with the nucleus. Other large dark clouds at the periphery of the elliptical galactic glow do not show any peculiar structure and have a more marked contrast, indicating that they probably lie in the outskirts of the galaxy.

What Model for M110?

M110 is currently classified as E6p elliptical galaxy, and is very often used as an example of how an elliptical galaxy should appear. This classification comes from its overall shape as viewed in the traditional long exposure photographs. However, what you would expect to see in an elliptical galaxy is very different from what is visible in my CCD pictures of M110. A true elliptical galaxy is formed by a large number of closely packed old stars orbiting a nucleus which is almost invisible into the gigantic glow irradiated by the center area. In this extremely hot environment, it is impossible for a dark cold cloud to permanently survive. It is still possible to see

some dark matter confined to an external belt in galaxies, like the famous Sombrero Galaxy M104, which is in transition from its spiral-shaped beginnings to an elliptical shape. During the process it is very likely that the dark matter left from the star formation process will be expelled into space by the radiation pressure.

Instead, M110 shows that its structure is choked with dust, including probably the areas close to the nucleus. In addition, the galaxy lacks a dense concentration of old stars enveloping the nucleus; instead, the stars are probably scattered around, with an apparent density less than that of the central regions of spiral galaxies. This is probably one of the key factors making the dark clouds survive successfully everywhere, without being evaporated or expelled by the radiation pressure. We might ask: how is the galaxy's disk oriented in space? Are we looking at M110 "edge-on", or is what we see a perspective view of a flat, disk-like galaxy?

In the absence of a rigorous spectrographic survey of the rotational speed, I favor the model of a disk inclined with respect to our line of sight. I support my opinion with the fact that an edge-on galaxy would not show any rotational feature, while M110 has two faint antisymmetric halos revealing its sense of rotation. If M110 were oriented edge-on, then its aspect would have been very close to the narrow, chaotic and elongated shape of M82, a famous example of a disturbed interacting galaxy. In this case, it would be very hard to correctly explain M110's external structure.

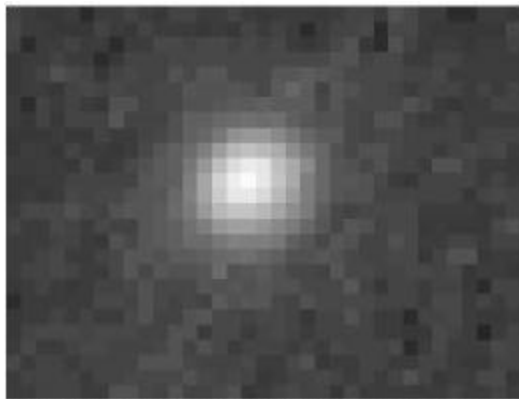


Fig 5 : 24min exposure on a Torus 14.5" f10 Cassegrain telescope and an SBIG ST8 CCD camera in full resolution. The field is 17"x12.8", with .49"/pixel and 6.9 Years-Light/pixel (Courtesy Arnie Rosmer).

From this brief analysis of a few observational aspects, I believe that the time is ripe to revise the M110 classification. Thus, if M110 is not an elliptical or a dwarf spheroidal galaxy, what else can be? I do not intend in this article to proceed further "by exclusion", since at the end we might conclude that the aspect of M110 does not match any classical category. Instead, any effort to attach a correct "galaxy type" label on M110 should not disregard that:

- We are looking at a dynamic evolution powered by the gravitational pull of M31.
- We should try to guess how M110 looked before it was "harassed" by M31.
- We should try to predict what conclusion we would draw for the end of this story.

I believe that this approach is more exciting than a thriller! In addition, the black hole in the other small satellite galaxy, M32, has been revealed to be of the same size as the one hidden in our galaxy. If M110 shows the same black hole size, we will see the destiny awaiting our galaxy when it approaches M31 at a close distance.

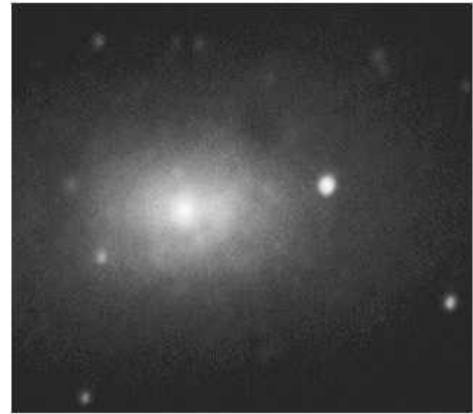


Fig 4 : 24min. exposure; 10" SCT at f10 and camera in full resolution. The field is 3.8'x3.4', with .72"/pixel and 10 Years-Light/pixel.

If it is true that we are looking at an inclined galactic disk, then the dark cloud distribution as well must be imagined layered on a disk. Then the famous dark ring structure around the nucleus, discussed in the previous paragraph, would be necessarily located close to the nucleus, rather than in a random position. An additional argument in favor of a disk inclined with respect both to our line of sight and the M31 galactic plane, is that the more disrupted side is the one which apparently is on the far side respect to M31. This can only be possible if the perspective is giving us a false vision of what is the near and what is the far side, which is possible only if the two galaxies are not co-planar.

Virtual Astronomy

by Dave Kodama

Eclipse '99

The featured speaker for the May meeting of the OCA was veteran eclipse chaser (and long-time OCA member) Joel Harris who updated everyone about the upcoming August solar eclipse, the last for this millennium.

Those who choose to see the eclipse in person need to consider a host of factors in choosing an observing location. These include the path of maximum totality, weather, accessibility, and political stability, to name just a few. As one might expect, the web is a great place to find this information, starting with Fred Espenak's excellent solar eclipse pages at NASA:

<http://sunearth.gsfc.nasa.gov/eclipse/TSE1999/TSE1999.html>

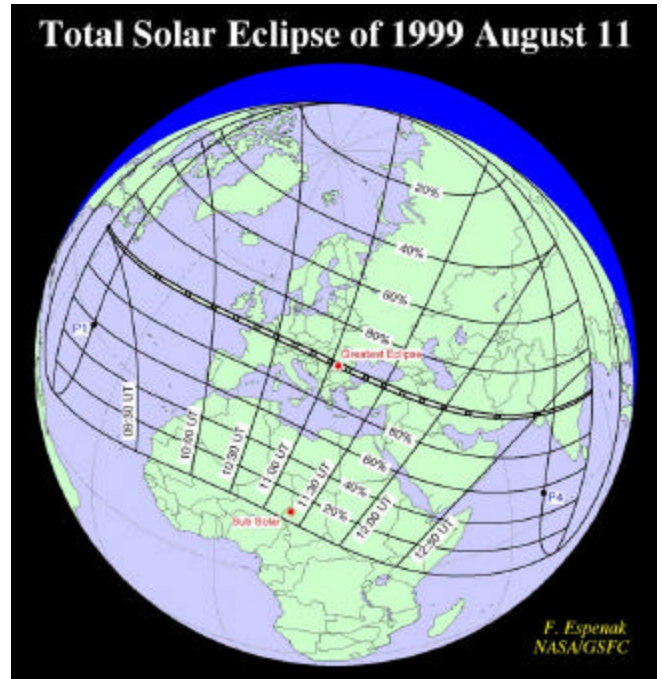
August 1999 eclipse info

<http://sunearth.gsfc.nasa.gov/eclipse/eclipse.html>

Fred Espenak's solar eclipse web page

<http://umbra.nascom.nasa.gov/eclipse/>

NASA's solar eclipse information center



Eclipse map courtesy of Fred Espenak, NASA/Goddard Space Flight Center.

Even if you can't take the time to see the eclipse in person, be sure to check the first link after the eclipse as it will be updated with photographs taken of the eclipse. Additional useful travel information for eclipse chasers can be found at:

<http://travel.state.gov/>

U.S. Department of State foreign travel info

<http://www.cdc.gov/travel/index.htm>

CDC health info for travelers

Solar Activity Peak Approaches

Of additional interest to amateur astronomers is the fact that the sun's activity is starting to pick up as we approach the peak of cycle 23. The predicted maximum should occur sometime next year with astronomers estimating that it will be somewhat more active than the average. Sunspot counts can be seen in a graph maintained at the Sacramento Peak Solar Observatory, and other solar activity is graphed at the DX Listener's club:

<ftp://ftp.sunspot.noao.edu/pub/sunspots/spots.gif>

Sunspot count plots (Sacramento Peak

<http://www.dxl.com/solar/>

DX Listener's Club Solar activity page

More info on current solar activity can be found at the major solar research centers:

<http://www.bbso.njit.edu/>

Big Bear Solar Observatory

<http://koa.ifa.hawaii.edu/>

University of Hawaii Mees Solar Observatory (Maui)

<http://argo.tuc.noao.edu/>

National Solar Observatory (Kitt Peak, Sacramento Peak)

<http://www.ssl.msfc.nasa.gov/ssl/pad/solar/>

Marshall Space Flight Center Solar Physics

or, you can get some real-time views of the sun from amateur Mike Rushford's remotely controlled solar telescope:

<http://sunmil1.uml.edu/eyes/>.

COMET COMMENTS FOR JUNE 1999

by Don Machholz

A new comet has been discovered in the Southern Hemisphere. It is visible in our evening sky, while **Comet LINEAR (1998 T1)**, dimmer than expected, is in the morning sky. Steve Lee visually discovered a new comet in the southern sky while observing from a star party in Australia. Then at magnitude 9, the comet, **C/1999 H1 (Lee)** should brighten as it continues to move north and then behind the sun. It will emerge into our morning northern sky in late July. The **SOHO** satellite found two new comets. One (**C/1999 G2**) was found on April 13 and the other (**C/1999 H2**) on April 19. Both disappeared.

The **LINEAR** program found two more comets. The one found on April 7, **C/1999 G1** was closest to the sun last September at 4.4 AU and remains faint. The other (**C/1999 H3**) was found on April 22 and will be closest to the sun this August at 3.5 A.U. It may brighten to magnitude 13.

The **CATALINA** program found a new comet on March 23. **C/1999 F1** is still nearly three years away from perihelion at 5.8 AU. It is magnitude 19 now, and may brighten by then to magnitude 14.

COMET HUNTING NOTES: Comet Lee is one of four comets found by amateurs at star parties during the past 25 years. In 1975 Doug Berger found Comet Kobayashi-Berger-Milon while looking for M2 at a San Jose Astronomical Association event. In 1985 I found Comet Machholz (1985e) at the Riverside Telescope Makers' Conference. In 1995, at a star party in Arizona, Thomas Bopp found a comet near M70. Three of these four finds were accidental finds, and those three comets reached magnitude seven or brighter.

EPHEMERIDES

C/1999 H1 (Lee)

Date(00UT) R.A. (2000) Dec El Sky Mag
05-07 09h36.6m -38d48' 109d E 7.8
05-12 09h14.1m -27d31' 98d E 7.7
05-17 08h58.8m -17d22' 88d E 7.6
05-22 08h48.0m -08d49' 78d E 7.6
05-27 08h40.2m -01d49' 69d E 7.5
06-01 08h34.1m +03d54' 61d E 7.5
06-06 08h29.2m +08d38' 53d E 7.4
06-11 08h24.8m +12d38' 46d E 7.3
06-16 08h20.8m +16d05' 39d E 7.1
06-21 08h16.6m +19d07' 33d E 7.0
06-26 08h12.3m +21d51' 27d E 6.9
07-01 08h07.5m +24d22' 21d E 6.7
07-06 08h02.3m +26d42' 15d E 6.7
07-12 07h56.7m +28d52' 11d E 6.7

C/1998 T1 (LINEAR)

Date(00UT) R.A. (2000) Dec El Sky Mag
05-07 23h36.5m -04d04' 53d M 11.5
05-12 23h35.9m -04d44' 58d M 11.2
05-17 23h34.7m -05d33' 64d M 11.0
05-22 23h32.6m -06d36' 69d M 10.7
05-27 23h29.3m -07d58' 76d M 10.4
06-01 23h24.4m -09d45' 82d M 10.1
06-06 23h16.9m -12d09' 90d M 9.8
06-11 23h05.6m -15d28' 98d M 9.4
06-16 22h47.9m -20d06' 108d M 9.0
06-21 22h18.7m -26d42' 121d M 8.6
06-26 21h27.6m -35d32' 137d M 8.2
07-01 19h57.8m -44d36' 153d M 8.0
07-06 17h54.3m -47d47' 152d E 8.0
07-11 16h12.9m -43d42' 136d E 8.3

ELEMENTS

Object: Lee ^LINEAR (T1)
Peri. Date: 1999 07 11.1657 ^1999 06 25.2578
Peri. Dist (AU): 0.708308 AU ^1.468118 AU
Arg/Peri (2000): 040.6689 deg. ^ 226.3361 deg.
Asc. Node (2000): 162.6375 deg. ^ 153.3540 deg.
Incl (2000): 149.3558 deg. ^170.1601 deg.
Eccen: 1.00 ^0.99915
Orbital Period: Long Period ^71,000 years
Ref: MPC 34421 ^MPC 33451
Epoch: 1999 07 11 ^1999 01 22
Absol. Mag/"n": 7.0/4.0 ^7.8/4.0

Don's Comet Hunting Hours

Comet Hunting Hours 1975-1998: **6468.00**
Additional hrs. thru April 1999: **50.50**
Total hours at last discovery (10-8-94): **5589.00**
Least hours in any month since I began comet hunting
on 1/1/75: **4.00** (02/98), **4.50** (01/86), **5.50** (02/80)
Most hours in any month since I began comet hunting: **69.25** (05/76), **63.00** (05/78).

CC250.TXT 05-08-99 Don Machholz (530) 346-8963

Space Update

Gathered by Don Lynn from NASA and other sources

(To find out more on these topics, or those of past months' columns, through the World Wide Web, send your Web browser to our OCA website: <http://www.chapman.edu/oca/>, and select Space Update Online.)

Mars Global Surveyor (MGS) - was reported in last month's column to have suffered a lock-up of the arm holding the high-gain antenna. The arm still will not flex beyond the lock-up point. In the current position of the arm, MGS points at Mars to take data while the antenna points at Earth until next February, so mapping of Mars has resumed. After February, the geometry of the planets will change so that is no longer possible. Spacecraft controllers are working on plans to try to free the arm, or change geometry or timing of data gathering by February.

MGS's magnetometer discovered banded patterns of magnetic fields on the Martian surface, with adjacent bands having opposite magnetization. This resembles magnetic bands on Earth's ocean floors, caused by the Earth's magnetic field reversing over millions of years, as lava formed new sea floor as it welled up from a rift. If this is how the features on Mars formed, it is evidence that Mars had 1) crustal spreading from lava, 2) a stronger magnetic field when this spreading occurred, 3) a periodically reversing magnetic field, and 4) a hotter (than now) molten core of metal to create that stronger reversing magnetic field. It is possible, however, that there is an alternate explanation for the magnetic bands, such as fracturing and stretching of an already magnetized surface. Any crustal spreading, as well as all tectonic activity, seems to be extinct now on Mars. Observation of the magnetic bands was possible by the aerobraking or dipping barely into the upper atmosphere to alter MGS's orbit. That low altitude allowed MGS to drop under Mars's ionosphere, which interferes with the most sensitive of magnetic measurements. The final mapping orbit is too high into the ionosphere to observe the bands.

MGS's magnetic map may help solve another mystery—the origin of a striking difference in appearance between the smooth, sparsely-cratered northern lowlands of Mars and the heavily-cratered southern highlands. The northern regions are largely free of magnetism, indicating it formed after the core dynamo died out. An area in the southern highlands, which has the most heavily-cratered and unmodified crust, was found to have the most prominent magnetic bands.

The Martian magnetic bands are wider than those on Earth, indicating that the crust spread faster, or the magnetic field of the planet reversed more slowly. The bands are approximately east-to-west, and are about 100 miles wide and 600 or more miles long. To confirm the spreading theory of formation, scientists will need to find a point of symmetry, where the spreading originated, such as is found in the middle of the Earth's ocean spreading regions.

Galileo (Jupiter mission) - Remember last month in this column when we learned that Galileo had been reprogrammed to fix itself instead of going into safe mode when the erroneous power reset problem occurs, which has happened every few months? Just before the flyby of Callisto in May, the same glitch occurred twice, and would have wiped out all observations during the flyby, except the new software in Galileo's computers fixed the problem and resumed observations without missing anything. The flyby studied the size distribution of Callisto's craters, and is studying one known fresh crater, named Bran, in hopes of determining the chemical composition of material thrown from beneath the surface when the impact formed Bran. In addition, more measurements of the moon's extremely thin atmosphere were made to help determine composition.

The Galileo fly-by of Callisto is the first of four designed to modify the spacecraft's orbit so that it approaches Jupiter more closely, and therefore crosses Io's orbit, the moon nearest to Jupiter. Galileo has not approached Io's orbit since the day it went into orbit about Jupiter. On that day tape recorder problems prevented making any observations of Io, so all observations of Io have been from great distances. This change in orbit has been saved until the end of the mission because the radiation belt at Io is strong enough that long exposures to the radiation may damage Galileo. The plan is to attempt two flybys of Io, then end the mission. However, if funding can be obtained and Galileo is still functioning, JPL plans to continue taking fields and particles measurements, though no more pictures.

Galileo's observations of Io are planned to study the volcanoes, of which there are dozens, which are caused by the heating generated by flexing the solid surface up to 100 yards by the monstrous tidal forces. The spacecraft will pass so close to Io that images will have the resolution of objects as small as 20 feet. Also, the spacecraft will study the belt of sulfurous

gas surrounding Io's orbit and the huge electrical current (constituting 2 trillion watts) flowing from Io to Jupiter, due to the generating action of Jupiter's spinning magnetic field. The planned orbit will fly Galileo through the plume of volcano Pillan Patara.

Space Shuttle (STS) - Discovery is visiting the International Space Station on the 10-day mission STS-96, taking a 3-nation crew of 4 men and 3 women, along with 5000 pounds of supplies, to the station. The mission is scheduled to launch May 27 (as we go to press), so it should be ending approximately when you read this. The mission was delayed to repair damage to the insulation on the external tank caused by a hailstorm. Technicians have repaired similar damage once before, in 1995, but that time it was caused by woodpeckers rather than hail. Astronauts on this mission are installing equipment and conducting a spacewalk to attach a crane to the station for future assembly. Since the crane has to work in zero (or micro) gravity, it does not work like Earth-bound cranes. Permanent occupation of the station will have to wait until after the launch of the crew quarters module planned later this year. The first occupation of those crew quarters is expected next March.

TERRIERS (ionosphere satellite) - was launched late the evening of May 17 into a polar orbit by a Pegasus rocket, which itself is launched by an L-1011 airplane. TERRIERS uses ultraviolet, radio, and visible light to map out in three dimensions chemicals and reactions in the Earth's atmosphere and ionosphere, the electrically charged region above the bulk of atmosphere. What makes this science-packed mission unusual is that the satellite was built by more than 60 students and faculty members of Boston University, and will be run by students at an on-campus mission control center. TERRIERS allegedly stands for Tomographic Experiment using Radiative Recombinative Ionospheric Extreme ultraviolet and Radio Sources, but is actually a blatant promotion of the Boston University mascot. As we go to press, report is that TERRIERS failed to orient itself with its solar panels toward the Sun, so its batteries ran down. A recovery team has been formed to develop a plan to return the satellite to operation.

Leonids (meteor shower) - were the topic of a conference held last month in Manhattan Beach, CA. About 100 satellite owners and operators at the conference reported no damage to their satellites from the Leonids meteor shower last November, although impacts were detected. At least two conference presenters predicted a storm-level concentration of meteoroids for this coming November. Scientists will repeat similar Leonid monitoring from the ground, aircraft, and satellites around the world.

JUNE'S FEATURED SPEAKER



Dr. Scott W. Teare

Department of Astronomy, University of Illinois

Dr. Teare received his doctorate in Condensed Matter Physics from the Guelph-Waterloo Programme for Graduate Work in Physics in 1991. He has designed instrumentation and simulation software for the nuclear industry in Canada and is now a research associate in the Astronomy Department of the University of Illinois developing a laser guide star adaptive optics system on the 100-inch Hooker telescope at the Mount Wilson Observatory. Dr. Teare is involved in educational outreach through the JPL and Mount Wilson Institute's Telescopes in Education Program and is developing photometry and imaging programs for use by its students.

On his talk to the OCA, Dr. Teare writes: the scientific effort needed to attain diffraction limited performance from meter class telescopes is comparable to that needed to build larger aperture telescopes. The advantage of working toward the goal of high resolution imaging in astronomy is that such instruments can be retrofitted to a larger number of existing telescopes; cost effectively returning them to scientific viability. Since the 1950s a number of successful instruments have been constructed and used on telescopes to provide near-diffraction limited performance. Today these instruments range from tip tilt systems, designed for use on small telescopes, to the natural and laser guide star adaptive optics systems used at professional observatories. The two adaptive optics systems operating at the Mount Wilson Observatory will be presented through a discussion of more commonly used CCD imaging techniques.

Do You Want To Look Thru the Mt Wilson 60" Telescope?

Does the thought of an image from a 60" telescope lighting up your eye also figuratively light up your eyes? Well, for a small fee, the Mt. Wilson 60" telescope is available to our group through the Mt. Wilson Institute.

The group fee is \$900 for a full night of viewing. The number in attendance is limited to 25. With 25, the individual fee is \$36; with 10, the fee would be \$90 each. The trade off is between cost and number of objects to be viewed. The targeted date is Saturday, October 9, a new moon night. We are making this available to club members first, and others if the numbers allow it. Here are some of the details.

- Gate opens ¼hr. before sunset then every hour for a couple of hours, then by request. There's a pay phone outside the parking lot gate, so you can call in. We leave by individual request.
- They supply 1 telescope operator and 1-2 docents for escorting, etc.
- The cassegrain f/16 focus is used. 2 eyepieces are provided (4" dia.). They have a 2" adapter. No filters are available, but visitors are free to bring their own. A 100mm eyepiece = 240x, with a 6mm pupil exit & the Field of View = 12 arc min; a 50mm eyepiece = 480x, with a 3mm pupil exit and a 6 arc minute FOV. Therefore, the best objects are: Planets, Planetary Nebulas, tight Star Clusters & other small, high surface brightness objects. This is not a "wide nebula" viewing setup. However, they can also do a slow scan for objects such as Orion Nebula.
- The scope has an f/5 newt. And f/30 coude that they don't offer. For newt. there is a platform that will hold at least 4 people, but no one's asked to use it that he knows. He doesn't know if there is an absolute rule on not using it.
- Signing a Release of Liability agreement is required.
- There is no prohibition against photography. People can also use their camera at infinity focus & handhold for a "thru the lens" shot of the planets, or piggyback on the 60".
- To show 25 people one object, a good ½hr. is usually needed, because a long stare up to a minute is allowed/encouraged.
- They don't guarantee the weather, however if the night is a bust they may offer another night.

If you are interested in reserving a spot for yourself, please contact Jay Glowacki at: jay.glowacki@aero.org or (310) 831-4199 (home, 6-9pm). We will need to know what your preference is for the quantity of people (and the fee) and what is your high & low group size that you will accept. If a number of people wish to be part of a smaller party, we may schedule another night or two. Sunday, September 5 (Labor Day weekend) is open (new moon is 9/9) and so is Saturday, December 11 (new moon is 12/7). Next year is another possibility. However, for October: first come, first served.

Creative students wanted by the Planetary Society for a student-created experiment to send on the JPL/NASA Mars Surveyor 2001 Lander mission. Students must be 18 or younger (pre- college only). The experiment may be incorporated in the mission's Mars Environmental Compatibility Assessment (MECA) experiment package. For more information on the project, named the NanoExperiment Challenge, visit the website <http://planetary.org/learn/nanoexp.html>. Application forms can be printed from the website and need to be returned by July 31, 1999. You may also contact Jeffrey Oslick at (262) 739-5100 or by email at tps.nanoexp@planetary.org.

ASTROLLANEOS

JPL Open House, June 5-6, 1999, 9 a.m. - 4 p.m. The Jet Propulsion Laboratory, an operating division of the California Institute of Technology, and a field center of the National Aeronautics and Space Administration, invites the public to its annual open house. Visitors will see exhibits, displays, demonstrations and presentations about space exploration of the past, present and future. Learn about planetary imaging, space robotics, spacecraft communications and tracking, and much more from the experts themselves. Children can participate in hands-on activities. Food, beverages and souvenirs will be available. Directions: Go to Pasadena. Take the 210 Freeway West (toward La Canada Flintridge), exit Berkshire/Oak Grove Drive, and follow the signs. JPL, 4800 Oak Grove Drive, Pasadena, CA 91109. Call (818) 354-4700 for more details.

The 1999 Astronomical League will be holding its 52nd annual convention, ASTROCON '99, "A Thousand Years of Stars & Space", at Eastern Washington University in Cheney, Washington, just outside Spokane, July 13th-17th 1999. This will be the first time in 10 years that the convention has been held in the Northwest and 8 years since being held on the West Coast! The long list of speakers includes Dr. F. Story Musgrave, Astronaut and HST primary repair mission specialist, Dr. Donald Parker, President of ALPO (Association of Lunar & Planetary Observers). Besides the speakers, there will also be many workshops and activities. For more info, check out the website: <http://www.SpokaneAstronomical.org/astrocon99>.

Outreach Opportunity!! You are WANTED at The Orange County Fair!!! Dates are: Friday, July 16, and Saturday, July 17. Come with or without telescopes. Contact Jim Benet for details at: 714-693-1639, or email at: jimbenet@csi.com

CLASSIFIEDS

Wanted: **85mm to 100mm refractor** (long barrel), with equatorial mount and tripod preferred, and eyepieces. Talk to my machine, please, Carl Berryman, at 949-724-9812.

Free: **8-inch mirror blank and tool (partially ground)**. Cleaning out garage, if U can use it, U can have it. Email Jaxdon@earthlink.net or call (949) 768-6602.

For Sale: a **"heavy-duty" Meade tripod** for a 12-inch LX200, \$300.00 obo. Contact: Jim Leonard, P.O. Box 1526, Inyokern, CA, 93527-1526. (760) 377-3474. Email: supersaw@ridgecrest.ca.us.

ASTRONOMER

NEWSLETTER OF THE
ORANGE COUNTY ASTRONOMERS
 P.O. BOX 1762
 COSTA MESA, CA 92628

**DO NOT FORWARD
 RETURN SERVICE
 REQUESTED**

Nonprofit Organization
 U.S. Postage
PAID
 Garden Grove, CA
 PERMIT NO. 15

**DATED MATERIAL
 DELIVER PROMPTLY**

HANDY CONTACT LIST

President.....	Wayne Johnson.....	mrgalaxy@juno.com.....	909-653-8813
Vice Pres., Webmaster, Press Contact	Russell Sipe	sipe@sipe.com	714-281-0651
Treasurer	Charlie Oostdyk	charlie@cccd.edu	714-751-5381
Secretary.....	Bruce Crowe	714-971-8427
Trustee	Carol Copp.....	714-871-3430
Trustee, Beginner's Astronomy Class..	Don French.....	don667@aol.com	949-830-1167
Trustee	Jay Glowacki	jay.glowacki@aero.org.....	310-831-4199
Trustee, Sirius Astronomer Editor	Chris McGill.....	chrism31@gte.net	714-840-1026
Trustee.....	Gary Schones	gary378@aol.com	714-556-8729
Trustee, Media, Public Observatory.....	Bob Gill.....	rgill@fullerton.edu.....	714-525-0831
Trustee, Outreach Coordinator.....	Jim Benet.....	jimbenet@csi.com	714-693-1639

COMMITTEES, SUBGROUPS, AND FUNCTIONARIES

Sirius Astronomer Editor	Chris McGill.....	chrism31@gte.net	714-840-1026
22" Scope Maint., EOA, Research.....	Wayne Johnson.....	mrgalaxy@juno.com.....	909-653-8813
Anza Site Maintenance	Don Lynn.....	donald.lynn@usa.xerox.com	714-775-7238
Astrophysics SIG, Fundraising	Gordon Pattison	glpbmp@home.com	949-786-7079
Librarian.....	Cathy Bailey Weinberger	oneleaf@earthlink.net.....	949-768-5205
Membership, Pad Coordinator	Charlie Oostdyk	charlie@cccd.edu	714-751-5381
Beginner's Astronomy Class.....	Don French.....	don667@aol.com	949-830-1167
Planetarium Group	Don Prescott	KF6AGP@worldnet.att.net.....	714-997-8828
WAA Representative	Tim Hogle	tim.hogle@jpl.nasa.gov.....	626-357-7770
Silverado Star Parties.....	Robert Buchheim	rbuchheim@compuserve.com	949-459-7622
Star Member Training.....	Chuck Lodoza	flyman@ix.netcom.com	909-699-4699
Anza House Coordinator	Roy Weinberger.....	oneleaf@earthlink.net.....	949-768-5205
Telescope Loaner Program	Henry Fry.....	714-635-6056
OCA WEBSITE.....	http://www.chapman.edu/oca/		
STARLINE 24-HR. RECORDING.....			714-995-2203
ANZA OBSERVATORY.....			909-763-5152
PRESS CONTACT.....			714-281-0651